



Karlsruhe Institute of Technology

# **Module Handbook Information Engineering and Manage- ment ER 2006 (M.Sc.)**

Winter term 2010/2011

Long version

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**Faculty of Economics and Business Engineering  
Fakultät für Informatik**



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# 1 Structure of the Master Programme in Information Engineering and Management

The Master programme in *Information Engineering and Management* has 4 terms.

The terms 1 to 3 (7 - 9 when counting consecutively) 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, operations research, and law 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 (the 10-th term when counted consecutively) is reserved for the Master's 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.

Semester	1	2	3	4
Subject Informatics	Elective module (16 CP)	Elective module (17 CP)		
Subject Economics Sciences	Business Adm.1 (4,5 CP)	Business Adm.2 (4,5 CP)	Inter. disz. Sem (6 CP)	Master Thesis (30 LP)
	OR (4 CP)	Elective module(s) (2*10 CP)		
Subject Law	Law (6 CP)	Elective module (12 CP)		

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

### **Mandatory Modules (25 CP)**

The mandatory part of the programme consists of the following modules:

ModuleID	Module	Subject	Coordinator	CP
IW4WWIW1	Information Engineering and Management 1	Business Administration	Weinhardt	4.5
IW4WWIW2	Information Engineering and Management 2	Business Administration	Geyer-Schulz	4.5
IW4WWOR	Stochastic Models in Information Engineering and Management	Operations Research	Waldmann	4
IW4INJURA	Law	Law	Dreier	6
IW4IWSEM	Interdisziplinäre Seminar		Dreier	6
	Summe			25

Table 1: Mandatory Modules

### **Elective Modules: Business Administration/OR/Economics/Statistics**

The elective programme in the economic sciences consists either of one module with 20 CP or 2 modules with 10 CP each.

### **Elective Modules: Informatics**

The student has to choose one module with 16 CP and one module with 17 CP.

### **Elective Modules: Law**

The student has to choose law module(s)) with 12 CP.



## 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.

#### IW4INAALG - Advanced Algorithms (S. 18)

##### Anmerkungen

Currently, the course *Graph Algorithms* is not lectured.

The lecturer *Algorithm Design* is not offered anymore. The exam is possible for students who failed, only.

#### IW4WWORM - Operational Risik Management (S. 44)

##### Anmerkungen

The courses *Multidisciplinary Risk Research* [26328] and *Risk Management of Microfinance and Private Households* [26354] are offered irregularly. For further information, see: <http://insurance.fbv.uni-karlsruhe.de>

The course *Enterprise Risk Management* [26326] is extraordinarily held by Dr. Edmund Schwake in the winter term 2010/11.

#### wms - Workflowmanagement-Systems (S. 185)

##### Anmerkungen

The module is no longer offered, examination is possible until summer term 2011.

Starting with the winter term 2010/11 the new module *Konzepte und Anwendungen von Workflowsystemen* [IN4INKAW] (5 credit points) is offered.

#### vdh - Distributed Data Management (S. 178)

##### Anmerkungen

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

#### 26326 - Enterprise Risk Management (S. 79)

##### Anmerkungen

To attend the course please register at the secretary of the chair of insurance science.

In the winter term 2010/11 the course is held by Dr. Edmund Schwake.

#### praktvd - Practical Course Distributed Data Management (S. 131)

##### Anmerkungen

The course is not offered in WS 10/11

#### AlgAS - Algorithms for Ad-Hoc and Sensor Networks (S. 48)

##### Anmerkungen

The course is not lectured in the summer term 2010.

## 4 Mandatory Modules

### 4.1 All Subjects

#### Module: Information Engineering and Management 1 [IW4WWIW1]

**Coordination:** Christof Weinhardt  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Business Administration (obligatory)

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

#### Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26450	Principles of Information Engineering and Management (p. 86)	2/1	W	4,5	C. Weinhardt, J. Kraemer, C. van Dinther

#### Learning Control / Examinations

The overall grade is determined by the result of the course "Principles of Information Engineering and Management".

#### Conditions

The course "Principles of Information Engineering and Management" must be chosen.

#### Learning Outcomes

The compulsory module "Information Engineering and Management 1" introduces students to basic knowledge and skills in the field of Information Engineering and Management. The students should be able to understand and analyze the central role of information as an economic good, a production factor, and a competitive factor in today's societies. Students are supposed to be able to identify, evaluate, price, and market information goods with the help of the concepts and methods taught in the lecture. Furthermore, students learn basic aspects about information systems and information flows within and between organizations, as well as their design parameters.

#### Content

The module "Information Engineering and Management 1" comprises the lecture "Principles of Information Engineering and Management". There, 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.

#### Remarks

None.

## Module: Information Engineering and Management 2 [IW4WWIW2]

**Coordination:** Andreas Geyer-Schulz  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Business Administration (obligatory)

ECTS Credits	Cycle	Duration
4,5	Every 2nd term, Summer Term	1

Courses in module					
ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26500	Business Administration in Information Engineering and Management (p. 56)	2/1	S	4.5	A. Geyer-Schulz

### Learning Control / Examinations

The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the Prüfungsordnung für Informationswirtschaft and of assignments during the course as an "Erfolgskontrolle anderer Art" following §4, Abs. 2, 3 of the Prüfungsordnung für Informationswirtschaft.

### Conditions

None.

### Recommendations

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

### Learning Outcomes

The student is able to

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

### Content

In the module *Information Engineering and Management 2*, 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 SPO 2006 (M.Sc.)  
**Subject:** Operations Research (obligatory)

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

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25679	Markov Decision Models I (p. 164)	2/1/2	W	4	K. Waldmann

**Learning Control / Examinations**

The assessment of the module is in a written examination according to §4(2), 1 of the examination regulation of the Bachelor programme in Information Engineering and Management. 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 students are familiar with the modern concepts of stochastic modeling and are in a position to describe and to analyse simple systems in an adequate way.

**Content**

## Module: Contract Drafting and Internet Law [IW4INJURA]

**Coordination:** Thomas Dreier  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Law (obligatory)

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

Courses in module					
ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24671	Law of Contracts (p. 180)	2/0	S	3	P. Sester
24812	Internet Law (p. 95)	2/0	S	3	T. Dreier

### Learning Control / Examinations

The assessment of this module consists of:

1. a written examination (§ 4(2), 1 of the SPO) for the course "Law of Contracts" (see also the transition rule until the winter semester 2008/9)
2. a written examination (§ 4(2), 1 of the SPO) for the course "Internet Law" (see also the transition rule until the winter semester 2008/9)

The grade of the module is a credits weighted average of the grades.

### Conditions

The obligatory module law builds upon the legal lectures of the bachelor study course. The courses can be followed parallel to the courses of the elective modules.

The courses of the obligatory module law will introduce the students to the most important areas of information law.

### Learning Outcomes

The Students should be enabled to analyse and draft contracts, and to get acquainted with current legal issues that are raised by the use of the internet.

### Content

The obligatory module law depends the understanding of students of the legal issues of the information society.

### Remarks

Please note the following:

- During the transition period until the winter semester 2008/09 students can also replace the course "Law of Contracts" by the course "Computer contract law" (2 SWS, Semester: SS, 3 CP, lecturer Bartsch, Michael).

**Module: Interdisciplinary Seminar [IW4IWSEM]**

**Coordination:** Martina Zitterbart, Studiendekan (Fak. f. Wirtschaftswissenschaften)  
**Degree programme:** Informationswirtschaft SPO 2006 (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)
26530	Interdisciplinary Seminar in Information Engineering and Management (p. 92)	2	W/S	6	A. Geyer-Schulz, T. Dreier

**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 interdisciplinary seminar separately.

**Conditions**

Regulated in §14 of the examination regulation for the Master programme Information Engineering and Management.

**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 [IW4IWMATHESES]

**Coordination:** Studiendekan (Fak. f. Wirtschaftswissenschaften), Vorsitzender des Prüfungsausschusses  
**Degree programme:** Informationswirtschaft SPO 2006 (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 §15 of the examination regulation.

The requirements for the examiner are described in §6 (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 Informatics

#### Module: Advanced Algorithms [IW4INAALG]

**Coordination:** Dorothea Wagner  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Informatics

ECTS Credits	Cycle	Duration
16 oder 17	Every term	1

##### Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24171	Randomized Algorithms (p. 138)	2	W	4	T. Worsch
24123	Algorithm Engineering (p. 47)	2	W/S	4	P. Sanders, D. Wagner
24118	Algorithms for Visualization of Graphs (p. 51)	2	W/S	5	D. Wagner, R. Görke
xGraphAlgo	Graph Algorithms (p. 84)	2	W/S	4	D. Wagner
24109	Parallel Algorithms (p. 124)	2	W/S	4	P. Sanders
25708	Distributed Algorithms (p. 176)	3	W/S	5	H. Schmeck
25706	Nature-inspired Optimisation (p. 115)	2/1	W	5	S. Mostaghim, P. Shukla
24622	Algorithms in Cellular Automata (p. 50)	2/1	S	5	T. Worsch
24079p	Practical Course in Algorithm Design (p. 134)	4	W/S	5	P. Sanders, D. Wagner, M. Krug
24614	Algorithms for Planar Graphs (p. 49)	2/1	S	5	D. Wagner
AlgAS	Algorithms for Ad-Hoc and Sensor Net- works (p. 48)	2	S	4	B. Katz

#### Learning Control / Examinations

The assessment is described individually for each lecture within this module. The overall grade of the module will be the rounded average of the courses selected weighted by their respective credits.

#### Conditions

None.

#### Learning Outcomes

The Student should be able to evaluate the computational complexity of problems from different fields and apply appropriate solution algorithms. Besides algorithm design and theoretical analysis of algorithms with respect to running time and space consumption also issues like parallelism, different models of computation, implementation and experimental evaluation should be taken into account.

#### Content

In this module, modern and efficient algorithms and their design and analysis are presented in the context of various applications such as visualization, networks, parallel algorithms, distributed algorithms, sensor- and ad-hoc networks, nature-oriented techniques, quantum computing, coding and computer algebra.

#### Remarks

Currently, the course *Graph Algorithms* is not lectured.

The lecturer *Algorithm Design* is not offered anymore. The exam is possible for students who failed, only.

**Module: e-Collaboration [IW4INECOLL]**

**Coordination:** Andreas Oberweis  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Informatics

ECTS Credits	Cycle	Duration
16 oder 17	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25724	Database Systems and XML (p. 70)	2/1	W	5	A. Oberweis
25735	Document Management and Groupware Systems (p. 72)	2	S	4	S. Klink
25702	Algorithms for Internet Applications (p. 52)	2/1	W	5	H. Schmeck
25750	Semantic Web Technologies II (p. 141)	2/1	S	5	S. Agarwal, S. Grimm, E. Simperl, A. Harth
25722	Distributed Database Systems: Basic Technology for e-Business (p. 177)	2/1	S	5	A. Oberweis
kbse	Component Based Software Engineering (p. 97)	2	S	3	R. Reussner, M. Kuperberg, K. Krogmann
25760	Complexity Management (p. 59)	2/1	S	5	D. Seese
25788	Strategic Management of Information Technology (p. 167)	2/1	S	5	T. Wolf
25784	Management of IT-Projects (p. 101)	2/1	S	4	R. Schätzle
25770	Service Oriented Computing 1 (p. 151)	2/1	W	5	S. Tai
25070s	Seminar in Applied Informatics (p. 142)	2	W/S	4	A. Oberweis, H. Schmeck, D. Seese, R. Studer, S. Tai
25070p	Advanced Lab Applied Informatics (p. 129)	2	W/S	5	A. Oberweis, H. Schmeck, D. Seese, R. Studer, S. Tai
25764	IT Complexity in Practice (p. 102)	2/1	W	5	D. Seese, Kreidler
26458	Computational Economics (p. 61)	2/1	W	5	S. Caton, P. Shukla

**Learning Control / Examinations**

Students select courses with 16 or 17 ECTS credits in total.

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**

- A maximum of one seminar can be chosen.
- A maximum of one practical course can be chosen.

**Learning Outcomes**

Students can use languages and methods for planning and design of eCollaboration. They are able to evaluate, select and to use appropriate tools taking into account the current situation.

**Content**

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

## Module: Complex Internet Applications [IW4INIAPP]

**Coordination:** Hartmut Schmeck  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Informatics

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

### Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24604/24153	Advanced Web Applications (p. 46)	2/0	W/S	4	S. Abeck
25702	Algorithms for Internet Applications (p. 52)	2/1	W	5	H. Schmeck
24146	Ubiquitous Computing (p. 170)	2/0	W	4	M. Beigl
25748	Semantic Web Technologies I (p. 140)	2/1	W	5	R. Studer, S. Rudolph, A. Harth
25750	Semantic Web Technologies II (p. 141)	2/1	S	5	S. Agarwal, S. Grimm, E. Simperl, A. Harth
24304/24873	Practical Course Web Technologies (p. 133)	2/0	W/S	4	S. Abeck, Gebhart, Hoyer, Link, Pansa
25704	Organic Computing (p. 121)	2/1	S	5	H. Schmeck, S. Mostaghim
24124	Web Engineering (p. 182)	2/0	W	4	M. Nußbaumer
24149	Network and IT-Security Management (p. 117)	2/1	W	5	H. Hartenstein

### Learning Control / Examinations

The control of success is described in the lectures of this module.

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

### Conditions

Selected courses have to add up to at least 16 or 17 credit points.

Besides the listed courses you may choose a seminar or advanced lab on the topics of this module offered by one of the participating lecturers.

### Learning Outcomes

The Student should become acquainted with challenging internet technology applications, and should be able to apply useful tools and techniques to design an internet application, according to the requirement of a concrete section of application.

### Content

The lectures of this module, procure diverse knowledge about current techniques to configurate challenging applications in the internet and world wide web.

### Remarks

The list of lectures is temporarily.

## Module: Large-Scale Information and Knowledge Management [IW4INLIKM]

**Coordination:** Klemens Böhm  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Informatics

ECTS Credits	Cycle	Duration
16 oder 17	Every term	1

Courses in module						
ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)	
24647	Deployment of Database Systems (p. 65)	2/1	S	5	K. Böhm	
24114	Data Warehousing and Mining (p. 63)	2/1	W	5	K. Böhm	
vdh	Distributed Data Management (p. 178)	2/1	W	5	K. Böhm	
db_impl	Database Implementation and Tuning (p. 67)	2/1	S	5	K. Böhm	
wms	Workflowmanagement-Systems (p. 185)	2	W	3	J. Mülle	
24141	Information Integration and Web Portals (p. 88)	2	W	3	J. Mülle, Andreas Schmidt	
25742	Knowledge Discovery (p. 96)	2/1	W	5	R. Studer	
semis	Seminar Information Systems (p. 144)	2	W/S	4	K. Böhm	
25810	Practical Seminar Knowledge Discovery (p. 149)	2	S	4	R. Studer	
24292	Practical Course Database Systems (p. 68)	2	W	4	K. Böhm	
24874	Practical Course Data Warehousing and Mining (p. 130)	2	S	4	K. Böhm	
praktvd	Practical Course Distributed Data Management (p. 131)	2	W	4	K. Böhm	
24605	Data Privacy Protection in Interconnected Information Systems (p. 71)	2	S	3	K. Böhm, Buchmann	
24109	Moving Objects Databases (p. 66)	2	W	3	K. Böhm	
24111	Mechanisms and Applications of Workflow Systems (p. 98)	3	W	5	J. Mülle, Silvia von Stackelberg	

### Learning Control / Examinations

The assessment is described individually for each lecture within this module. The overall grade of the module will be the rounded average of the courses selected weighted by their respective credits.

### Conditions

This module presupposes knowledge on database systems and knowledge management, such as the content of lectures "Communications and Database Systems" and "Knowledge Management". The courses in this module assume the following basic knowledge: data models, database design, relational algebra, database-application development and declarative query languages, transactions, ontology-based knowledge management, information retrieval, intelligent document management, communities of practice, skill management, personal knowledge management and case-based reasoning (CBR).

The students are strongly advised to select this module only if they are familiar with the topics mentioned. Alternatively, it is advised to select the module "Advanced Concepts of Information and Knowledge Management" which does not presuppose this knowledge.

- This module cannot be chosen in combination with module "Advanced Concepts of Information and Knowledge Management".
- At least one of the following lectures have to be selected: "Deployment of Database Systems", "Data Warehousing and Mining", "Database Implementation and Tuning".
- No course can be chosen which has been absolved in the undergraduate studies
- Maximally one seminar can be chosen.
- Maximally one practical course can be chosen.
- You may not choose both "Data Warehousing and Mining" and "Knowledge Discovery", only one of the two. Further, it is not possible to choose one of these lectures if you have chosen the other one within another module.

**Learning Outcomes**

The students should

- be able to work scientifically in the field of information and knowledge management and know the different aspects of this field,
- be able to develop complex database applications on their own,
- be able to manage and lead projects of unpredictable complexity in the field of information and knowledge management
- be able to explain and discuss non-trivial aspects of the topics covered in this module with other experts and people without a deep knowledge of information and knowledge management.

**Content**

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

## Module: Advanced Concepts of Information and Knowledge Management [IW4INLIK1M1]

**Coordination:** Klemens Böhm  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Informatics

<b>ECTS Credits</b> 16 oder 17	<b>Cycle</b> Every term	<b>Duration</b> 2
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### Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25740	Knowledge Management (p. 184)	2/1	W	5	R. Studer
24114	Data Warehousing and Mining (p. 63)	2/1	W	5	K. Böhm
vdh	Distributed Data Management (p. 178)	2/1	W	5	K. Böhm
db_impl	Database Implementation and Tuning (p. 67)	2/1	S	5	K. Böhm
wms	Workflowmanagement-Systems (p. 185)	2	W	3	J. Mülle
25742	Knowledge Discovery (p. 96)	2/1	W	5	R. Studer
25762	Intelligent Systems in Finance (p. 90)	2/1	S	5	D. Seese
semis	Seminar Information Systems (p. 144)	2	W/S	4	K. Böhm
25810	Practical Seminar Knowledge Discovery (p. 149)	2	S	4	R. Studer
24874	Practical Course Data Warehousing and Mining (p. 130)	2	S	4	K. Böhm
24605	Data Privacy Protection in Interconnected Information Systems (p. 71)	2	S	3	K. Böhm, Buchmann
24516	Database Systems (p. 69)	2/1	S	4	K. Böhm
24111	Mechanisms and Applications of Workflow Systems (p. 98)	3	W	5	J. Mülle, Silvia von Stackelberg

### Learning Control / Examinations

The assessment is described individually for each lecture within this module. The overall grade of the module will be the rounded average of the courses selected weighted by their respective credits.

The assessment of the course *Database Systems* follows Sec. 4 Subsec. 2 No. 3 of the study and examination regulations.

### Conditions

- This module cannot be chosen in combination with module *Large-Scale Information and Knowledge Management*.
- The lectures *Database Systems* and *Knowledge Management* have to be selected if they have not yet been selected and assessed.
- Maximally one seminar can be chosen.
- Maximally one practical course can be chosen.
- You may not choose both *Data Warehousing and Mining* and *Knowledge Discovery*, only one of the two. Further, it is not possible to choose one of these lectures if you have chosen the other one within another module.

### Learning Outcomes

The students should

- be able to work scientifically in the field of information and knowledge management and know the different aspects of this field,
- be able to develop complex database applications on their own,
- be able to manage and lead projects of unpredictable complexity in the field of information and knowledge management,
- be able to explain and discuss non-trivial aspects of the topics covered in this module with other experts and people without a deep knowledge of information and knowledge management.

### Content

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

**Module: Advanced Infrastructures [IW4INNET]**

**Coordination:** Martina Zitterbart  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Informatics

ECTS Credits	Cycle	Duration
16 oder 17	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24074	Networked IT-Infrastructures (p. 175)	2/1	W	5	W. Juling
24128	Telematics (p. 169)	2	W	4	M. Zitterbart
24132	Multimedia Communications (p. 114)	2/0	W	4	R. Bless
24674	Next Generation Internet (p. 118)	2/0	S	4	R. Bless
24643	Mobile Communications (p. 109)	2/0	S	4	O. Waldhorst
24601	Network Security: Architectures and Protocols (p. 116)	2/0	S	4	M. Schöller
24149	Network and IT-Security Management (p. 117)	2/1	W	5	H. Hartenstein
24110	High Performance Communication (p. 87)	2/0	W	4	M. Zitterbart
24669	Modeling and Simulation of Networks and Distributed Systems (p. 110)	2/0	S	4	H. Hartenstein
24146	Ubiquitous Computing (p. 170)	2/0	W	4	M. Beigl
24104	Wireless Sensor-Actuator-Networks (p. 73)	2/0	W	4	M. Zitterbart
24074s	Seminar in Telematics (p. 143)	2	W/S	4	M. Zitterbart, H. Hartenstein
PrakATM	Lab Advanced Telematics (p. 128)	2	W/S	5	M. Zitterbart
24519	Introduction in Computer Networks (p. 76)	2/1	S	4	H. Hartenstein

**Learning Control / Examinations**

The assessment is described individually for each lecture within this module. The overall grade of the module will be the rounded average of the courses selected weighted by their respective credits.

**Conditions**

None.

**Learning Outcomes**

The student will

- study design principles of communication systems, apply them in a new context, and be able to identify flaws of existing systems
- be able to evaluate the performance potential of protocols, networks, and architectures
- master advanced protocols, architectures, and algorithms of communication networks and systems

**Content**

Within this module, different aspects of communication systems are examined in more detail. Besides requirements and solutions for multimedia, mobile and secure communication, knowledge about the deployment and management of large communication networks and systems are offered to the student. An important subject hereby is the evaluation and mastery of the applied architectures, protocols, and algorithms. In addition, the lectures offer room for current and future developments in the area of Telematics.



**Module: Software Systems [IW4INSW]**

**Coordination:** Walter F. Tichy, Ralf Reussner  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Informatics

ECTS Credits	Cycle	Duration
16 oder 17	Every term	2

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24112	Multicore Computers and Computer Clusters (p. 113)	2	W	4	V. Pankratius
24660	Software Development for modern, parallel platforms (p. 156)	2	S	3	V. Pankratius, W. Tichy, Frank Otto
24076	Software Engineering II (p. 157)	3/1	W	6	R. Reussner, W. Tichy
24164	Software-Evolution (p. 155)	2	W	3	K. Krogmann, Mircea Trifu

**Learning Control / Examinations**

See the assessment of each course of this module. The overall grade is computed by weighting the grade of each course with its credits and computing the average of the weighted grades.

**Conditions**

None.

**Learning Outcomes**

The student will be enabled to systematically plan, build and maintain large software systems. To this end, suitable methods and tools will be presented.

**Content**

Subject of the module is the planing, development, and maintenance of large software systems.

**Remarks**

The lecture *Component Based Software Engineering* is not offered any longer, examination is possible until winterterm 2011/12.  
 The lecture *Model Driven Software Development* is not offered any longer, examination is possible until winterterm 2010/11.  
 The lecture *Software Architecture* is not offered any longer, examination is possible until summerterm 2011.  
 The lecture *Softwaretechnik* will not be offered after the summer term 09. The exam of the lecture will be offered in the summer term 2011 for the last time.

**Module: Service Technologies [IW4INSER]**

**Coordination:** Stefan Tai  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Informatics

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

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25770	Service Oriented Computing 1 (p. 151)	2/1	W	5	S. Tai
25772	Service Oriented Computing 2 (p. 152)	2/1	S	5	S. Tai, R. Studer
25776	Cloud Computing (p. 58)	2/1	W	5	S. Tai, Kunze
25774	Web Service Engineering (p. 183)	2/1	S	5	C. Zirpins
26470	Seminar Service Science, Management & Engineering (p. 146)	2	W/S	4	S. Tai, C. Weinhardt, G. Satzger, R. Studer
25820	Lab Class Web Services (p. 132)	2	W	4	S. Tai, R. Studer, G. Satzger, 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 of the course.

**Conditions**

The course *Service-oriented Computing 1* [25770] has to be attended.

It is recommended to combine the module *Service Technologies* with the modules *Service Engineering* and *Service Management*.

**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 *Service Technologies* covers knowledge about designing and implementing service-oriented architectures. In this context several 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. In addition, an overview of existing development methodologies and tools is given.
- The module introduces technologies for improving collaboration between service requesters and providers, and it gives use cases for applying these technologies.
- Concepts and technologies for the distributed realization of highly scalable Web Services are presented.

## 6 Law

### Module: Law of the Information Economy [IW4INJUIINWI]

**Coordination:** Thomas Dreier  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Law

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

#### Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24167	Employment Law I (p. 53)	2	W	3	A. Hoff
24668	Employment Law II (p. 54)	2	S	3	A. Hoff
24168	Tax Law I (p. 162)	2/0	W	3	D. Dietrich
24646	Tax Law II (p. 163)	2/0	S	3	D. Dietrich
24650	Civil Law for Advanced (p. 179)	2/0	S	3	P. Sester
24583	Computer Contract Law (p. 181)	2/0	S	3	M. Bartsch
24121	Copyright (p. 173)	2/0	W	3	T. Dreier
24574	Patent Law (p. 125)	2/0	S	3	N.N.
24136/24609	Trademark and Unfair Competition Law (p. 103)	2/0	W/S	3	Y. Matz, P. Sester
24082	Public Media Law (p. 119)	2	W	3	C. Kirchberg
24632	Telecommunications Law (p. 168)	2/0	S	3	I. Spiecker genannt Döhmann
24666	European and International Law (p. 82)	2/0	S	3	I. Spiecker genannt Döhmann
24815	(p. 85)	2/0	W/S	3	K. Melullis

#### Learning Control / Examinations

The module exam consists of 4 written exams of 45 minutes each (§ 4 (2) 1 SPO. Each of the 4 exams covers one of the four courses which the student has selected within this module.

The overall grade of the module is calculated on the basis of the 4 grades, each of them weighed according to their respective CPs.

#### Conditions

The students can freely choose four of the courses assigned to this module each comprising 3 CP.

#### Learning Outcomes

The student

- solves complex legal problems that appear in the information society.

#### Content

By choosing the module *Law of the Information Economy*, the Student should gain a broad overview. Contrary to the other two modules *Law of Information Companies* and *Law of the Information Society*, which both aim at greater profiling and deepening of particular aspects, the module *Law of the Information Economy* aims at an all englobing overview. Students choosing this module shall be able to solve complex legal problems that appear in the information society.

#### Remarks

None.

## Module: Law of the Information Society [IW4INJURDIG]

**Coordination:** Thomas Dreier  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Law

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

### Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24121	Copyright (p. 173)	2/0	W	3	T. Dreier
24574	Patent Law (p. 125)	2/0	S	3	N.N.
24136/24609	Trademark and Unfair Competition Law (p. 103)	2/0	W/S	3	Y. Matz, P. Sester
24082	Public Media Law (p. 119)	2	W	3	C. Kirchberg
24632	Telecommunications Law (p. 168)	2/0	S	3	I. Spiecker genannt Döhmann
24666	European and International Law (p. 82)	2/0	S	3	I. Spiecker genannt Döhmann
24815	(p. 85)	2/0	W/S	3	K. Melullis

### Learning Control / Examinations

The module exam consists of 4 written exams of 45 minutes each (§ 4 (2) 1 of the SPO). Each of the 4 exams covers one of the four courses which the student has selected within this module. The overall grade of the module is calculated on the basis of the 4 grades, each of them weighed according to their respective CPs.

### Conditions

The modul *Law of the Information Society* builds on the mandatory lectures *Contracting* and *Internet Law*. Students can choose 4 courses (3 CP) that form part of the module.

### Learning Outcomes

By choosing the module *Law of the Information Society*, the Student should gain a broad overview of the Law of the Information Society. Contrary to the module *Law of Information Economies* students can gain a profile and specialization on aspects which focus on the information society as a whole rather than on individual enterprises. Rather, the focus is on general issues and trends which are raised by the development of the information society as a whole and which can be discussed even before they become of practical importance for individual market participants. Students choosing this module shall be able to recognize new trends and discuss their legal implications.

### Content

The module comprises courses which cover general legal aspects of the information economy and the information society. The focus is less on issues which affect individual businesses, but rather on general issues affecting the mechanisms and development of the information society as such. Here, the legal framework is determined by national, but also by European law. The complexity of legal questions raised in this respect therefore results less out of a close-up, detailed perspective, but rather from the broad effects which these issues and trends have with regard to the future of the information society as such.

### Remarks

None.

## Module: Law for Information Companies [IW4INJURDIU]

**Coordination:** Peter Sester  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Law

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

Courses in module					
ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24167	Employment Law I (p. 53)	2	W	3	A. Hoff
24668	Employment Law II (p. 54)	2	S	3	A. Hoff
24168	Tax Law I (p. 162)	2/0	W	3	D. Dietrich
24646	Tax Law II (p. 163)	2/0	S	3	D. Dietrich
24650	Civil Law for Advanced (p. 179)	2/0	S	3	P. Sester
24583	Computer Contract Law (p. 181)	2/0	S	3	M. Bartsch

### Learning Control / Examinations

The module exam consists of 4 written exams of approx. 45 minutes each according to section 4 subsection 2 no. 1 study and examination regulations. Each of the 4 exams covers one of the four courses which the student has selected within this module. The overall grade of the module is calculated on the basis of the 4 grades, each of them weighed according to their respective CPs.

### Conditions

The module *Law for Information Companies* follows up on the compulsory courses *Form of Contract* and *Internet Law* and the courses which address the general legal basis of Corporate Law as well as the sector-specific problems of information enterprises. The students can freely choose four of the courses assigned to this module each comprising 3 CP.

### Learning Outcomes

To begin with, the student should gain a general overview of the Corporate Law, as a great amount of legal problems related to the information enterprises are not sector-specific. Furthermore, the specific questions will be dealt with which follow from the character of the product information and transport as well as allocation of information. The student should be enabled to understand more complex legal and economic coherences in the area of the Law of information enterprises.

### Content

The courses about the Law of information enterprises firstly cover the topic of Corporate Law in general, as a great part of the legal problems which arise in relation to information enterprises correspond with the general Corporate Law, which is mostly not sector-specific. Furthermore, the specific questions will be dealt with, which follow from the character of the product information and transport as well as allocation of information. The aim of the lectures on information enterprises is to give a basic understanding of the regulatory surrounding and the business structure within which the future alumni of the study course information enterprises will range in their everyday business life.

## 7 Economic Sciences

### Module: Information, Market, and Service Engineering [IW4WWIMSE]

**Coordination:** Andreas Geyer-Schulz, Christof Weinhardt  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Economic Sciences

ECTS Credits	Cycle	Duration
20	Every term	1

Courses in module					
ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26460	Market Engineering: Information in Institutions (p. 104)	2/1	S	5	C. Weinhardt, J. Kraemer, C. van Dinther, S. Caton
26452	Management of Business Networks (p. 100)	2/1	W	5	C. Weinhardt, J. Kraemer
26454	eFinance: Information Engineering and Management for Securities Trading (p. 75)	2/1	W	5	C. Weinhardt, R. Riordan
26456	Business Models in the Internet: Planning and Implementation (p. 83)	2/1	S	5	C. Weinhardt, C. Holtmann, C. van Dinther
26502	Electronic Markets (Principles) (p. 77)	2/1	W	5	A. Geyer-Schulz
26508	Customer Relationship Management (p. 62)	2/1	W	5	A. Geyer-Schulz
26506	Personalization and Recommender Systems (p. 126)	2/1	S	5	A. Geyer-Schulz
26518	Social Network Analysis in CRM (p. 158)	2/1	W/S	5	B. Hoser
26510	Master Seminar in Information Engineering and Management (p. 108)	2	W	3	A. Geyer-Schulz
26510p	Practical Course in Information Engineering and Management (Master) (p. 107)	0*	W	2	A. Geyer-Schulz
SemIW	Seminar Information Engineering and Management (p. 145)	2	W/S	4	C. Weinhardt
26477	Practical seminar Information Engineering and Management (p. 148)	0*	W/S	1	C. Weinhardt

#### Learning Control / Examinations

The assessment is described for every course in this module. The overall score of the module is composed of the single scores of the courses weighted with their credits.

#### Conditions

- The course *Market Engineering* [26460] has to be taken.
- No more than two of the courses *Management of Business Networks* [26452], *eFinance: Information Engineering and Management for Securities Trading* [26454] and *Customer Relationship Management* [26508] may be taken.
- The course [26510p] could only be taken additionally to the course [26510].
- The practical seminar [26478] is a supplement to the course seminar Information Engineering and Management [SemIW] and it can only be taken in conjunction with the course [26474].

#### Learning Outcomes

The student should learn to

- understand and analyze the role of information with its distinct facets (as digital information good, as competitive factor,...) and their impacts on entrepreneurial behaviour and economic developments
- develop and implement new products, services and markets in consideration of the technological progresses of information and communication technology and the increasing economic networking
- restructure and develop new business processes under those conditions

- design and construct innovative business models and new forms of organisation in companies and company networks
- understand and analyze the emergence of new forms of competition

### **Content**

The module Information, Market, and Service Engineering treats different aspects of information (digital economic good, competitive factor, ...) and puts them into a business and economic context. Furthermore, this module addresses the challenges of creating new kinds of products, services, markets, and market information services in the context of new developed information and communication technologies. These developments offer the opportunity to develop new and innovative business processes, business models, forms of organization, markets, and competition. These issues are addressed in the courses of this module.

**Module: Information and Market Engineering [IW4WWIMSE1]**

**Coordination:** Christof Weinhardt, Andreas Geyer-Schulz  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Economic Sciences

<b>ECTS Credits</b> 10	<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)
26460	Market Engineering: Information in Institutions (p. 104)	2/1	S	5	C. Weinhardt, J. Kraemer, C. van Dinther, S. Caton
26454	eFinance: Information Engineering and Management for Securities Trading (p. 75)	2/1	W	5	C. Weinhardt, R. Riordan
26502	Electronic Markets (Principles) (p. 77)	2/1	W	5	A. Geyer-Schulz
26510	Master Seminar in Information Engineering and Management (p. 108)	2	W	3	A. Geyer-Schulz
26510p	Practical Course in Information Engineering and Management (Master) (p. 107)	0*	W	2	A. Geyer-Schulz
SemIW	Seminar Information Engineering and Management (p. 145)	2	W/S	4	C. Weinhardt
26477	Practical seminar Information Engineering and Management (p. 148)	0*	W/S	1	C. Weinhardt

**Learning Control / Examinations**

The assessment is described for every course in this module. The overall score of the module is composed of the single scores of the courses weighted with their credits.

**Conditions**

- The course *Market Engineering* [26460] has to be taken.
- The course [26510p] could only be taken additionally to the course [26510].
- The practical seminar [26478] is a supplement to the course seminar Information Engineering and Management [26474] and it can only be taken in conjunction with the course [26474].

**Learning Outcomes**

The student should learn to

- develop and implement new markets with regards to the technological progresses of information and communication technology and the increasing economic networking
- restructure and develop new business processes in markets under those conditions
- design and construct innovative business models and new forms of organisation for market provider or networks of market provider
- elaborate solutions in a team

**Content**

The courses of this module addresses the challenges of creating new kinds of markets and market information services in the context of new developed information and communication technologies. Innovative business processes, business models, form of organization and competition on and between market platforms are the major topics.



**Module: Service Engineering [IW4WWIMSE2]**

**Coordination:** Christof Weinhardt, Andreas Geyer-Schulz  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Economic Sciences

<b>ECTS Credits</b> 10	<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)
26508	Customer Relationship Management (p. 62)	2/1	W	5	A. Geyer-Schulz
26456	Business Models in the Internet: Planning and Implementation (p. 83)	2/1	S	5	C. Weinhardt, C. Holtmann, C. van Dinther
26460	Market Engineering: Information in Institutions (p. 104)	2/1	S	5	C. Weinhardt, J. Kraemer, C. van Dinther, S. Caton
26506	Personalization and Recommender Systems (p. 126)	2/1	S	5	A. Geyer-Schulz
26518	Social Network Analysis in CRM (p. 158)	2/1	W/S	5	B. Hoser
26510	Master Seminar in Information Engineering and Management (p. 108)	2	W	3	A. Geyer-Schulz
26510p	Practical Course in Information Engineering and Management (Master) (p. 107)	0*	W	2	A. Geyer-Schulz
SemIW	Seminar Information Engineering and Management (p. 145)	2	W/S	4	C. Weinhardt
26477	Practical seminar Information Engineering and Management (p. 148)	0*	W/S	1	C. Weinhardt
26470	Seminar Service Science, Management & Engineering (p. 146)	2	W/S	4	S. Tai, C. Weinhardt, G. Satzger, R. Studer

**Learning Control / Examinations**

The assessment is described for every course in this module. The overall score of the module is composed of the single scores of the courses weighted with their credits.

**Conditions**

- The course [26510p] could only be taken additionally to the course [26510].
- The practical seminar [26478] is a supplement to the course seminar Information Engineering and Management [26474] and it can only be taken in conjunction with the course [26474].

**Recommendations**

- It is recommended to combine the module *Service Engineering* with the module *Service Management* and the computer science module *Service Technologies*.
- It is recommended to attend course *Customer Relationship Management* [26508], if it has not already been attended during the bachelor studies.

**Learning Outcomes**

The student should learn to

- develop and implement new markets with regards to the technological progresses of information and communication technology and the increasing economic networking
- restructure and develop new business processes in markets under those conditions
- understand service competition as a sustainable competitive strategy and understand the effects of service competition on the design of markets, products, processes and services.

### **Content**

This module addresses the challenges of creating new kinds of products, processes, services, and markets from a service perspective in the context of new developed information and communication technologies and the globalization process. The module describes service competition as a business strategy in the long term that leads to the design of business processes, business models, forms of organization, markets, and competition. Real-world examples from e-Finance, personalized services, recommender systems and social platforms are presented in the courses.

**Module: Service Management [IW4WWSER1]**

**Coordination:** Gerhard Satzger, Christof Weinhardt  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Economic Sciences

<b>ECTS Credits</b> 10	<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)
26484	Business and IT Service Management (p. 55)	2/1	W	5	G. Satzger
26466	eServices (p. 81)	2/1	S	5	C. Weinhardt, G. Satzger
26452	Management of Business Networks (p. 100)	2/1	W	5	C. Weinhardt, J. Kraemer
26468	Service Innovation (p. 150)	2/1	S	5	G. Satzger, A. Neus
26470	Seminar Service Science, Management & Engineering (p. 146)	2	W/S	4	S. Tai, C. Weinhardt, G. Satzger, R. Studer
SemIW	Seminar Information Engineering and Management (p. 145)	2	W/S	4	C. Weinhardt
26477	Practical seminar Information Engineering and Management (p. 148)	0*	W/S	1	C. Weinhardt

**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 *Business and IT Service Management* [26484] is mandatory.
- It is recommended to attend course *eServices* [26466], if it has not already been attended during the bachelor studies.
- The *practical seminar* [26478] is a supplement to the course *seminar Information Engineering and Management* [SemIW] and it can only be chosen in conjunction with the course.

**Learning Outcomes**

The student should learn to

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

**Content**

The module service management addresses the basics of developing and managing IT-based services. The lectures contained in this module teach the basics of developing and managing IT-based services and the application of OR methods in the field of service management. Moreover, students learn to 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: Marketing [IW4WWMAR]**

**Coordination:** Wolfgang Gaul  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Economic Sciences

<b>ECTS Credits</b> 20	<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)
25154	Modern Market Research (p. 111)	2/1	S	5	W. Gaul
25156	Marketing and Operations Research (p. 106)	2/1	S	5	W. Gaul
25158	Corporate Planning and Operations Research (p. 172)	2/1	W	5	W. Gaul
25171	Data Analysis and Operations Research (p. 64)	2/1	W	5	W. Gaul
25160	e-Business & electronic Marketing (p. 74)	1	S	2.5	W. Gaul
25162	Information Technology and Business Information (p. 89)	2/1	S	5	B. Neibecker
25164	International Marketing (p. 94)	1	S	2.5	W. Gaul
25165	Marketing and Innovation (p. 105)	1/1	W	2.5	W. Gaul
25166	Strategic and Innovative Decision Making in Marketing (p. 166)	2/1	S	5	B. Neibecker
25167	Behavioral Approaches in Marketing (p. 174)	2/1	W	5	B. Neibecker
25170	Entrepreneurship and Marketing (p. 80)	1/1	W	2.5	W. Gaul

**Learning Control / Examinations**

The assessment consists of a general written exam according to §4 Abs. 2, Nr. 1 of examination regulation. The written exam has a duration of 240 min. and contains topics from at least two of four main lectures [25154], [25156], [25158] and [25171] as well as from the chosen lectures. The examination is offered every semester. Re-examinations are offered at every ordinary examination date and has to be absolved within one year.

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

It is recommended, to attend more lectures than required to fulfill 20 Credit Points as it is possible to examine in these additional lectures and influence the final grade positively.

If a Seminar is attended within the module, the assessment for this course is done individually (according to §4, Abs. 2, Nr. 3 of the examination regulation). The grade of the seminar is taken into account for the overall grade of the module.

**Conditions**

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

**Learning Outcomes****Content**

**Module: Marketing Research [IW4WWMAR1]**

**Coordination:** Wolfgang Gaul  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Economic Sciences

<b>ECTS Credits</b> 10	<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)
25154	Modern Market Research (p. 111)	2/1	S	5	W. Gaul
25171	Data Analysis and Operations Research (p. 64)	2/1	W	5	W. Gaul
25160	e-Business & electronic Marketing (p. 74)	1	S	2.5	W. Gaul
25164	International Marketing (p. 94)	1	S	2.5	W. Gaul
25165	Marketing and Innovation (p. 105)	1/1	W	2.5	W. Gaul
25170	Entrepreneurship and Marketing (p. 80)	1/1	W	2.5	W. Gaul

**Learning Control / Examinations**

The assessment consists of a general written exam according to §4 Abs. 2, Nr. 1 of examination regulation. The written exam has a duration of 120 min. and contains topics from at least one main lecture [25154] and [25171] as well as from the chosen lectures. The examination is offered every semester. Re-examinations are offered at every ordinary examination date and has to be absolved within one year.

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

It is recommended, to attend more lectures than required to fulfill 10 Credit Points as it is possible to examine in these additional lectures and influence the final grade positively.

If a Seminar is attended within the module, the assessment for this course is done individually (according to §4, Abs. 2, Nr. 3 of the examination regulation). The grade of the seminar is taking into account for the overall grade of the module.

**Conditions**

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

**Learning Outcomes****Content**

**Module: Quantitative Marketing and OR [IW4WWMAR2]**

**Coordination:** Wolfgang Gaul  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Economic Sciences

ECTS Credits	Cycle	Duration
10	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25154	Modern Market Research (p. 111)	2/1	S	5	W. Gaul
25156	Marketing and Operations Research (p. 106)	2/1	S	5	W. Gaul
25158	Corporate Planning and Operations Research (p. 172)	2/1	W	5	W. Gaul
25171	Data Analysis and Operations Research (p. 64)	2/1	W	5	W. Gaul

**Learning Control / Examinations**

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

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

It is recommended, to attend more lectures than required to fulfill 10 Credit Points as it is possible to examine in these additional lectures and influence the final grade positively.

If a Seminar is attended within the module, the assessment for this course is done individually (according to §4, Abs. 2, Nr. 3 of the examination regulation). The grade of the seminar is taking into account for the overall grade of the module.

**Conditions**

None.

**Learning Outcomes****Content**

**Module: Behavioral Approaches in Marketing and Data Analysis [IW4WWMAR3]**

**Coordination:** Bruno Neibecker  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Economic Sciences

<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)	
25167	Behavioral Approaches in Marketing (p. 174)	2/1	W	5	B. Neibecker	
25154	Modern Market Research (p. 111)	2/1	S	5	W. Gaul	
25162	Information Technology and Business Information (p. 89)	2/1	S	5	B. Neibecker	

**Learning Control / Examinations**

Assessment consist of a written module exam according to §4 Abs. 2, Nr. 1 of the Prüfungsordnung für Informationswirtschaft. The module exam has a duration of 120 min. and contains topics from the main lecture [25167] as well as from one of the chosen lectures [25154] and [25162].

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

**Conditions**

- The lecture *Behavioral Approaches in Marketing* [25167] has to be attended.
- From the lectures *Modern Market Research* [25154] and *Information Technology and Business Information* [25162], one must be attended.
- At least 10 CP must be achieved.

**Learning Outcomes**

- 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: Strategy, Innovation and Data Analysis [IW4WWMAR4]**

**Coordination:** Bruno Neibecker  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Economic Sciences

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

Courses in module					
ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25166	Strategic and Innovative Decision Making in Marketing (p. 166)	2/1	S	5	B. Neibecker
25154	Modern Market Research (p. 111)	2/1	S	5	W. Gaul
25162	Information Technology and Business Information (p. 89)	2/1	S	5	B. Neibecker

**Learning Control / Examinations**

Assessment consist of a written module exam according to §4 Abs. 2, Nr. 1 of the Prüfungsordnung für Informationswirtschaft. The module exam has a duration of 120 min. and contains topics from the main lecture [25166] as well as from one of the chosen lectures [25154] and [25162].

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

**Conditions**

- The lecture *Strategic and Innovative Decision Making in Marketing* [25166] has to be attended.
- From the lectures *Modern Market Research* [25154] and *Information Technology and Business Information* [25162], one must be attended.
- At least 10 CP must be achieved.

**Learning Outcomes**

- 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 identify 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: Stochastic Methods in Economics and Engineering [IW4WWOQM1]**

**Coordination:** Karl-Heinz Waldmann  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Economic Sciences

ECTS Credits	Cycle	Duration
10	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25674	Quality Control I (p. 136)	2/1/2	W	5	K. Waldmann
25659	Quality Control II (p. 137)	2/1/2	S	5	K. Waldmann
25687	Optimization in a Random Environment (p. 120)	2/1/2	W/S	5	K. Waldmann

**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**

None.

**Learning Outcomes**

The students acquire the ability to master the modern use of statistical methods for quality control and improvement. This includes a sound understanding of the principles and the basis for applying those principles in a wide variety of both product and nonproduct situations.

**Content**

The courses Statistical Quality Control I and II are about the modern use of statistical methods for quality control and improvement. Main topics are statistical process control, acceptance sampling, process design and improvement with designed experiments, reliability theory. The course optimization in a random environment deals with the quantitative analysis of selected problems arising in economics, engineering, and applied sciences.

**Remarks**

The lectures of the module are offered irregularly. The curriculum of the next two years is available online. Credit from the voluntary computer lab in Quality Control I and II is accounted for in the overall grade raising the exam grade by 1/3 each.

**Module: Business Organization: Theory and Management Perspective [IW4WWORG]**

**Coordination:** Hagen Lindstädt  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Economic Sciences

<b>ECTS Credits</b> 20	<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)
25902	Managing Organizations (p. 122)	2/0	W	4	H. Lindstädt
25904	Organization Theory (p. 123)	2/1	W	6	H. Lindstädt
25907	Special Topics in Management: Management and IT (p. 160)	1/0	W/S	2	H. Lindstädt
26291	Managing New Technologies (p. 99)	2/1	S	5	T. Reiß
25915/25916	Seminar: Management and Organization (p. 147)	2	W/S	4	H. Lindstädt

**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**

Students must attend the three courses [25902], [25904] and [25907] and the course [26291] and one seminar, [25915] or [25916] additionally.

**Learning Outcomes**

The module provides knowledge and skills about economic models and management frameworks in corporate organization, managing organizations, and organizational theory.

The module focuses on problem solving skills and understanding fundamental economic concepts in the area of management and organization.

**Content**

The module emphasises three aspects: The student will learn models and frameworks of the theory of organization. Additionally, the module deals with problems and questions concerning value based corporate management as an important part in strategic management. Finally, the module provides knowledge about concepts of organizational management and their practical application.

**Module: Strategy and Organization [IW4WWORG1]**

**Coordination:** Hagen Lindstädt  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Economic Sciences

ECTS Credits	Cycle	Duration
10	Every term	2

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25900	Management and Strategy (p. 171)	2/0	S	4	H. Lindstädt
25902	Managing Organizations (p. 122)	2/0	W	4	H. Lindstädt
25907	Special Topics in Management: Management and IT (p. 160)	1/0	W/S	2	H. Lindstädt

**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**

Alle Veranstaltungen des Moduls müssen besucht werden.

**Learning Outcomes**

The module provides knowledge and skills about economic models and management frameworks in strategic management and managing organizations.

The module focuses on problem solving skills and understanding fundamental economic concepts in the area of strategy and organization.

**Content**

The module emphasises three aspects: The student will learn models and frameworks which are used in strategic management and managing organizations. In addition, the module provides knowledge about management concepts and their practical application.

**Module: Operational Risk Management [IW4WWORM]**

**Coordination:** Ute Werner  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Economic Sciences

<b>ECTS Credits</b> 10	<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)
26328	Multidisciplinary Risk Research (p. 112)	3/0	W/S	4.5	U. Werner
25055	Principles of Insurance Management (p. 135)	3/0	S	4	U. Werner
26326	Enterprise Risk Management (p. 79)	3/0	W	4.5	U. Werner
26354	Risk Management of Microfinance and Private Households (p. 139)	3/0	W/S	4.5	U. Werner
26353	International Risk Transfer (p. 93)	2/0	S	2.5	W. Schwehr

**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.

The assessment of most of the courses consists of an oral presentations within the lecture (according to Section 4 (2), 3 of the examination regulation) and an oral exam (according to Section 4 (2), 2 of the examination regulation). The overall grade of the assessment consists of the valuation of the oral presentation and the valuation of the oral exam.

The assessment of the course „*International Risk Transfer*“ [26353] is only a written exam (according to Section 4 (2), 1 of the examination regulation) after the course period.

**Conditions**

None.

**Learning Outcomes**

Identifying specific risk concepts for various disciplines; comparative analysis of risks, depending on to the natural, technological and social environment; examining processes of risk perception, risk assessment and risk-taking behaviour by applying quantitative and qualitative methods; gaining insight into risk management from an individual, institutional and global perspective including strategies and instruments of risk management employed; understanding the particular importance of insurance for risk management and the economic principles of insurance business.

**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* [26328] and *Risk Management of Microfinance and Private Households* [26354] are offered irregularly. For further information, see: <http://insurance.fbv.uni-karlsruhe.de>

*The course Enterprise Risk Management [26326] is extraordinarily held by Dr. Edmund Schwake in the winter term 2010/11.*

**Module: Stochastic Modeling and Optimization [IW4WWSSM]**

**Coordination:** Karl-Heinz Waldmann  
**Degree programme:** Informationswirtschaft SPO 2006 (M.Sc.)  
**Subject:** Economic Sciences

ECTS Credits	Cycle	Duration
10	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25662	Simulation I (p. 153)	2/1/2	W	5	K. Waldmann
25665	Simulation II (p. 154)	2/1/2	S	5	K. Waldmann
25679	Markov Decision Models I (p. 164)	2/1/2	W	4	K. Waldmann
25682	Markov Decision Models II (p. 165)	2/1/2	S	5	K. Waldmann
25369	Game Theory II (p. 161)	2/2	W	6	S. Berninghaus

**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**

None.

**Learning Outcomes**

The students acquire the ability to see and to analyse stochastic interrelations in their professional life. This includes a sound understanding of modeling, analysing and optimizing stochastic systems from an application-oriented point of view.

**Content**

See Lectures

**Remarks**

The lectures *Markov Decision Models II*, *Simulation I* [25662], and *Simulation II* [25665] are offered irregularly. The curriculum of the next two years is available online.

Credit from the voluntary computer lab in *Markov Decision Models I*, *Markov Decision Models II*, *Simulation I* [25662], and *Simulation II* [25665] is accounted for in the overall grade raising the exam grade by 1/3 each.

## 8 Courses

### 8.1 All Courses

#### Course: Advanced Web Applications [24604/24153]

**Coordinators:** Sebastian Abeck  
**Part of the modules:** Complex Internet Applications (p. 20)[IW4INIAPP]

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

#### Learning Control / Examinations

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

#### Conditions

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

#### Learning Outcomes

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

#### Content

The course consists of the following course units:

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

#### Media

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

#### Literature

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

#### Elective literature:

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

## Course: Algorithm Engineering [24123]

**Coordinators:** Peter Sanders, Dorothea Wagner

**Part of the modules:** Advanced Algorithms (p. 18)[IW4INAALG]

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

### Learning Control / Examinations

Assessment will consist of an oral exam (20 min) following §4, Abs. 2, 2 of the Prüfungsordnung für Informationswirtschaft.

### Conditions

Lecture *Algorithm Design*

### Learning Outcomes

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

### Content

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

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

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

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

### Media

Slides, Scriptum, scientific papers, source codes

### Literature

#### Elective literature:

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

### Remarks

This course is offered irregularly.

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

**Coordinators:** Bastian Katz  
**Part of the modules:** Advanced Algorithms (p. 18)[IW4INAALG]

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

### Learning Control / Examinations

The assessment consists of an oral exam of approx. 20 minutes according to Sec. 4 Subsec. 2 No. 2 of the study and examination regulations.

### Conditions

None.

### Recommendations

Basic knowledge of graph theory and algorithm engineering are helpful.

### Learning Outcomes

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

### Content

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

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

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

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

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

### Media

Slides.

### Literature

#### Elective literature:

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

### Remarks

The course is not lectured in the summer term 2010.



## Course: Algorithms for Planar Graphs [24614]

**Coordinators:** Dorothea Wagner

**Part of the modules:** Advanced Algorithms (p. 18)[IW4INAALG]

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

### Learning Control / Examinations

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

### Conditions

None.

### Recommendations

Basic knowledge of graph theory and algorithm design is helpful.

### Learning Outcomes

The lecture aims at providing students with an overview on the field of planar graphs and especially focuses on algorithmic aspects. The students obtain a systematic understanding of the central concepts and techniques for tackling algorithmic questions on planar graphs, which builds upon the students' knowledge in the areas of graph theory and algorithmics. In this course problems are reduced to their algorithmic core and are afterwards, if possible from a complexity theoretical point of view, solved efficiently. The students learn to apply the presented methods and techniques autonomously to related problems. With the obtained knowledge they are able to work on current research problems in the area of planar graphs

### Content

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

### Media

Blackboard, script.

### Literature

#### Elective literature:

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

## Course: Algorithms in Cellular Automata [24622]

**Coordinators:** Thomas Worsch

**Part of the modules:** Advanced Algorithms (p. 18)[IW4INAALG]

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

### Learning Control / Examinations

Assessment will consist of an oral exam (20 min) following §4, Abs. 2, 1 of the SPO.

### Conditions

None.

### Learning Outcomes

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

### Content

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

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

Contents:

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

### Media

lecture notes and slides in pdf format; computer demonstrations

### Literature

#### Elective literature:

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

## Course: Algorithms for Visualization of Graphs [24118]

**Coordinators:** Dorothea Wagner, R. Görke

**Part of the modules:** Advanced Algorithms (p. 18)[IW4INAALG]

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

### Learning Control / Examinations

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

### Conditions

None.

### Recommendations

Basic knowledge of graph theory and algorithmics is helpful.

### Learning Outcomes

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

### Content

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

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

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

### Media

Blackboard, slides, script.

### Literature

#### Elective literature:

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

## Course: Algorithms for Internet Applications [25702]

**Coordinators:** Hartmut Schmeck

**Part of the modules:** e-Collaboration (p. 19)[IW4INECOLL], Complex Internet Applications (p. 20)[IW4INIAPP]

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

### Learning Control / Examinations

The assessment consists of a written exam (60 min) (according to Section 4(2), 1 of the examination regulation) and an additional written examination (called "bonus exam", 60 min) (according Section 4(2), 3 of the examination regulation) (the bonus exam may be split into several shorter written tests).

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

### Conditions

None.

### Learning Outcomes

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

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

### Content

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

### Media

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

### Literature

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

### Elective literature:

- Further references will be given in the course.

**Course: Employment Law I [24167]****Coordinators:** Alexander Hoff**Part of the modules:** Law for Information Companies (p. [29](#))[IW4INJURDIU], Law of the Information Economy (p. [27](#))[IW4INJUIINWI]

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

**Learning Control / Examinations**

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

**Conditions**

None.

**Learning Outcomes**

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

**Content**

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

**Literature**

tba at the beginning of the course.

**Course: Employment Law II [24668]****Coordinators:** Alexander Hoff**Part of the modules:** Law for Information Companies (p. 29)[IW4INJURDIU], Law of the Information Economy (p. 27)[IW4INJUIINWI]

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

**Learning Control / Examinations**

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

**Conditions**

None.

**Learning Outcomes**

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

**Content**

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

**Literature**

Tba at the beginning of the course.

## Course: Business and IT Service Management [26484]

**Coordinators:** Gerhard Satzger

**Part of the modules:** Service Management (p. 35)[IW4WWSER1]

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

### Learning Control / Examinations

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

### Conditions

None.

### Learning Outcomes

Students understand the importance of “servitization” for organizations, the challenges for the management of service-oriented enterprises and the interdependence of business and IT services.

Students learn standard concepts and methods of service-oriented management and are able to apply them in practical case studies.

Student get familiar with current research and tools and are able to critically evaluate them.

Students practice to communicate in English and to work on solutions in teams.

### Content

The rapid development of information and communication technology transforms many enterprises towards service-oriented structures: with new digital services, new business models and SOA-based process structures within larger service networks. Thus, strategic and operative management of service-oriented enterprises increasingly gains importance. In this course, we want to systematically acquire relevant know-how and apply this to real word examples. Particular focus will be on the interdependence of business, IT and legal aspects.

The course will be taught in English. It should provide ample opportunity for active participation of students. The course will integrate presentations of experts from business practice as well as a comprehensive case study (“en bloc” for 1 day) in which students will actively work on the strategic service-oriented shift of an enterprise.

### Media

Presentation (pdf)

### Literature

Fitzsimmons J./Fitzsimmons, M., Service Management, Operations, Strategy and Information Technology, 6. ed., 2007

Maister, David H., Managing The Professional Service Firm, 1997

Teboul, J. , Service is Front Stage: Positioning services for value advantage, 2006

Grönroos, Service Management and Marketing, 2007

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

**Coordinators:** Andreas Geyer-Schulz

**Part of the modules:** Information Engineering and Management 2 (p. 13)[IW4WWIW2]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/1	Summer term	de

### Learning Control / Examinations

Assessment consists of a written exam of 1 hour length following §4 (2), 1 of the examination regulation and by submitting written papers as part of the exercise following §4 (2), 3 of the examination regulation.

The course is considered successfully taken, if at least 50 out of 100 points are acquired in the written exam. In this case, all additional points (up to 12) from exercise work will be added. The grades of this lecture are assigned following the table below:

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

### Conditions

None.

### Recommendations

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

### Learning Outcomes

The student is able to

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

### Content

In this lecture, classical Business Administration is applied to businesses in an information- and 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.

### Media

Slides, Audio.

### Literature

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



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

**Course: Cloud Computing [25776]****Coordinators:** Stefan Tai, Kunze**Part of the modules:** Service Technologies (p. 26)[IW4INSERT]

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

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

None.

**Learning Outcomes**

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

**Content**

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

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

**Literature**

Cloud Computing: Web-basierte dynamische IT-Services, von C. Baun, M. Kunze, J. Nimis, S. Tai. Springer-Verlag 2009.

## Course: Complexity Management [25760]

**Coordinators:** Detlef Seese  
**Part of the modules:** e-Collaboration (p. 19)[IW4INECOLL]

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

### Learning Control / Examinations

The assessment of this course consists of a written examination (60 min) (following §4(2), 1 SPO). The exam will be offered every semester and may be repeated at every ordinary exam date.

Questions are in German and English, answers are possible in German or in English.

In case that only a small number of candidates apply for the examination there will be offered an oral examination according to Section 4(2),1 of the examination regulation.

### Conditions

None.

### Recommendations

A basic knowledge in informatics is suitable.

### Learning Outcomes

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

### Content

Complexity is one of the biggest challenges of our time. Central questions are: - Why humans often fail in complex situations? - What is complexity? - What are reasons for complexity? - Which parameters are essential to control complexity? - How systems have to be designed to reduce their complexity and to enable management of complexity?

The lecture gives a survey on fundamental results and handles the following topics: - Understanding of the difficulties produced by complex systems and complex processes - Foundations: modelling complex systems, complexity theory, descriptive, structural and parametric complexity, dynamic systems, topology, dimension, non-linearity, chaos, randomness and emerging structures, human shortcomings, simulation - Complexity of products and production - Complexity of markets - How to improve complexity management? - Decision support by intelligent use of IT

### Media

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

### Literature

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

### Elective literature:

- M.R. Garey, D. S. Johnson: Computers and intractability A guide to the theory of NP-completeness, W. H. Freeman and Company, New York, 1979
- N. Immerman: Descriptive Complexity; Springer-Verlag, New York 1999
- R. Diestel: Graphentheorie, Springer 1996
- J. A. Bondy, U.S.R. Murty: Graph Theory, Springer 2008
- H.D. Ebbinghaus, J. Flum, W. Thomas: Mathematical Logic, Springer-Verlag, New York 1984
- Christos H. Papadimitriou: Computational Complexity, Addison-Wesley, Reading, Massachusetts, 1994
- R. Niedermeier: Invitation to Fixed-Parameter Algorithms, Oxford University Press 2006
- W. Metzler: Nichtlineare Dynamik und Chaos, Teubner Studienbücher Mathematik, Stuttgart 1998

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

**Remarks**

The content of the lecture will permanently be adapted to actual developments. This can be the cause to changes of the described content and schedule.

## Course: Computational Economics [26458]

**Coordinators:** Simon Caton, Pradhyum Shukla  
**Part of the modules:** e-Collaboration (p. 19)[IW4INECOLL]

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

### Learning Control / Examinations

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

### Conditions

None.

### Learning Outcomes

The Student should become acquainted with the methods of Computational Economics and be able to put them into practice. The focus is on important modelling concepts and agent models, including the most important mathematical fundamentals as well as their practical implementations. The goal is to understand the challenge and the possibilities of the modelling of limited rational behaviour and of ability to learn. The students should know the advantages and disadvantages of the different models and be able to use them according to the situation and to evaluate them with the help of adequate statistical methods for analyzing simulation results. Furthermore, the student should be able to apply the acquired knowledge adequately in practice. Therefore practical scenarios will be modelled and analyzed. The students should be capable of finding arguments for the chosen solutions and express them to others.

### Content

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

### Media

Lecture slides and exercises as pdf-files.

### Literature

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

### Elective literature:

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

### Remarks

This course is offered in cooperation with the Institute of Applied Informatics and Formal Description Models (AIFB).

## Course: Customer Relationship Management [26508]

**Coordinators:** Andreas Geyer-Schulz

**Part of the modules:** Information, Market, and Service Engineering (p. 30)[IW4WWIMSE], Service Engineering (p. 33)[IW4WWIMSE2]

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

### Learning Control / Examinations

Assessment consists of a written exam of 1 hour length following §4 (2), 1 of the examination regulation and by submitting written papers as part of the exercise following §4 (2), 3 of the examination regulation.

The course is considered successfully taken, if at least 50 out of 100 points are acquired in the written exam. In this case, all additional points (up to 12) from exercise work will be added. The grades of this lecture are assigned following the table below:

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

### Conditions

None.

### Learning Outcomes

The students

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

### Content

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

### Media

Slides, Audio, Reader

### Literature

Christian Grönroos. Service Management and Marketing : A Customer Relationship Management Approach. Wiley, Chichester, 2nd edition, 2000.

### Elective literature:

Jill Dyché. The CRM Handbook: A Business Guide to Customer Relationship Management. Addison-Wesley, Boston, 2nd edition, 2002.

Ronald S. Swift. Accelerating Customer Relationships: Using CRM and Relationship Technologies. Prentice Hall, Upper Saddle River, 2001.

Stanley A. Brown. Customer Relationship Management: A Strategic Imperative in the World of E-Business. John Wiley, Toronto, 2000.

## Course: Data Warehousing and Mining [24114]

**Coordinators:** Klemens Böhm

**Part of the modules:** Advanced Concepts of Information and Knowledge Management (p. 23)[IW4INLIK1], Large-Scale Information and Knowledge Management (p. 21)[IW4INLIK1]

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

### Learning Control / Examinations

The assesment is performed according to section 4 subsection 2 no. 3 of the study and examination regulations and requires active participation in the excercises.

### Conditions

This course cannot be combined with the courses *Knowledge Discovery* [25742] and/or *Data Mining* [25375].

### Recommendations

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

### Learning Outcomes

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

### Content

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

### Media

Slides.

### Literature

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

### Elective literature:

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

### Remarks

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

**Course: Data Analysis and Operations Research [25171]****Coordinators:** Wolfgang Gaul**Part of the modules:** Marketing Research (p. 37)[IW4WWMAR1], Marketing (p. 36)[IW4WWMAR], Quantitative Marketing and OR (p. 38)[IW4WWMAR2]

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

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

Basics of data analysis and operations research are assumed.

**Learning Outcomes****Content**



## Course: Deployment of Database Systems [24647]

**Coordinators:** Klemens Böhm

**Part of the modules:** Large-Scale Information and Knowledge Management (p. 21)[IW4INLIKIM]

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

### Learning Control / Examinations

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

### Conditions

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

### Learning Outcomes

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

### Content

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

### Media

Slides.

### Literature

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

### Elective literature:

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

## Course: Moving Objects Databases [24109]

**Coordinators:** Klemens Böhm

**Part of the modules:** Large-Scale Information and Knowledge Management (p. 21)[IW4INLIKIM]

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

### Learning Control / Examinations

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

### Conditions

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

### Recommendations

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

### Learning Outcomes

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

### Content

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

Keywords:

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

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

### Media

Slides.

### Literature

Ralf Hartmut Güting, Markus Schneider: *Moving Objects Databases*, Academic Press, 2005

### Elective literature:

Will be announced in the lecture.

## Course: Database Implementation and Tuning [db\_impl]

**Coordinators:** Klemens Böhm

**Part of the modules:** Large-Scale Information and Knowledge Management (p. 21)[IW4INLIK1M], Advanced Concepts of Information and Knowledge Management (p. 23)[IW4INLIK1M]

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

### Learning Control / Examinations

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

### Conditions

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

### Learning Outcomes

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

### Content

Database systems form the backbone of all kinds of information processing. Without such systems, business management, commerce, research and development – as well as everything in the areas of mobile communication, genetics and the web – is not possible. Therefore, nowadays it belongs to the general knowledge of computer science, to understand how such systems are composed. In addition to that, many techniques which are today common sense in computer science, have their roots in database technology. Finally, many specialists are needed, so called database administrators, who are able to configure the functionality and performance of database systems. Without the knowledge of what happens inside such systems, it is hardly possible to configure and tune them.

Such knowledge will be thought in this lecture. As an orientation framework serves a reference architecture which primarily comes from performance optimisation. Its essential components are the memory and query engine as well as transaction management. These components are discussed following a layered architecture from file management at the bottom to the user interface at the top level. This layered architecture allows for determining methodically the necessary and possible means of performance improvement as well as identifying their place within the architecture. Therefore, the lecture also contributes in the area of software engineering of large scale systems.

### Media

Slides.

### Literature

#### Elective literature:

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

## Course: Practical Course Database Systems [24292]

**Coordinators:** Klemens Böhm

**Part of the modules:** Large-Scale Information and Knowledge Management (p. 21)[IW4INLIKIM]

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

### Learning Control / Examinations

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

### Conditions

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

### Learning Outcomes

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

### Content

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

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

Working in teams is another important aspect of all projects.

### Media

- Slides.
- Practical course notes.

### Literature

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

### Elective literature:

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

## Course: Database Systems [24516]

**Coordinators:** Klemens Böhm

**Part of the modules:** Advanced Concepts of Information and Knowledge Management (p. 23)[IW4INLIK1]

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

### Learning Control / Examinations

The assessment is explained in the module description.

### Conditions

None.

### Recommendations

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

### Learning Outcomes

The student

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

### Content

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

### Media

Slides.

### Literature

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

### Elective literature:

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

**Course: Database Systems and XML [25724]**

**Coordinators:** Andreas Oberweis  
**Part of the modules:** e-Collaboration (p. 19)[IW4INECOLL]

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

**Learning Control / Examinations**

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

**Conditions**

None.

**Learning Outcomes**

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

**Content**

Databases are a proven technology for managing large amounts of data. The oldest database model, the hierarchical model, was replaced by different models such as the relational or the object-oriented data model. The hierarchical model became particularly important with the emergence of the Extensible Markup Language XML. XML is a data format for structured, semi-structured, and unstructured data. In order to store XML documents consistently and reliably, databases or extensions of existing data base systems are required. Among other things, this lecture covers the data model of XML, concepts of XML query languages, aspects of storage of XML documents, and XML-oriented database systems.

**Media**

Slides, access to internet resources.

**Literature**

- M. Klettke, H. Meyer: XML & Datenbanken: Konzepte, Sprachen und Systeme. dpunkt.verlag 2003
- H. Schöning: XML und Datenbanken: Konzepte und Systeme. Carl Hanser Verlag 2003
- W. Kazakos, A. Schmidt, P. Tomchyk: Datenbanken und XML. Springer-Verlag 2002
- R. Elmasri, S. B. Navathe: Grundlagen der Datenbanksysteme. 2002
- G. Vossen: Datenbankmodelle, Datenbanksprachen und Datenbankmanagementsysteme. Oldenbourg 2000

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

**Coordinators:** Klemens Böhm, Buchmann

**Part of the modules:** Advanced Concepts of Information and Knowledge Management (p. 23)[IW4INLIK1], Large-Scale Information and Knowledge Management (p. 21)[IW4INLIK1]

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

### Learning Control / Examinations

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

### Conditions

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

### Learning Outcomes

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

### Content

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

### Media

lecture slides

### Literature

Will be announced in the lecture.

## Course: Document Management and Groupware Systems [25735]

**Coordinators:** Stefan Klink  
**Part of the modules:** e-Collaboration (p. 19)[IW4INECOLL]

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

### Learning Control / Examinations

The assessment consists of an 1h written exam in the first week after lecture period according to Section 4(2), 1 of the examination regulation).

### Conditions

None.

### Learning Outcomes

Students master the basics of integration and structure of document management systems (DMS) and know the complete DMS process - from document capture of the archiving until retrieval. Students know how to realize operative workflows. They know which activities are needed to carry out the conceptual design and installation of DMS and they are able to apply a DMS as an archive system, workflow system and retrieval system. Furthermore, they know groupware systems exemplarily and can use them for collaborative tasks.

### Content

The lecture gives basics of document management and groupware systems. It covers different system categories, their interaction and their use areas and illustrates this with concrete examples. These include document management in the strict sense, scanning, Document Imaging (acquisition and visualization of scanned documents), indexing, electronic archiving, retrieval of relevant documents, workflow, groupware, and office communications.

### Media

Slides, access to internet resources.

### Literature

- Klaus Götzer, Udo Schneiderath, Berthold Maier, Torsten Komke: Dokumenten-Management. Dpunkt Verlag, 2004, 358 Seiten, ISBN 3-8986425-8-5
- Jürgen Gulbins, Markus Seyfried, Hans Strack-Zimmermann: Dokumenten-Management. Springer, Berlin, 2002, 700 Seiten, ISBN 3-5404357-7-8
- Uwe M. Borghoff, Peter Rödig, Jan Scheffcyk, Lothar Schmitz: Langzeitarchivierung – Methoden zur Erhaltung digitaler Dokumente. Dpunkt Verlag, 2003, 299 Seiten, ISBN 3-89864-258-5

### Elective literature:

Further literature is given in each lecture individually.



## Course: Wireless Sensor-Actuator-Networks [24104]

**Coordinators:** Martina Zitterbart

**Part of the modules:** Advanced Infrastructures (p. 24)[IW4INNET]

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

### Learning Control / Examinations

The assessment will consist of an oral exam (20 min) following § 4 Abs. 2 Nr. 1 SPO.

### Conditions

None.

### Recommendations

Knowledge of the lectures *Introduction in Computer Networks* [24519] (or similar lectures) and *Telematics* [24128].

### Learning Outcomes

The objective of this lecture is to present topics in research. As sensor networks are more and more becoming part of our daily-life, this lecture does not only focus on classical topics, such as time-synchronization and routing, but also on security and safety.

### Content

Due to the emerging miniaturization of microcontrollers during the past years a new field of research established: wireless sensor networks. These are networks that consist of huge amounts of tiny, autonomous sensor nodes which are able to fulfill some assigned sensing task totally unattended and self-organizing. One important characteristic is their restricted resources wrt/ computational power, memory and communication capacity, which is due to the node's scarce energy resources. Under these conditions, traditional communication architectures and protocols seem to be not well suited. The lecture will cover essential concepts, protocols and architectures which were developed with respect to the special needs of those networks. Topics of the course will be: hardware platforms for sensornetworks, media access control protocols, naming and addressing, time synchronization, localization of sensor nodes, topology control, a bunch of specialized routing protocols, service- and data-centric view of communication, security, and robustness.

### Media

Slides.

### Literature

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

**Course: e-Business & electronic Marketing [25160]****Coordinators:** Wolfgang Gaul**Part of the modules:** Marketing Research (p. 37)[IW4WWMAR1], Marketing (p. 36)[IW4WWMAR]

ECTS Credits	Hours per week	Term	Instruction language
2.5	1	Summer term	de

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

None.

**Learning Outcomes****Content**

## Course: eFinance: Information Engineering and Management for Securities Trading [26454]

**Coordinators:** Christof Weinhardt, Ryan Riordan

**Part of the modules:** Information, Market, and Service Engineering (p. 30)[IW4WWIMSE], Information and Market Engineering (p. 32)[IW4WWIMSE1]

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

### Learning Control / Examinations

70% of the mark is based on the written examination and 30% is based on assignments during the exercises.

### Conditions

None.

### Learning Outcomes

The goal of the lecture is to make the students familiar with the theoretical as well as the practical aspects of electronic trading and exchanges and the IT systems used in the financial industry. While markets for products and services are discussed, the focus is on the trading of financial securities. Existing centralized equity exchanges face competition from new alternative trading systems made possible by today's information technology. This course will also examine the impact and implications of this dynamic. The focus is on the economic and technical design of markets as information processing systems.

### Content

The theoretical part of the course examines the New Institutions Economics which provides a theoretically found explanation for the existence of markets and intermediaries. Building upon the foundations of the market micro structure, several key parameters and factors of electronic trading are examined. These insights gained along a structured securities trading process are complemented and verified by the analysis of prototypical trading systems developed at the institute as well as selected trading systems used by leading exchanges in the world. In the more practical-oriented second part of the lecture, speakers from practice will give talks about financial trading systems and link the theoretical findings to real-world systems and applications.

### Media

Powerpoint presentations, recorded lecture available on the internet

### Literature

- Picot, Arnold, Christine Bortenlänger, Heiner Röhl (1996): "Börsen im Wandel". Knapp, Frankfurt
- Harris, Larry (2003): "Trading and Exchanges - Market Microstructure for Practitioners". Oxford University Press, New York

### Elective literature:

- Gomber, Peter (2000): "Elektronische Handelssysteme - Innovative Konzepte und Technologien". Physika Verlag, Heidelberg
- Schwartz, Robert A., Reto Francioni (2004): "Equity Markets in Action - The Fundamentals of Liquidity, Market Structure and Trading". Wiley, Hoboken, NJ

## Course: Introduction in Computer Networks [24519]

**Coordinators:** Hannes Hartenstein

**Part of the modules:** Advanced Infrastructures (p. 24)[IW4INNET]

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

### Learning Control / Examinations

The assessment is explained in the module description.

### Conditions

None.

### Recommendations

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

### Learning Outcomes

#### Content

Today's Internet is arguably the most well-known and most complex artefact ever created by mankind: hundreds of millions connected

computers and connecting networks. Millions of users who connect at any time to the Internet via various devices such as mobile phones, PDAs or laptops. Given the large scale as well as the diversity of the Internet, the question arises to which extent it is possible to understand the complex structures behind. Here, this lecture tries to provide an introduction to the world of computer networks by presenting theoretical and practical aspects of computer networks. Therefore, it covers basics of telecommunications engineering, fundamental protocol mechanisms as well as the layers model of current computer networks. Hence, we present all layers starting with the physical medium layer up to the application layer.

#### Media

Slides.

#### Literature

- J.F. Kurose, K.W. Ross: Computer Networking - A Top-Down Approach featuring the Internet. Addison-Wesley, 2007.
- W. Stallings: Data and Computer Communications. Prentice Hall, 2006.

#### Elective literature:

- F. Halsall: Computer Networking and the Internet. Addison-Wesley, 2005.
- P. Lockemann, G. Krüger, H. Krumm: Telekommunikation und Datenhaltung. Hanser Verlag, 1993.
- S. Abeck, P.C. Lockemann, J. Schiller, J. Seitz: Verteilte Informationssysteme. dpunkt-Verlag, 2003

## Course: Electronic Markets (Principles) [26502]

**Coordinators:** Andreas Geyer-Schulz

**Part of the modules:** Information, Market, and Service Engineering (p. 30)[IW4WWIMSE], Information and Market Engineering (p. 32)[IW4WWIMSE1]

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

### Learning Control / Examinations

Assessment consists of a written exam of 1 hour length following §4 (2), 1 of the examination regulation and by submitting written papers as part of the exercise following §4 (2), 3 of the examination regulation.

The course is considered successfully taken, if at least 50 out of 100 points are acquired in the written exam. In this case, all additional points (up to 12) from exercise work will be added. The grades of this lecture are assigned following the table below:

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

### Conditions

None.

### Learning Outcomes

The student

- has an overview about the different organizational form and their efficiency,
- names coordination methods and motivation methods and evaluates them regarding their efficiency,
- knows, in the context of markets as a coordination form, the conditions under which markets are not efficient (market failure),
- knows phenomena like adverse selections and moral hazard,
- names reasons for these phenomena and develops methods to encounter them.

### Content

What are the conditions that make electronic markets develop? The first part of the lecture treats the selection of the type of organization as an optimization of transaction costs. The second part includes the efficiency of electronic markets (price, information and allocation efficiency) as well as reasons for market failure.

Besides a centralistic approach, markets can be used for decentral coordination of plans and activities. Hereby, optimality can be guaranteed, if the coordination problem has no design or innovation characteristics. Viewed from a bottom-up perspective, given the coordination problem, it is possible to answer questions regarding the centralization or decentralization, the design of coordination mechanisms, and the coherence of business strategies. The last part of the lecture consists of motivation problems, like bounded rationality and information asymmetries (private information and moral hazard) and the development of incentive systems.

### Literature

Kapitel "Management Control Systems, Dezentralisierung, interne Märkte und Transferpreise" (S. 745-773) in Charles T. Horn-gren, Srikant M. Datar, and George Foster. Cost Accounting: A Managerial Emphasis. Prentice Hall, Upper Saddle River, 11 edition, 2003.

Paul Milgrom and John Roberts. Economics, Organisation and Management. Prentice Hall, 1 edition, 1992.

### Elective literature:

Michael Dell and Catherine Fredman. Direct from DELL: Strategies that Revolutionized an Industry. Harper Collins Publisher, London, 1999.

Andreas Geyer-Schulz, Michael Hahsler, and Maximillian Jahn. Educational and scientific recommender systems: Designing the information channels of the virtual university. *International Journal of Engineering Education*, 17(2):153 – 163, 2001.

Friedrich A. Hayek. The use of knowledge in society. *The American Economic Review*, 35(4):519 – 530, Sep 1945.

Norbert Hochheimer. *Das kleine QM-Lexikon*. Wiley-UCH, Weinheim, 2002.

Adam Smith. *An Inquiry into the Nature and Causes of the Wealth of Nations*, volume II. 1976.

## Course: Enterprise Risk Management [26326]

**Coordinators:** Ute Werner

**Part of the modules:** Operational Risik Management (p. 44)[IW4WWORM]

ECTS Credits	Hours per week	Term	Instruction language
4.5	3/0	Winter term	de

### Learning Control / Examinations

The assessment consists of oral presentations (incl. papers) within the lecture (according to Section 4 (2), 3 of the examination regulation) and a final oral exam (according to Section 4 (2), 2 of the examination regulation).

The overall grade consists of the assessment of the oral presentations incl. papers (50 percent) and the assessment of the oral exam (50 percent).

### Conditions

None.

### Learning Outcomes

Learning to identify, to analyse and to assess business risks; this serves as a basis for strategy and policy design regarding risks and opportunities of an enterprise. Introduction to approaches that allow to consider area-specific risk objectives, risk-bearing capacity and risk acceptance.

### Content

1. Concepts and practice of risk management, based on decision theory
2. Goals, strategies and policies for the identification, analysis, assessment and management of risks
3. Insurance as an instrument for loss-financing
4. Selected aspects of risk management: e.g. environmental protection, organizational failure and D&O-coverage, development of a risk management culture
5. Organisation of risk management
6. Approaches for determining optimal combinations of risk management measures considering their investment costs and outcomes.

### Literature

- K. Hoffmann. Risk Management - Neue Wege der betrieblichen Risikopolitik. 1985.
- R. Hölscher, R. Elfgen. Herausforderung Risikomanagement. Identifikation, Bewertung und Steuerung industrieller Risiken. Wiesbaden 2002.
- W. Gleissner, F. Romeike. Risikomanagement - Umsetzung, Werkzeuge, Risikobewertung. Freiburg im Breisgau 2005.
- H. Schierenbeck (Hrsg.). Risk Controlling in der Praxis. Zürich 2006.

### Elective literature:

Additional literature is recommended during the course.

### Remarks

To attend the course please register at the secretary of the chair of insurance science.

In the winter term 2010/11 the course is held by Dr. Edmund Schwake.

**Course: Entrepreneurship and Marketing [25170]****Coordinators:** Wolfgang Gaul**Part of the modules:** Marketing Research (p. [37](#))[IW4WWMAR1], Marketing (p. [36](#))[IW4WWMAR]

ECTS Credits	Hours per week	Term	Instruction language
2.5	1/1	Winter term	de

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

None.

**Learning Outcomes**

The Student should ...

**Content**



**Course: eServices [26466]**

**Coordinators:** Christof Weinhardt, Gerhard Satzger  
**Part of the modules:** Service Management (p. 35)[IW4WWSER1]

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

**Learning Control / Examinations**

The assessment consists of a written examination (60 min.) according to Section 4.2.1 of the examination regulation and by submitting written papers as part of the exercise (according to Section 4.2.3 of the examination regulation).

**Conditions**

None.

**Learning Outcomes**

This course conveys the fundamental knowledge to understand the importance of services in our economy and the impact of information and communication technology (ICT) on existing and emerging service industries. Combining theoretical models with multiple case studies and application scenarios, this course will enable students:

- to understand different service perspectives and apply the general concept of “value co-creation”
- to know and to be able to apply concepts, methods and tools used for the design, engineering and management of eServices
- to be familiar with current research topics
- to gain experience in group work and to improve their presentation skills
- to be exposed to English language in preparation for working in international environments

**Content**

The world is moving more and more towards “service-led” economies: in developed countries services already account for around 70% of gross value added. In order to design, engineer, and manage services, traditional “goods-oriented” models are often inappropriate. In addition, the rapid development of information and communication technology (ICT) pushes the economic importance of services that are rendered electronically (eServices) and, thus, drives competitive changes: increased interaction and individualization open up new dimensions of “value co-creation” between providers and customers; dynamic and scalable service value networks replace static value chains; digital services can be globally delivered and exchanged across today’s geographic boundaries;

Building on a systematic categorization of (e)Services and on the general notion of “value co-creation”, we cover concepts and foundations for engineering and managing IT-based services, allowing for further specialization in subsequent KSRI courses. Topics include service innovation, service economics, service modeling as well as the transformation and coordination of service value networks.

In addition, case studies, hands-on exercises and guest lectures will illustrate the applicability of the concepts. English language is used throughout the course to acquaint students with international environments.

**Media**

PowerPoint slides;

**Literature****Elective literature:**

- Anderson, J./ Nirmalya, K. / Narus, J. (2007), Value Merchants.  
 Lovelock, C. / Wirtz, J. (2007) Services Marketing, 6th ed.  
 Meffert, H./Bruhn, M. (2006), Dienstleistungsmarketing, 5. Auflage,  
 Spohrer, J. et al. (2007), Steps towards a science of service systems. In: IEEE Computer, 40 (1), p. 70-77  
 Stauss, B. et al. (Hrsg.) (2007), Service Science – Fundamentals Challenges and Future Developments.  
 Teboul, (2007), Services is Front Stage.  
 Vargo, S./Lusch, R. (2004) Evolving to a New Dominant Logic for Marketing, in: Journal of Marketing 68(1): 1–17.  
 Shapiro, C. / Varian, H. (1998), Information Rules - A Strategic Guide to the Network Economy

## Course: European and International Law [24666]

**Coordinators:** Indra Spiecker genannt Döhmann

**Part of the modules:** Law of the Information Economy (p. 27)[IW4INJUNWI], Law of the Information Society (p. 28)[IW4INJURDIG]

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

### Learning Control / Examinations

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

### Conditions

None.

### Learning Outcomes

Due to the Europeanization of national law, the examination of European law is indispensable for everyone aiming to gain basic legal knowledge. Hardly any national activity can be imagined without the consideration of presetting of European Community law. By comparison, the influence of international law is of small importance. In light of this, the lecture predominantly deals with European law and imparts the knowledge of the EU law necessary for the students in order to comprehend how the national law is being covered by European Community law defaults. Afterwards, the student should be able to solve questions regarding European legislation in a problem-oriented manner. As the subject matter partly will be acquired in discourse with the students, it is necessary to acquire a corpus juris (e.g. Beck-Texte "Europarecht").

### Content

The lecture predominantly deals with the European law: in the origin, this contains an analysis of history from the EEC to EC and EU, of participants (parliament, commission, council, European Court of Justice), of sources of law (regulations, directives, final judgements, opinions, recommendations) and legislative procedure. Further, the lecture focuses on the basic liberties of the EC, which enable a free flow of goods (for example of beer not matching the German purity law), persons (like the professional footballer Bosman), services (like entrepreneurial activities) and capital. In addition, the charter of fundamental rights of the EC and the rules of competition will be discussed, in each case in the light of a concrete legal case. Moreover, the fundamental rights of the European Convention on Human Rights (ECHR) are being introduced. Concluding, a short survey of international law, especially of the World Trade Organization (WTO), will be given.

### Media

Content structure

### Literature

Further details will be announced in the lecture.

### Elective literature:

Further details will be announced in the lecture.

## Course: Business Models in the Internet: Planning and Implementation [26456]

**Coordinators:** Christof Weinhardt, Carsten Holtmann, Clemens van Dinther

**Part of the modules:** Information, Market, and Service Engineering (p. 30)[IW4WWIMSE], Service Engineering (p. 33)[IW4WWIMSE2]

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

### Learning Control / Examinations

50% of the mark is based on the written mid term examination, 10% is based on assignments during the exercises, and 40% of the mark is based on a project work, which includes a term paper and a presentation.

### Conditions

None.

### Learning Outcomes

This lecture aims at providing the students with knowledge about the lifecycles of web applications starting from economic concepts to the commercialization within the WWW. Students will learn, on the one hand, to analyze, design and to implement web applications and, on the other hand, to develop sustaining business models. This involves the analysis of the online users' requirements and expectations, the assessment of the potential innovative web applications have, the study of web technologies allowing students to gauge their applicability.

### Content

The emergence of internet economy has resulted in an accelerated evolution of commerce models in eBusiness. Early adopters have experimented with a variety of new business models, technologies and application designs. At the same time, there has been a growing demand for new standards to facilitate the exchange of information, catalogue content and transactions between buyers and sellers. But the true understanding of how to bring buyers and sellers together is still widely missing, leading to multiple cases of costly missed investments. This course focuses on the design and implementation of successful business models for eBusiness applications for the World Wide Web (WWW), imparting the basic knowledge for building successful eBusiness applications. We consider not only technical foundations of eBusiness applications but also economical aspects. In small groups, students develop and implement an eBusiness model that is eventually discussed with a representative from the venture capitalist industry.

### Media

Powerpoint presentations, recorded lecture available on the internet, (if circumstances allow videoconferencing)

### Literature

Will be announced within the course.

## Course: Graph Algorithms [xGraphAlgo]

**Coordinators:** Dorothea Wagner

**Part of the modules:** Advanced Algorithms (p. 18)[IW4INAALG]

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

### Learning Control / Examinations

Assessment will consist of an oral exam (20 min) following §4, Abs. 2, 2 of the Prüfungsordnung für Informationswirtschaft.

### Conditions

Lecture *Algorithmentechnik* [24079] is recommended.

### Learning Outcomes

Students will acquire basic knowledge about fundamental methods and techniques in the field of network analysis.

### Content

Networks are ubiquitous in our modern world. Beside physically present networks used for example in electrotechnology or for transportation, the number and the relevance of abstract or virtual networks drastically increases. Examples are the connectivity structure of the WWW or the analysis of political relations. Due to the large number of applications and their inherent problem settings, a variety of methods and approaches have emerged mixing techniques from graph theory, linear algebra and probabilistic methods.

The course systematically deals with fundamental techniques. Most of the objectives are motivated by applications, yet the focus is put on algorithmic aspects.

**Course: [24815]****Coordinators:** K. Melullis**Part of the modules:** Law of the Information Economy (p. [27](#))[IW4INJUNWI], Law of the Information Society (p. [28](#))[IW4INJURDIG]

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

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

None.

**Learning Outcomes****Content****Literature****Elective literature:**

Schulte, Rainer, Patentgesetz, Carl Heymanns Verlag, 8. Aufl. 2008, ISBN:3406555055

Kraßer, Rudolf, Patentrecht, Verlag C.H. Beck, 6. Aufl. 2009, ISBN: 3-406-384552

Jestaedt, Bernhard, Patentrecht - Ein fallbezogenes Lehrbuch, Heymanns, 2. Aufl. 2008, ISBN: 3452261832

Bekard, Patent- und Gebrauchsmustergesetz, Verlag C.H. Beck, 10. Aufl. 2006, ISBN: 3406539548

## Course: Principles of Information Engineering and Management [26450]

**Coordinators:** Christof Weinhardt, Jan Kraemer, Clemens van Dinther

**Part of the modules:** Information Engineering and Management 1 (p. 12)[IW4WWIW1]

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

### Learning Control / Examinations

The assessment of this course is a written examination (following §4(2), 1 SPO) and by submitting written papers as part of the exercise (following §4(2), 3 SPO). The total grade for this lecture will consist to 90% of the grade achieved in the written examination and to 10% of the assignments during the exercises.

### Conditions

None.

### Learning Outcomes

The students should be able to understand and analyze the central role of information as an economic good, a production factor, and a competitive factor in today's societies. Students are supposed to be able to identify, evaluate, price, and market information goods with the help of the concepts and methods taught in the lecture. Furthermore, students learn basic aspects about information systems and information flows within and between organizations, as well as their design parameters.

### Content

Information plays a central role in today's society. The resulting structures and processes cannot be explained intuitively with traditional approaches of economic theory. Formerly, information has only been implicitly treated as a production factor; its role as a competitive factor used to be neglected. In order to deal with the central role of information we developed the concept of the "information lifecycle" that systematizes all phases from information generation to information distribution. The single phases 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 across this information lifecycle within the lectures. The content of the lecture is deepened in accompanying lecture courses.

### Media

- PowerPoint slides
- eLearning Platform Ilias

### Literature

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

## Course: High Performance Communication [24110]

**Coordinators:** Martina Zitterbart

**Part of the modules:** Advanced Infrastructures (p. 24)[IW4INNET]

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

### Learning Control / Examinations

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

### Conditions

None.

### Recommendations

Knowledge of the lectures *Introduction in Computer Networks* [24519] (or similar lectures) and *Telematics* [24128].

### Learning Outcomes

The goal of the course is to introduce the fundamental technologies of today's and future wide area networks.

### Content

The main focus of this course are current developments in the area of network technologies. Part of this is the well-established Multi-Protocol Label Switching (MPLS) and the precursor ATM (Asynchronous Transfer Mode). Additionally, methods to support Quality of Service, signalling of requirements for Quality of Service, and the establishment of network-internal switching and routing systems are discussed. The lecture also goes into current developments in the domain of optical networks (SONET: Synchronous Optical Networking, WDM: Wavelength Division Multiplexing).

### Media

Slides.

### Literature

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

### Elective literature:

- W. Haaß. Handbuch der Kommunikationsnetze. Springer-Verlag, 1996, ISBN 3-540-61837-3.
- J. Jahn. Photonik: Grundlagen, Komponenten und Systeme. Oldenbourg-Verlag, 2001, ISBN 3-486-25425-1.
- D. Minoli, A. Alles. LAN, ATM and LAN Emulation Technologie. Artech-House, 1996, ISBN 0-89006-916-6.
- E. Rathgeb, E. Wallmeier. ATM-Infrastruktur für die Hochleistungskommunikation. Springer-Verlag, 1997, ISBN 3-540-60370-0.
- G. Siegmund. ATM – Die Technik. 3. Auflage, Hüthig Verlag, 1997, ISBN 3-7785-2541-7.
- W. Stallings. High-Speed Networks. Prentice Hall, 1998, ISBN 0-13-525965-7.
- M. Zitterbart Hochleistungskommunikation, Band 1: Technologie und Netze. R. Oldenbourg Verlag, 1995, ISBN 3-486-22707-6.

## Course: Information Integration and Web Portals [24141]

**Coordinators:** Jutta Mülle, Andreas Schmidt

**Part of the modules:** Large-Scale Information and Knowledge Management (p. 21)[IW4INLIKIM]

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

### Learning Control / Examinations

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

### Conditions

Knowledge about database systems, e.g. from the lecture *Database Systems* [24516].

### Learning Outcomes

The students obtain...

- Knowledge about state-of-the-art technologies (e.g., J2EE, JSF, .NET, XML) for building web applications and ability to evaluate their usage in concrete scenario.
- Proficiency in architectural approaches for building scalable web applications and integration of heterogeneous systems (e.g., multi-tier architectures, Model-View-Controller, mediator architectures, service-oriented architectures).
- Ability to analyze integration problems at different levels (presentation, services, information, technology).
- Proficiency in applying virtual and materialized integration approaches to concrete scenarios.
- Knowledge about core concepts and technologies for service-oriented architectures.
- Knowledge about potentials of ontologies for integration on service and information level.

### Content

Building web portals, bundling an information offer from different information sources for a specific target group, serves as a showcase problem for the lecture. Using a fictional sample port, this problem is approached from different viewpoints within the three major parts of the lecture. The first part is dedicated to scalable and maintainable web applications. Multi-tier architectures and component frameworks (J2EE, .NET) are the main topics. In addition to that, the principle of separation of content, layout and behavior is illustrated for different web technologies (e.g., JSP, JSF, AJAX). The second part follows the theme of integration of autonomous systems, which are typically encountered in inter-organizational cooperation. Within this part, information integration approaches (virtual vs. materialized) and service-oriented integration are presented and assessed. Usage potentials of ontologies for integration scenarios complement this part. The third part is dedicated to recent developments and real-world systems and products, presented by company representatives in the areas of portal, web and integration technology.

### Media

- Slides.
- Tutorial materials (Execution-Environment, Source-Code, Examples).

### Literature

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

### Elective literature:

- Serge Abiteboul, Peter Buneman, Dan Suciu: Data on the Web: from Relations to Semistructured Data and XML, Morgan Kaufmann, 1999, ISBN: 155860622X
- N. Kassem. Designing Enterprise Applications with the Java 2 Platform: Enterprise Edition. Longman 2000



## Course: Information Technology and Business Information [25162]

**Coordinators:** Bruno Neibecker

**Part of the modules:** Strategy, Innovation and Data Analysis (p. 40)[IW4WWMAR4], Marketing (p. 36)[IW4WWMAR], Behavioral Approaches in Marketing and Data Analysis (p. 39)[IW4WWMAR3]

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

### Learning Control / Examinations

Examination performance will consist of a written exam according to the description of the module (written exam following §4(2), 1 of the Prüfungsordnung Informationswirtschaft).

### Conditions

None.

### Learning Outcomes

(see description of the course)

### Content

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

### Literature

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

## Course: Intelligent Systems in Finance [25762]

**Coordinators:** Detlef Seese

**Part of the modules:** Advanced Concepts of Information and Knowledge Management (p. 23)[IW4INLIK1M1]

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

### Learning Control / Examinations

The assessment is a written examination.

See the German part for special requirements to be admitted for the examination.

### Conditions

None.

### Learning Outcomes

- The students acquire abilities and knowledge of methods and systems from the area of machine learning and learn how to use them in the area of finance, which is the core area of application of this lecture.
- It is taught the ability to choose and change these methods and systems adequate to the situation and to use them for problem solving in the area of finance.
- The students get the ability to find strategic and creative answers in their search for solutions for precisely defined, concrete and abstract problems.
- At the same time the lecture aims to give foundational knowledge and methods in the context of their application in practise. On the basis of the basic understanding of concepts and methods of informatics the students should be able to comprehend quickly the new developments in the area and to use them correctly.

### Content

A new generation of computing methods, commonly known as “intelligent systems”, has recently been successfully applied to a variety of business and financial modelling tasks. In many application fields these novel methods outperform traditional statistical techniques. The lecture provides a comprehensive coverage of the area, including foundations and applications. In particular it deals with intelligent software agents, genetic algorithms, neural networks, support vector machines, fuzzy-logic, expert systems and intelligent hybrid systems. The presented applications focus on the finance area and are related to risk management (credit risk, operational risk), financial trading, portfolio management and economic modelling. The lecture is given in cooperation with the company msgGILLARDON. The lecture starts with an introduction of the central problems of application in this area, e.g. decision support for investors, Portfoliosselection under constraints, information retrieval from business reports, automatic development of trading rules for the capital market, modelling of time series at the capital market, explanation of phenomena at capital markets by simulation, decision support in risk management (credit risk, operational risk). After this the basics of intelligent systems are discussed. Basic ideas and essential results for different stochastic heuristics for local search are discussed next, especially Hill Climbing, Simulated Annealing, Threshold Accepting and Tabu Search. After this different population-based approaches of evolutionary methods are presented, e.g. Genetic Algorithms, Evolutionary Strategies and Programming, Genetic Programming, Memetic Algorithms and Ant-Algorithms. It follows an introduction into Neural Networks, Support Vector Machines and Fuzzylogic. Softwareagents and agentbased stock market models are the next topic. The lecture ends with an overview on the complexity of algorithmic problems in the area of finance, giving in this way one of the key reasons for the necessity to use heuristics and intelligent systems. Essential examples and basic applications are chosen from the area of finance.

### Media

Slides.

### Literature

There is no text book covering completely the content of the lecture.

- Z. Michalewicz, D. B. Fogel. How to Solve It: Modern Heuristics. Springer 2000.
- J. Hromkovic. Algorithms for Hard Problems. Springer-Verlag, Berlin 2001.
- P. Winker. Optimization Heuristics in Econometrics. John Wiley & Sons, Chichester 2001.
- A. Brabazon, M. O'Neill. Biologically Inspired Algorithms for Financial Modelling. Springer, 2006.
- A. Zell. Simulation Neuronaler Netze. Addison-Wesley 1994.
- R. Rojas. Theorie Neuronaler Netze. Springer 1993.
- N. Cristianini, J. Shawe-Taylor. An Introduction to Support Vector Machines and other kernel-based learning methods. Cambridge University Press 2003.
- G. Klir, B. Yuan. Fuzzy Sets and Fuzzy Logic: Theory and Applications. Prentice-Hall, 1995.

- F. Schlottmann, D. Seese. Modern Heuristics for Finance Problems: A Survey of Selected Methods and Applications. In S. T. Rachev (Ed.) Handbook of Computational and Numerical Methods in Finance, Birkhäuser, Boston 2004, pp. 331 - 359.

Further references will be given in each lecture.

**Elective literature:**

- S. Goonatilake, Ph. Treleaven (Eds.). Intelligent Systems for Finance and Business. John Wiley & Sons, Chichester 1995.
- F. Schlottmann, D. Seese. Financial applications of multi-objective evolutionary algorithms, recent developments and future directions. Chapter 26 of C. A. Coello Coello, G. B. Lamont (Eds.) Applications of Multi-Objective Evolutionary Algorithms, World Scientific, New Jersey 2004, pp. 627 - 652.
- D. Seese, F. Schlottmann. Large grids and local information flow as reasons for high complexity. In: G. Frizelle, H. Richards (eds.), Tackling industrial complexity: the ideas that make a difference, Proceedings of the 2002 conference of the Manufacturing Complexity Network, University of Cambridge, Institute of Manufacturing, 2002, pp. 193-207. (ISBN 1-902546-24-5).
- R. Almeida Ribeiro, H.-J. Zimmermann, R. R. Yager, J. Kacprzyk (Eds.). Soft Computing in Financial Engineering. Physica-Verlag, 1999.
- S. Russel, P. Norvig. Künstliche Intelligenz Ein moderner Ansatz. 2. Auflage, Pearson Studium, München 2004.
- M. A. Arbib (Ed.). The Handbook of Brain Theory and neural Networks (second edition). The MIT Press 2004.
- J.E. Gentle, W. Härdle, Y. Mori (Eds.). Handbook of Computational Statistics. Springer 2004.
- F. Schweitzer. Brownian Agents and Active Particles. Collective Dynamics in the Natural and Social Sciences, Springer 2003.
- D. Seese, C. Weinhardt, F. Schlottmann (Eds.) Handbook on Information Technology in Finance, Springer 2008.
- Further references will be given in the lecture.

**Remarks**

The content of the lecture will permanently be adapted to actual developments. This can be the cause to changes of the described content and schedule.

## Course: Interdisciplinary Seminar in Information Engineering and Management [26530]

**Coordinators:** Andreas Geyer-Schulz, Thomas Dreier

**Part of the modules:** Interdisciplinary Seminar (p. 16)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
6	2	Winter / Summer Term	de

### Learning Control / Examinations

The assessment for this module is conducted using a "Erfolgskontrolle anderer Art" following §4 (2), 3 of the "Prüfungsordnung des Master-Studiengangs Informationswirtschaft". The exact form and composition of this assessment is defined for each Interdisciplinary Seminar separately.

### Conditions

Students should participate in the Interdisciplinary Seminar as last course of the compulsory program of the "Master-Studiengang Informationswirtschaft".

### Learning Outcomes

Participants of the Interdisciplinary Seminar in Information Engineering and Management should

- analyze a current issue of information engineering and management using the scientific methods of the participating disciplines and
- derive interdisciplinary approaches based on the state of the arts of the corresponding disciplines,
- justify the chosen solutions and methods during discussions using scientific arguments,
- and write down the results in a form appropriate to be published in a scientific journal.

### Content

The Interdisciplinary Seminar is regulated in §14 of the "Prüfungsordnung des Master-Studiengangs Informationswirtschaft". During the work on the interdisciplinary topic, students are supervised by a group of tutors. This group consists of one participant from computer science, one from business economics and one from law.

**Course: International Risk Transfer [26353]****Coordinators:** Wolfgang Schwehr**Part of the modules:** Operational Risk Management (p. 44)[IW4WWORM]

ECTS Credits	Hours per week	Term	Instruction language
2.5	2/0	Summer term	de

**Learning Control / Examinations**

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

**Conditions**

None.

**Learning Outcomes**

Becoming acquainted with the various possibilities of international risk transfer.

**Content**

How are the costs of potential major damages financed and covered on a global scale? Traditionally, direct insurers and, especially, reinsurers are conducting a global business, Lloyd's of London is a turntable for international risks, and global industrial enterprises are establishing captives for self insurance. In addition to this, capital markets and insurance markets are developing innovative approaches to cover risks, which were hard to insure in the past (e.g. weather risk). The lecture will elucidate the functioning and the background of these different possibilities of international risk transfer.

**Literature**

- K. Geratewohl. Rückversicherung: Grundlagen und Praxis Band 1-2.
- Brühwiler/ Stahlmann/ Gottschling. Innovative Risikofinanzierung - Neue Wege im Risk Management.
- Becker/ Bracht. Katastrophen- und Wetterderivate.

**Remarks**

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

**Course: International Marketing [25164]****Coordinators:** Wolfgang Gaul**Part of the modules:** Marketing Research (p. 37)[IW4WWMAR1], Marketing (p. 36)[IW4WWMAR]

ECTS Credits	Hours per week	Term	Instruction language
2.5	1	Summer term	de

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

None.

**Learning Outcomes****Content****Literature**

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

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

**Course: Internet Law [24812]****Coordinators:** Thomas Dreier**Part of the modules:** Contract Drafting and Internet Law (p. 15)[IW4INJURA]

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

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

None.

**Learning Outcomes**

It is the aim of this course to give the students an overview of the legal rules that are touched upon when the Internet is used as a means of communications and for doing business. These legal rules range from the law governing domain names, issues concerning the electronic formation of contracts, distance and electronic commerce contracts, to the issue liability and questions of unfair competition. Students shall understand how the legal rules depend upon, and interact with, the economic background, legislative policy and information and communication technologies. Students shall learn about the rules of national, European and international copyright law and to apply these legal rules in practical cases.

**Content**

The course deals with the legal rules that are touched upon when the Internet is used as a means of communications and for doing business. These legal rules range from the law governing domain names, issues concerning the electronic formation of contracts, distance and electronic commerce contracts, to the issue liability and questions of unfair competition. Students shall understand how the legal rules depend upon, and interact with, the economic background, legislative policy and information and communication technologies. Students shall learn about the rules of national, European and international copyright law and to apply these legal rules in practical cases.

**Media**

Slides

**Literature**

Script, Internetrecht (Internet Law)

**Elective literature:**

Additional literature tba in class.

**Remarks**

It is possible that this course will be taught in the summer instead of the winter semester.

## Course: Knowledge Discovery [25742]

**Coordinators:** Rudi Studer

**Part of the modules:** Advanced Concepts of Information and Knowledge Management (p. 23)[IW4INLIK1], Large-Scale Information and Knowledge Management (p. 21)[IW4INLIK]

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

### Learning Control / Examinations

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

### Conditions

None.

### Learning Outcomes

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

### Content

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

### Media

Slides.

### Literature

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



## Course: Component Based Software Engineering [kbse]

**Coordinators:** Ralf Reussner, Michael Kuperberg, Klaus Krogmann  
**Part of the modules:** e-Collaboration (p. 19)[IW4INECOLL]

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

### Learning Control / Examinations

The assessment consists of an oral exam of approx. 20 minutes according to Sec. 4 Subsec. 2 No. 2 of the study and examination regulations.

### Conditions

Basic knowledge about software techniques as in the lecture *Software Engineering I* [24518] is recommended.

### Learning Outcomes

#### Content

#### Media

Slides, wiki and websites.

#### Literature

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

#### Elective literature:

- W. Beer, D., H.-P. Mössenböck, A. Wöß, *Die . NET- Technologie. Grundlagen und Anwendungsprogrammierung*, dPunkt Verlag, 2002
- S. W. Ambler, T. Jewell, E. Roman, *Mastering Enterprise Java Beans*, Wiley, 2006, 3rd Ed.
- P. Herzum, O. Sims, *Business Component Factory*, Wiley, 1999A. W. Brown, *Large-scale Component-based Development*, Prentice-Hall, 2000
- J. Cheesman, J. Daniels, *UML Components*, Addison-Wesley, 2000
- C. Atkinson et al., *Component-based Product Line Engineering with UML*, Addison-Wesley, 2002
- Buschmann et al., *Pattern-oriented Software Architecture*, vol. 1—5, Wiley, 1996—2003
- Martin Fowler, *Analysis Patterns – Reusable Object Models* Addison-Wesley, 1997
- d'Souza, Wills, *Object, Components and Frameworks with UML – The Catalysis Approach*, Addison-Wesley, 1998
- Reussner, Hasselbring, *Handbuch der Software-Architektur, 2. Auflage*, dPunkt-Verlag, 2008

### Remarks

The course is not offered any longer, examination is possible until winterterm 2011/12.

## Course: Mechanisms and Applications of Workflow Systems [24111]

**Coordinators:** Jutta Mülle, Silvia von Stackelberg

**Part of the modules:** Advanced Concepts of Information and Knowledge Management (p. 23)[IW4INLIK1], Large-Scale Information and Knowledge Management (p. 21)[IW4INLIK1]

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

### Learning Control / Examinations

It will be announced in advance if the assessment consists of a written exam (approx. 60 minutes) according to section 4 subsection 2 no. 1 study and examination regulations or of an oral exam (approx. 20 minutes) following according to section 4 subsection 2 no. 2 study and examination regulations.

### Conditions

This lecture cannot be taken if the lecture *Workflowmanagement-Systems* has been taken already.

### Recommendations

Knowledge about database systems, e.g. from the lecture *Database Systems* [24516].

### Learning Outcomes

A goal of the course is that the participants are able to model workflows, to explain modelling aspects and their relationships, to compare modelling methods, and to evaluate the usability of these methods in different application areas. They should understand the technical construction of workflow-management systems with the most important components and different architectures and implementation alternatives. Finally, the participants should have obtained an overview on actual relevant standardization proposals and how to use these approaches, and they should be aware of actual research topics.

### Content

Workflow Management Systems (WFMS) support the management of business processes according to pre-defined process descriptions. Managing processes flexibly, i.e., handle deviations, e.g., in order to catch exceptions, adapt processes to modified process environments or to support ad-hoc workflows, becomes more and more important.

The course starts with discussing WFMS in the context of business-information systems and their relationship with the more common business-process modelling. Petri nets and pi-calculus are introduced as basic formalisms. Then, methods to model workflows and the design process for workflow-management applications are presented in detail and supplemented with exercises.

An advanced aspect is new research in WFMS technology. In particular, the use of internet techniques like web services and standardization approaches for process modeling, orchestration, and choreography in service-oriented architectures will be presented.

In the realization part of the course, various implementation techniques and architectural issues to realize workflow-management systems as well as diverse system types and concrete workflow-management systems are presented.

Further, the course presents application-driven procedures for changing and adapting workflows to new requirements, especially business process reengineering and continuous process improvement.

The course concludes with recent research areas and results, e.g., methods and techniques to support flexible, adaptive workflows, security of workflows and process mining.

### Media

Slides.

### Literature

- Matthias Weske: Business Process Management. Springer, 2007
- Frank Leymann, Dieter Roller: Production Workflows - Concepts and Techniques. Prentice-Hall, 2000
- W.M.P. van der Aalst: Workflow Management: Models, Methods, and Systems. MIT Press, 368 pp., 2002
- W.M.P. van der Aalst: Workflow Management: Models, Methods, and Systems. MIT Press, 368 pp., \$40.00, ISBN 0-262-01189-1, 2002
- Michael Havey: Essential Business Process Modeling. O'Reilly Media, Inc., 2005
- S. Jablonski, M. Böhm, W. Schulze (Hrsg.): Workflow-Management - Entwicklung von Anwendungen und Systemen. dpunkt-Verlag, Heidelberg, 1997

### Elective literature

Will be announced in the lecture.

## Course: Managing New Technologies [26291]

**Coordinators:** Thomas Reiß

**Part of the modules:** Business Organization: Theory and Management Perspective (p. 42)[IW4WWORG]

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

### Learning Control / Examinations

Written exam 100% following §4, Abs. 2.

### Conditions

None.

### Learning Outcomes

New technologies can contribute substantially to the international competitiveness of different industrial sectors. This course provides the necessary knowledge for understanding how industrial enterprises and policy-makers are dealing with the challenge to realise in time the potentials of new technologies and to use them most efficiently. Key tasks of the management of new technologies will be practised.

### Content

The course provides an overview of the international development of a selected number of key technologies such as biotechnology, nanotechnology, neurotechnologies, converging technologies. Methods for monitoring new technologies including foresight approaches will be presented and the economic and social impacts of new technologies will be discussed.

### Media

Slides.

### Literature

- Hausschildt/Salomo: Innovationsmanagement; Borchert et al.: Innovations- und Technologiemanagement;
- Specht/Möhrle; Gabler Lexikon Technologiemanagement

## Course: Management of Business Networks [26452]

**Coordinators:** Christof Weinhardt, Jan Kraemer

**Part of the modules:** Information, Market, and Service Engineering (p. 30)[IW4WWIMSE], Service Management (p. 35)[IW4WWSER1]

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

### Learning Control / Examinations

The assessment of this course is a written examination (60 min) (following §4(2), 1 SPO) and by submitting written papers as part of the exercise (following §4, Abs. 2, 3 SPO). The total grade for this lecture will consist to 50% of the grade achieved in the written mid term examination, to 10% of the assignments during the exercises, and to 40% of a project work, which includes a term paper and a presentation.

### Conditions

None.

### Learning Outcomes

The student will become acquainted with the theoretical fundamentals of economic networks and how to manage them. Support of economic networks by information systems will be accomplished by several case studies, which will be worked on by groups autonomously. Basic knowledge of organisation theory, network analysis, strategic & operative management and logic systems will be communicated to the student. Furthermore, he will have a focused view on the mechanisms and supporting tools for interaction between companies, especially in negotiations and negotiation-supporting systems. In small groups, the student is trained in team-oriented and autonomous working techniques. Within this domain, the student will be trained to seek and read relevant technical literature in English, the language of science, and to adopt it to a specific problem.

### Content

The significant and lasting impact of web-based business-to-business (B2B) networks has just recently become apparent. The exploratory phase during the first Internet hype bred a variety of approaches which were often bold in business nature, yet simple and unfounded in system architecture. Only very few survived and proved sustainable. Nowadays web-based B2B networks are increasingly reappearing and even promoted by major traditional companies and governments. However, this new wave of networks is more mature and more powerful in functionality than their predecessors. As such they provide not only auction systems but also facilities for electronic negotiation. This implies a shift from price-focused to relationship-oriented trading. But what motivates this shift? Why do firms enter business networks? How can these networks be best supported by IT? The course intends to resolve these questions. Firstly, an introduction in organization theory will be given. Secondly, the problems of networks will be addressed. Thirdly, an analysis of how IT can alleviate those problems will be undertaken.

### Media

Powerpoint presentations, recorded lecture available on the internet, (if circumstances allow videoconferencing).

### Literature

- Milgrom, P., Roberts, J., Economics, Organisation and Management. Prentice-Hall, 1992.
- Shy, O., The Economics of Network Industries. Cambridge, Cambridge University Press, 2001.
- Bichler, M. The Future of e-Markets - Multi-Dimensional Market Mechanisms. Cambridge, Cambridge University Press, 2001.

## Course: Management of IT-Projects [25784]

**Coordinators:** Roland Schätzle

**Part of the modules:** e-Collaboration (p. 19)[IW4INECOLL]

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

### Learning Control / Examinations

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation of the Master of Science programme in Information Engineering and Management in the first week after lecture period.

### Conditions

None.

### Learning Outcomes

Students know the terminology of IT project management and typical used methods for planning, handling and controlling. They are able to use methods appropriate to current project phases and project contexts and they know how to consider organisational and social impact factors.

### Content

The lecture deals with the general framework, impact factors and methods for planning, handling, and controlling of IT projects. Especially following topics are addressed:

- project environment
- project organisation
- project planning including the following items:
  - plan of the project structure
  - flow chart
  - project schedule
  - plan of resources
- effort estimation
- project infrastrukt
- project controlling
- risk management
- feasibility studies
- decision processes, conduct of negotiations, time management.

### Media

Slides, access to internet resources.

### Literature

- B. Hindel, K. Hörmann, M. Müller, J. Schmied. Basiswissen Software-Projektmanagement. dpunkt.verlag 2004
- Project Management Institute Standards Committee. A Guide to the Project Management Body of Knowledge (PMBok guide). Project Management Institute. Four Campus Boulevard. Newton Square. PA 190733299. U.S.A.

Further literature is given in each lecture individually.

**Course: IT Complexity in Practice [25764]**

**Coordinators:** Detlef Seese, Kreidler  
**Part of the modules:** e-Collaboration (p. [19](#))[IW4INECOLL]

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

**Learning Control / Examinations**

see German version.

**Conditions**

see German version.

**Learning Outcomes**

see German version.

**Content**

see German version

**Literature****Elective literature:**

Will be announced in the lecture.

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

**Coordinators:** Yvonne Matz, Peter Sester

**Part of the modules:** Law of the Information Economy (p. 27)[IW4INJUNWI], Law of the Information Society (p. 28)[IW4INJURDIG]

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

### Learning Control / Examinations

Assessment will consist of an 1h written exam following §4, Abs. 2, 1 of the SPO.

### Conditions

None.

### Learning Outcomes

It is the aim of this course to provide students with knowledge in the area of trademark rights in the national as well as the European and International context. The course deals with the structure of trademark rights, especially with the procedures of registration and the claims, that result from the infringements of trademark rights, as well as with the right of other marks in the MarkenG.

### Content

The course deals with the subject matter of trademark rights: what is a trademark, how can I get the registration of a trademark, what rights and claims do owner of trademarks have, which other marks do exist? The students shall learn about the rules of national, European and international trademark law.

### Literature

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

## Course: Market Engineering: Information in Institutions [26460]

**Coordinators:** Christof Weinhardt, Jan Kraemer, Clemens van Dinther, Simon Caton

**Part of the modules:** Information and Market Engineering (p. 32)[IW4WWIMSE1], Information, Market, and Service Engineering (p. 30)[IW4WWIMSE], Service Engineering (p. 33)[IW4WWIMSE2]

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

### Learning Control / Examinations

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

### Conditions

None.

### Learning Outcomes

The students

- understand the role of an economist as an engineer to design markets
- compare different markets and market mechanisms to evaluate their efficiency
- apply game theoretic modelling and mechanism design as well as auction theory for interdisciplinary evaluation.

### Content

The ongoing advancements in information technology have revolutionized traditional business processes and given rise to electronic marketplaces. In contrast to physical marketplaces, electronic markets do not just evolve, but must be carefully designed, implemented and monitored and evaluated. Moreover electronic markets demand open and flexible platforms as well as adequate standards and information services. Future Market Engineers must therefore be able to consider the economic, legal and technological dimension of markets simultaneously. The lecture focuses on the discussion of (1) Microstructure, (2) IT infrastructure, and (3) Business Structure of electronic markets. Hence, students will be taught the economic incentives that a market can impose on market participants, development models for implementing markets, and business models for the application of markets.

### Media

- Powerpoint,
- eLearning Platform Ilias

### Literature

1. Roth, A., The Economist as Engineer: Game Theory, Experimental Economics and Computation as Tools for Design Economics. *Econometrica* 70(4): 1341-1378, 2002.
2. Weinhardt, C., Holtmann, C., Neumann, D., Market Engineering. *Wirtschaftsinformatik*, 2003.
3. Wolfstetter, E., Topics in Microeconomics - Industrial Organization, Auctions, and Incentives. Cambridge, Cambridge University Press, 1999.
4. Smith, V. „Theory, Experiments and Economics“, *The Journal of Economic Perspectives*, Vol. 3, No. 1, 151-69 1989



**Course: Marketing and Innovation [25165]****Coordinators:** Wolfgang Gaul**Part of the modules:** Marketing Research (p. [37](#))[IW4WWMAR1], Marketing (p. [36](#))[IW4WWMAR]

ECTS Credits	Hours per week	Term	Instruction language
2.5	1/1	Winter term	de

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

None.

**Learning Outcomes****Content**

**Course: Marketing and Operations Research [25156]****Coordinators:** Wolfgang Gaul**Part of the modules:** Quantitative Marketing and OR (p. [38](#))[IW4WWMAR2], Marketing (p. [36](#))[IW4WWMAR]

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

**Learning Control / Examinations**

See module description.

**Conditions**

Basics of Operations Research are required.

**Learning Outcomes****Content****Literature**

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

**Course: Practical Course in Information Engineering and Management (Master) [26510p]****Coordinators:** Andreas Geyer-Schulz**Part of the modules:** Information, Market, and Service Engineering (p. 30)[IW4WWIMSE], Information and Market Engineering (p. 32)[IW4WWIMSE1], Service Engineering (p. 33)[IW4WWIMSE2]

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

**Learning Control / Examinations**

The assessment of this course is according to §4(2), 3 of the examination regulation in form of an examination of a course work and its presentation.

**Conditions**

The Practical Course is an extension to the lecture *Master Seminar in Information Engineering and Management*. The dates of these lectures coincide.

**Learning Outcomes**

The student is able

- to work on a given question in a practical manner, e.g. conduct a market study, implement an algorithm.
- to communicate the work written as well as verbally in a scientific adequate manner.
- to identify problems that occur during the work, to discuss them and to develop solution approaches for them.

**Content**

The Practical Course is an extension of the *Master Seminar in Information Engineering and Management*. The topic treated in the seminar is extended by a practical work. The practical work may be the conduction of a small market study of the implementation of an algorithm.

A report has to be written apart and has to be presented in the seminar.

**Remarks**

The Practical Course is an extension of the Master-Seminar and does not require extra lecture lessons.

## Course: Master Seminar in Information Engineering and Management [26510]

**Coordinators:** Andreas Geyer-Schulz

**Part of the modules:** Information, Market, and Service Engineering (p. 30)[IW4WWIMSE], Information and Market Engineering (p. 32)[IW4WWIMSE1], Service Engineering (p. 33)[IW4WWIMSE2]

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

### Learning Control / Examinations

The assessment of this course is according to §4(2), 3 of the examination regulation in form of an examination of the written seminar thesis and a presentation.

The grade is given, if the presentation is held and the seminar thesis is handed in.

The grade of this course is based on the grade of the seminar thesis. The presentation can improve or worsen the grade of the seminar thesis by up to two grade levels (up to 0.7 grades).

### Conditions

None.

### Learning Outcomes

The student is able to

- to perform a literature search for a given topic, to identify, find, value and evaluate the relevant literature.
- to write his seminar thesis of 15-20 pages in a structured scientific manner.
- to communicate his results in a presentation with discussion afterwards.

### Content

The seminar serves on one hand to improve the scientific working skills. On the other hand, the student should work intensively on a given topic and develop a scientific work, that is based on a profound literature research.

**Course: Mobile Communications [24643]**

**Coordinators:** Oliver Waldhorst  
**Part of the modules:** Advanced Infrastructures (p. 24)[IW4INNET]

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

**Learning Control / Examinations**

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

**Conditions**

None.

**Recommendations**

Knowledge of the lectures *Introduction in Computer Networks* [24519] (or similar lectures) and *Telematics* [24128].

**Learning Outcomes**

The goal of the course is to introduce the technical foundations of mobile communication systems (signal propagation, medium access, etc.). An additional focus is on topics of current research (Mobile IP, Ad hoc Networks, Mobile TCP, etc.).

**Content**

The course "Mobile Communications" uses prominent examples for systems of currently deployed mobile communication systems, to explain typical architectures of such systems, e.g. mobile telecommunication systems, wireless personal, local, and metropolitan area networks. Additional topics related to current research efforts include TCP/IP-based communication over mobile networks and positioning systems. The goal of the course is not to teach facts on particular architectures and standards, but to show typical problems in mobile communications and present typical solutions. The fundamental principles of digital wireless transmissions including the frequency bands, signal propagation, modulation, and multiplexing are explained by application examples.

**Media**

Slides.

**Literature**

J. Schiller; *Mobilkommunikation*; Addison-Wesley, 2003.

**Elective literature:**

C. Eklund, R. Marks, K. Stanwood, S. Wang; IEEE Standard 802.16: A Technical Overview of the WirelessMAN™ Air Interface for the Broadband Wireless Access; IEEE Communications Magazine, June 2002.

H. Kaaranen, A. Ahtiainen, et. al., *UMTS Networks – Architecture, Mobility and Services*, Wiley Verlag, 2001.

B. O'Hara, A. Petrick, *The IEEE 802.11 Handbook – A Designers Companion* IEEE, 1999.

B. A. Miller, C. Bisdikian, *Bluetooth Revealed*, Prentice Hall, 2002

J. Rech, *Wireless LAN – 802.11-WLAN-Technologien und praktische Umsetzung im Detail*, Verlag Heinz Heise, 2004.

B. Walke, *Mobilfunknetze und ihre Protokolle*, 3. Auflage, Teubner Verlag, 2001.

R. Read, *Nachrichten- und Informationstechnik*; Pearson Studium 2004.

What You Should Know About the ZigBee Alliance <http://www.zigbee.org>.

C. Perkins, *Ad-hoc Networking*, Addison Wesley, 2000.

H. Holma, *WCDMA For UMTS, HSPA Evolution and LTE*, 2007

## Course: Modeling and Simulation of Networks and Distributed Systems [24669]

**Coordinators:** Hannes Hartenstein  
**Part of the modules:** Advanced Infrastructures (p. 24)[IW4INNET]

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

### Learning Control / Examinations

The assessment will consist of a 30 minute written exam according to § 4 Abs. 2 Nr. 1 SPO.

### Conditions

Basic knowledge in computer networks, according to the lectures *Database Systems* and *Introduction in Computer Networks* are required. Additionally the lecture *Wahrscheinlichkeitstheorie und Statistik* is required.

### Learning Outcomes

The goal of this lecture is on the one hand to introduce the theoretical basics of discrete event-based simulation and on the other hand to give insight into the practical work of conducting simulation studies, particularly for Internet protocols and services as well as for ubiquitous networks and systems. Special emphasis is given to the appropriate modeling of the different building blocks of simulation environments for networks and distributed systems.

### Content

The simulation of networks and distributed systems is a means to analyze and evaluate protocols in a quick and cost-efficient way and is therefore a valuable tool in the research of networks and distributed systems. While analytical approaches are often challenged by the complexity of scenarios and field tests are challenged by a high hardware configuration effort and resulting costs, simulations allow for the efficient investigation of the parameter space regarding network topologies, communication patterns and dependencies to other protocols. However, simulation results are only of relevance if the modeling and evaluation has been done accurately. Therefore, the lecture provides the required basics in mathematics and algorithms, practical experience in the use of simulators and simulation tools as well as an illustration of how simulations can be applied to answer recent research questions, e.g. in the field of vehicular networks or social networks.

### Media

Slides

### Literature

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

### Remarks

The course was known as *Simulation von Rechnernetzen* till the winter term 09/10.

## Course: Modern Market Research [25154]

**Coordinators:** Wolfgang Gaul

**Part of the modules:** Marketing (p. 36)[IW4WWMAR], Behavioral Approaches in Marketing and Data Analysis (p. 39)[IW4WWMAR3], Strategy, Innovation and Data Analysis (p. 40)[IW4WWMAR4], Marketing Research (p. 37)[IW4WWMAR1], Quantitative Marketing and OR (p. 38)[IW4WWMAR2]

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

### Learning Control / Examinations

See module description.

### Conditions

Basic knowledge of statistics.

### Learning Outcomes

#### Content

#### Literature

Further literature references are announced in the script.

## Course: Multidisciplinary Risk Research [26328]

**Coordinators:** Ute Werner

**Part of the modules:** Operational Risik Management (p. 44)[IW4WWORM]

ECTS Credits	Hours per week	Term	Instruction language
4.5	3/0	Winter / Summer Term	de

### Learning Control / Examinations

The assessment consists of oral presentations (incl. papers) within the lecture (according to Section 4 (2), 3 of the examination regulation) and a final oral exam (according to Section 4 (2), 2 of the examination regulation).

The overall grade consists of the assessment of the oral presentations incl. papers (50 percent) and the assessment of the oral exam (50 percent).

### Conditions

None.

### Learning Outcomes

Getting an overview of the various theoretical, empirical and methodological approaches used in risk research. Learning to assess disciplinary perspectives and approaches. Detailed examination of at least one theoretical and one methodological approach by the analysis of case studies.

### Content

The course consists of two chapters:

In the theoretical part risk concepts of various disciplines will be discussed as well as categorisations of risk (e.g. technical or natural origin) and of risk carriers. Based on empirical research, processes of risk perception, risk assessment, and risk taking – at the individual, institutional, and global level - are described and explained.

The methodological part of the course deals with hazard research, approaches for identification and mapping of risks and their accumulations, as well as with safety culture research. Using empirical studies, survey methods regarding risk perception and risk assessment will be discussed. Specific problems in the context of intercultural research will be considered too.

### Literature

- U. Werner, C. Lechtenbörger. Risikoanalyse & Risikomanagement: Ein aktueller Sachstand der Risikoforschung. Arbeitspapier 2004
- Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen (WBGU). Welt im Wandel: Strategien zur Bewältigung globaler Umweltrisiken. Jahresgutachten 1998, [http://www.wbgu\\_jg1998.html](http://www.wbgu_jg1998.html).
- R. Löfstedt, L. Frewer. Risk and Modern Society, London 1998.
- <http://www.bevoelkerungsschutz.ch>

### Elective literature:

Additional literature is recommended during the course.

### Remarks

This course is offered on demand. For further information, see: <http://insurance.fbv.uni-karlsruhe.de>

To attend the course please register at the secretary of the chair of insurance science.



## Course: Multicore Computers and Computer Clusters [24112]

**Coordinators:** Victor Pankratius

**Part of the modules:** Software Systems (p. 25)[IW4INSW]

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

### Learning Control / Examinations

Assessment consists of an oral exam (20 min.) following §4, Abs. 2, 1 of the SPO.

### Conditions

None.

### Recommendations

The course requires basic knowledge of C/C++, Java, operating systems, computer architecture. The course is self-contained, but can be taken in conjunction with the summer course „Software Engineering for Modern, Parallel Platforms“.

### Learning Outcomes

Understand basics of systems architecture, programming models, algorithms for parallel shared-memory and distributed-memory systems.

### Content

This course discusses system architectures and programming approaches for parallel shared-memory and distributed-memory systems. For shared-memory systems, the course explains how to write parallel programs in OpenMP, Java, and other models (e.g., Transactional Memory); it elaborates on MPI and ZPL for distributed-memory architectures. The course also discusses basics of networking (Gigabit Ethernet, Myrinet, Infiniband), resource management and scheduling, as well as parallel algorithms needed for cluster programming.

### Media

Lecture presentations

### Literature

#### Elective literature:

Additional literature will be announced in class.

**Course: Multimedia Communications [24132]****Coordinators:** Roland Bless**Part of the modules:** Advanced Infrastructures (p. 24)[IW4INNET]

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

**Learning Control / Examinations**

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

**Conditions**

None.

**Recommendations**

Knowledge of the lectures *Introduction in Computer Networks* [24519] (or similar lectures) and *Telematics* [24128].

**Learning Outcomes**

Objective of the lecture is to present techniques, protocols, and latest developments in Internet-based multimedia communications. Especially in the context of increasing amount of voice communications over the Internet (Voice over IP), key technologies and protocols such as RTP and SIP are intensively discussed so that their function and principles are understood in detail.

**Content**

This lecture describes techniques and protocols to transmit audio and video data over the Internet. Topics are audio/video conferences, audio/video transport protocols, Voice over IP SIP for signaling, establishment and control of multimedia sessions, RTP for transport of multimedia data over the Internet, RTSP for control of A/V streams, ENUM, A/V Streaming, Middleboxes and Caches, DVB, and Video on Demand.

**Media**

Slides. Protocol traces.

**Literature**

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

**Elective literature:**

Stephen Weinstein *The Multimedia Internet* Springer, 2005, ISBN 0-387-23681-3

Alan B. Johnston *SIP – understanding the Session Initiation Protocol* 2nd ed., Artech House, 2004

R. Steinmetz, K. Nahrstedt *Multimedia Systems* Springer 2004, ISBN 3-540-40867-3

Ulrich Trick, Frank Weber: *SIP, TPC/IP und Telekommunikationsnetze*, Oldenbourg, 3. Auflage, 2007

## Course: Nature-inspired Optimisation [25706]

**Coordinators:** Sanaz Mostaghim, Pradyum Shukla  
**Part of the modules:** Advanced Algorithms (p. 18)[IW4INAALG]

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

### Learning Control / Examinations

The assessment consists of a written exam (60 min) (according to Section 4(2), 1 of the examination regulation) and an additional written examination called "bonus exam", 60 min (according Section 4(2), 3 of the examination regulation) or a selection of exercises. The bonus exam may be split into several shorter written tests.

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

### Conditions

None.

### Learning Outcomes

To learn:

1. Different nature-inspired methods: local search, simulated annealing, tabu search, evolutionary algorithms, ant colony optimization, particle swarm optimization
2. Different aspects and limitation of the methods
3. Applications of such methods
4. Multi-objective optimization methods
5. Constraint handling methods
6. Different aspects in parallelization and computing platforms

### Content

any optimization problems are too complex to be solved to optimality. A promising alternative is to use stochastic heuristics, based on some fundamental principles observed in nature. Examples include evolutionary algorithms, ant algorithms, or simulated annealing. These methods are widely applicable and have proven very powerful in practice. During the course, such optimization methods based on natural principles are presented, analyzed and compared. Since the algorithms are usually quite computational intensive, possibilities for parallelization are also investigated.

### Media

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

### Literature

F. Glover and M. Laguna. „Tabu Search” In: Handbook of Applied Optimization, P. M. Pardalos and M. G. C. Resende (Eds.), Oxford University Press, pp. 194-208, 2002. G. Raidl and J. Gottlieb: Empirical Analysis of Locality, Heritability and Heuristic Bias in Evolutionary Algorithms: A Case Study for the Multidimensional Knapsack Problem. Evolutionary Computation, MIT Press, 13(4), pp. 441-475, 2005.

### Weiterführende Literatur:

E. L. Aarts and J. K. Lenstra: „Local Search in Combinatorial Optimization”. Wiley, 1997. D. Corne and M. Dorigo and F. Glover: „New Ideas in Optimization”. McGraw-Hill, 1999. C. Reeves: „Modern Heuristic Techniques for Combinatorial Optimization”. McGraw-Hill, 1995. Z. Michalewicz, D. B. Fogel: „How to solve it: Modern Heuristics”. Springer, 1999. E. Bonabeau, M. Dorigo, G. Theraulaz: „Swarm Intelligence”. Oxford University Press, 1999. A. E. Eiben and J. E. Smith: „Introduction to Evolutionary Computing”. Springer, 2003. K. Weicker: „Evolutionäre Algorithmen”. Teubner, 2002. M. Dorigo, T. Stützle: „Ant Colony Optimization”. MIT Press, 2004. K. Deb: „Multi-objective Optimization using Evolutionary Algorithms”, Wiley, 2003.

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

**Coordinators:** Marcus Schöller

**Part of the modules:** Advanced Infrastructures (p. 24)[IW4INNET]

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

### Learning Control / Examinations

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

### Conditions

None.

### Recommendations

Knowledge of the lectures *Introduction in Computer Networks* [24519] (or similar lectures) and *Telematics* [24128].

### Learning Outcomes

The course aims at teaching fundamental concepts of the design of secure communication protocols. More advanced topics include existing security protocols of the internet and local networks.

### Content

The lecture Network Security: Architectures and Protocols considers challenges and technologies in the design of secure communication protocols, as well as topics of data security and privacy. Complex systems like Kerberos will be discussed explicitly and their design decision considering security aspects will be outlined. A special focus is set on PKI-basics, infrastructures, as well as on specific PKI-formats. Furthermore, an emphasis is set on the commonly used security protocols IPSec, TLS/SSL, and protocols of infrastructure security.

### Media

Slides.

### Literature

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

### Elective literature:

- Charlie Kaufman, Radia Perlman, and Mike Speciner. *Network Security: Private Communication in a Public World*. 2nd Edition. Prentice Hall, New Jersey, 2002.
- Carlisle Adams and Steve Lloyd. *Understanding PKI*. Addison Wesley, 2003
- Rolf Oppliger. *Secure Messaging with PGP and S/MIME*. Artech House, Norwood, 2001.
- Sheila Frankel. *Demystifying the IPsec Puzzle*. Artech House, Norwood, 2001.
- Thomas Hardjono and Lakshminath R. Dondeti. *Security in Wireless LANs and MANs*. Artech House, Norwood, 2005.
- Eric Rescorla. *SSL and TLS: Designing and Building Secure Systems*. Addison Wesley, Indianapolis, 2000.

## Course: Network and IT-Security Management [24149]

**Coordinators:** Hannes Hartenstein

**Part of the modules:** Complex Internet Applications (p. 20)[IW4INIAPP], Advanced Infrastructures (p. 24)[IW4INNET]

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

### 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.

### Conditions

Basics in computer networks, according to the lectures *Database Systems* [24516] and *Introduction in Computer Networks* [24519] and *Networked IT-Infrastructures* [24074] respectively are required.

### Learning Outcomes

The goal of this lecture is to introduce the basics of network and IT-security management. At the end of the lecture, technical as well as underlying management concepts can be applied by the student .

### Content

The lecture covers architectures, models, protocols and tools for controlling and monitoring of heterogeneous networks. Additionally, issues related to security and reliability of computer networks are also covered. The lecture presents technical solutions as well as corresponding management concepts. The first part of the lecture introduces management architecture in particular the Internet management architecture based on the SNMP protocol. Therefore, corresponding tools, platforms, and operational implementations are presented. Afterwards, public IP coordination, current trends, and the evolution of network management are described. In the IT security management part of the lecture the concept of a security process is introduced based on the BSI Grundschutz. Additional topics are access and identity management as well as firewalls, intrusion detection and prevention. Besides theoretical method and concepts, practical examples for the operation of the Steinbuch Centre for Computing (SCC) are shown, for example the design of the fiber-based backbone KITnet or the wireless campus network. Furthermore, the supplemental tutorial extends the acquired theory in a practical way by using tools such as MIB browsers etc.

### Media

Slides

### Literature

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

### Elective literature:

Heinz-Gerd Hegering, Sebastian Abeck, Bernhard Neumair, Integriertes Management vernetzter Systeme - Konzepte, Architekturen und deren betrieblicher Einsatz, dpunkt-Verlag, Heidelberg, 1999.

James F. Kurose, Keith W. Ross, Computer Networking. A Top-Down Approach Featuring the Internet, 3rd ed., Addison-Wesley Longman, Amsterdam, 2004.

Larry L. Peterson, Bruce S. Davie, Computer Networks - A Systems Approach, 3rd ed., Morgan Kaufmann Publishers, 2003.

William Stallings, SNMP, SNMPv2, SNMPv3 and RMON 1 and 2, 3rd ed., Addison-Wesley Professional, 1998.

Claudia Eckert, IT-Sicherheit. Konzepte - Verfahren - Protokolle, 4. Auflage, Oldenbourg, 2006.

Michael E. Whitman, Herbert J. Mattord, Management of Information Security, Course Technology, 2004.

**Course: Next Generation Internet [24674]**

**Coordinators:** Roland Bless  
**Part of the modules:** Advanced Infrastructures (p. 24)[IW4INNET]

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

**Learning Control / Examinations**

Assessment will consist of an oral exam (20 min) following § 4 Abs. 2 Nr. 1 SPO.

**Conditions**

None.

**Recommendations**

Knowledge of the lectures *Introduction in Computer Networks* [24519] (or similar lectures) and *Telematics* [24128].

**Learning Outcomes**

Objective of the lecture is to present latest developments in Internet-based networks and to explain the related advanced methods and techniques that are used. Furthermore, architectural principles of the current Internet are discussed and it is described which new challenges threaten the Internet architecture.

**Content**

In the main focus of the lecture are latest developments in the area of Internet-based network technologies. At first architectural principles of the current Internet are described and discussed. Next, nowadays and future challenges are presented. Methods to support quality of service (QoS), signaling of QoS requirements as well as IPv6 and multicast support for group communications are described. Application of the presented technologies in IP-based networks are discussed. Advanced approaches like active and programmable networks are presented in this lecture and recent developments in peer-to-peer networks.

**Media**

Slides

**Literature**

James F. Kurose, and Keith W. Ross *Computer Networking* 4th edition, Addison-Wesley/Pearson, 2007, ISBN 0-321-49770-8, Chapters 1, 2.6 (P2P), 4 (Network Layer), 75 - 76 (Scheduling, IntServ, DiffServ, RSVP)

**Elective literature:**

Ralf Steinmetz, Klaus Wehrle (Eds) *Peer-to-Peer Systems and Applications* LNCS 3854, Springer 2005  
 M. Blanchet: *Migrating to IPv6: A Practical Guide to Implementing IPv6 in Mobile and Fixed Network*, John Wiley & Sons, ISBN 0-471-49892-0, November 2005

**Course: Public Media Law [24082]****Coordinators:** Christian Kirchberg**Part of the modules:** Law of the Information Economy (p. 27)[IW4INJUNWI], Law of the Information Society (p. 28)[IW4INJURDIG]

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

**Learning Control / Examinations**

Assessment will consist of a written exam following §4, Abs. 2, 1 of the SPO.

**Conditions**

None.

**Learning Outcomes**

As the traditional media (print, radio, TV) the “new media” (online-services and the Internet) is governed by public law, yet with a different extent of regulation and with apparent effects on private law. The main influences for the media law are constitutional law and European community law. The lectures aims at providing an overview of the common grounds and differences of the current media law regime and of the conceivable perspectives of media convergence. Current developments in politics and economics, which are relevant for public media law, will be used as examples in the lecture. Besides, it is planned to attend a court hearing of the Federal Constitutional Court (Bundesverfassungsgericht) and/or the Federal Court (Bundesgerichtshof).

**Content**

Initially, the lecture will deal with the constitutional basis of the media law regime. i.e. the responsibilities of the Federal and the State legislatures, freedom of speech, freedom of information, constitutional media rights (Art. 5 para. 1 Constitutional Law) and its limitations by general laws, the ban on censorship and the counterstatement law. In addition, the European community principles on broadcasting and media law will be part of the lecture. Next will be an overview of the individual media laws, namely the broadcasting law (especially Rundfunkstaatsvertrag) the press law of the States and the statute on the so-called “telemedia” services. Finally, the protection of minors in the media will be dealt with (Act on Protection of Minors and Treaty on the Protection of Minors in the Media).

**Literature**

To understand the legal framework it is necessary for the students to have the relevant statutes, for example “Telemediarecht, Telekommunikations- und Multimediarecht”, beck-Texte im dtv , 7. Auflage 2007.

As an introduction it is recommended to read: Frank Fechner, Medienrecht, Verlag Mohr Siebeck, Verlag Mohr Siebeck, 8. Auflage 2007.

## Course: Optimization in a Random Environment [25687]

**Coordinators:** Karl-Heinz Waldmann

**Part of the modules:** Stochastic Methods in Economics and Engineering (p. 41)[IW4WWOQM1]

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

### Learning Control / Examinations

The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the Prüfungsordnung für Informationswirtschaft. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3.

### Conditions

None.

### Learning Outcomes

Students are enabled to apply their knowledge about techniques and methodology on current problems such as the measurement and evaluation of operational risk as required by the Basel II accord.

Subject matter of the course will be announced in due time.

### Content

The course is concerned with the quantitative analysis of selected problems arising in economics, engineering, and natural sciences. Subject matter of the course will be announced in due time.

### Media

Blackboard, Slides, Flash Animations, Simulation Software

### Literature

Lecture Notes.

### Elective literature:

problem-oriented

### Remarks

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



## Course: Organic Computing [25704]

**Coordinators:** Hartmut Schmeck, Sanaz Mostaghim  
**Part of the modules:** Complex Internet Applications (p. 20)[IW4INIAPP]

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

### Learning Control / Examinations

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

### Conditions

None.

### Learning Outcomes

The student acquires the ability to master methods and concepts of Organic Computing and to demonstrate innovation skills regarding the used methods.

Therefore the course aims at the teaching of fundamentals and methods of Organic Computing within the context of its applicability in practice. On the basis of a fundamental understanding of the taught concepts and methods the students should be able to choose the adequate methods and concepts, if necessary further develop them according to the situation and use them properly when facing related problems in their later job. The students should be capable of finding arguments for the chosen solutions and express them to others.

### Content

The mission of Organic Computing is to tame complexity in technical systems by providing appropriate degrees of freedom for self-organized behaviour adapting to changing requirements of the execution environment, in particular with respect to human needs. According to this vision an organic computer system should be aware of its own capabilities, the requirements of the environment, and it should be equipped with a number of "self-x" properties allowing for the anticipated adaptiveness and for a reduction in the complexity of system management. These self-x properties are self-organisation, self-configuration, self-optimization, self-healing, self-protection and self-explanation. In spite of these self-x properties, an organic system should be open to external control actions which might be necessary to prevent undesired behaviour.

### Media

powerpoint slides with annotations using a tablet pc access to applets and Internet resources lecture recording (camtasia).

### Literature

- Autonomic Computing: Concepts, Infrastructure and Applications. M. Parashar and S. Hariri (Ed.), CRC Press. December 2006.
- Self-Organization in Biological Systems. S. Camazine, J. Deneubourg, N. R. Franks, J. Sneyd, G. Theraulaz and E. Bonabeau. Princeton University Press, 2003.
- Complex Adaptive Systems: An Introduction. H. G. Schuster, Scator Verlag, 2001.
- Introduction to Evolutionary Computing. A. E. Eiben and J. E. Smith. Natural Computing Series, Springer Verlag, 2003. Swarm Intelligence: From Natural to Artificial Systems. Eric Bonabeau, Marco Dorigo and Guy Theraulaz. Oxford University Press, 1999.
- Control of Complex Systems. K. Astrom, P. Albertos, M. Blanke, A. Isidori and W. Schaufelberger. Springer Verlag, 2001.

### Elective literature:

- Adaptive and Self-organising Systems**, Christian Müller-Schloer, Moez Mnif, Emre Cakar, Hartmut Schmeck, Urban Richter, June 2007. Preprint. Submitted to ACM Transactions on Autonomous and Adaptive Systems (TAAS)
- Organic Computing - Addressing Complexity by Controlled Self-organization**, Jürgen Branke, Moez Mnif, Christian Müller-Schloer, Holger Prothmann, Urban Richter, Fabian Rochner, Hartmut Schmeck, In Tiziana Margaria, Anna Philippou, and Bernhard Steffen, *Proceedings of ISoLA 2006*, pp. 200-206. Paphos, Cyprus, November 2006.
- Evolutionary Optimization in Dynamic Environments. J. Branke. Kluwer Academic Publishers, 2002.
- Self-star Properties in Complex Information Systems: Conceptual and Practical Foundations (Lecture Notes in Computer Science. O. Babaoglu, M. Jelasity, A. Montresor, C. Fetzer, S. Leonardi, A. van Moorsel and M. van Steen. Springer Verlag, 2005.
- Design and Control of Self-organizing Systems. C. Gershenson. PhD thesis, Vrije Universiteit Brussel, Brussels, Belgium, 2007.
- VDE / ITG / GI - Positionspapier: Organic Computing - Computer- und Systemarchitektur im Jahr 2010. Juli 2003. it - Information Technology, Themenheft Organic Computing, Oldenbourg Verlag. Volume: 47, Issue: 4/2005.

further references will be announced in class

## Course: Managing Organizations [25902]

**Coordinators:** Hagen Lindstädt

**Part of the modules:** Strategy and Organization (p. 43)[IW4WWORG1], Business Organization: Theory and Management Perspective (p. 42)[IW4WWORG]

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

### Learning Control / Examinations

The assessment will consist of a written exam (60 min) taking place at the beginning of the recess period (according to Section 4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

### Conditions

None.

### Learning Outcomes

The course should enable the participants to assess the strengths and weaknesses of existing organisational structures and rules using systematic criteria. Here concepts and models for designing organisation structures, regulating organisational processes and managing organisational changes are presented and discussed using case studies. The course is structured to relate to actions and aims to give students a realistic view of the opportunities and limits of rational design approaches.

### Content

- Principles of organisational management
- Managing organisational structures and processes: the selection of design parameters
- Ideal-typical organisational structures: choice and effect of parameter combinations
- Managing organisational changes

### Media

Slides.

### Literature

- Laux, H.; Liermann, F.: *Grundlagen der Organisation*, Springer. 6. Aufl. Berlin 2005.
- Lindstädt, H.: *Organisation*, in Scholz, C. (Hrsg.): *Vahlens Großes Personalexikon*, Verlag Franz Vahlen. 1. Aufl. München, 2009.
- Schreyögg, G.: *Organisation. Grundlagen moderner Organisationsgestaltung*, Gabler. 4. Aufl. Wiesbaden 2003.

The relevant excerpts and additional sources are made known during the course.

## Course: Organization Theory [25904]

**Coordinators:** Hagen Lindstädt

**Part of the modules:** Business Organization: Theory and Management Perspective (p. 42)[IW4WWORG]

ECTS Credits	Hours per week	Term	Instruction language
6	2/1	Winter term	de

### Learning Control / Examinations

The assessment consists of a written exam following §4, Abs. 2, 1 of the examination regulation.

### Conditions

None.

### Learning Outcomes

The participants are made familiar with mostly classical principles of economic organisational theory and institutional economics. This includes transaction cost theory and agency-theory approaches, models for the function and design of organisational information and decision-making systems, transfer price models to coordinate the exchange of goals and services within companies, models on incentive systems and relative performance tournaments as well as selected OR optimisation approaches to designing organisational structures. The course therefore lays the basis for a deeper understanding of the advanced literature on this key economic area.

### Content

- Basic considerations and institution-economic principles of organisational theory
- Transfer prices and internal market-price relationships
- Design and coordination without conflicting objectives
- Economic evaluation of information
- Organisation under asymmetric information and conflicting objectives: agency theory principles

### Media

Folien.

### Literature

- Laux, H.; Liermann, F.: Grundlagen der Organisation. Springer, 5. Aufl. Berlin 2003.
- Milgrom, P.; Roberts, J.: Economics, Organization and Management. Prentice Hall, Englewoods Cliffs 1992.

The relevant excerpts and additional sources are made known during the course.

## Course: Parallel Algorithms [24109]

**Coordinators:** Peter Sanders

**Part of the modules:** Advanced Algorithms (p. 18)[IW4INAALG]

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

### Learning Control / Examinations

Assessment will consist of an oral exam (20 min.) following §4, Abs. 2, 2 of the Prüfungsordnung für Informationswirtschaft.

### Conditions

None.

### Recommendations

Knowledge from lectures as *Algorithms I/II* are recommended.

### Learning Outcomes

The Students are to learn basic techniques for the design of parallel algorithms as well as a selection of important parallel algorithms.

### Content

Models and their relationship to real machines:

- Shared memory - PRAM
- Message passing, BSP
- Circuits

Analysis: speedup, efficiency, scalability

Basic techniques:

- SPMD
- Parallel divide and conquer
- Collective communication
- Load balancing

Examples of real algorithms:

- Collective Communication (also for large data sets): broadcast, reduce, prefix sums, all-to-all exchange
- Matrix arithmetic
- Sorting
- List ranking
- Minimum spanning trees
- Load balancing: master worker with adaptive problem size, random polling, random distribution

### Media

Slides (pdf), scientific articles

### Literature

#### Elective literature:

- Sanders, Worsch. Parallele Programmierung mit MPI – ein Praktikum
- Kumar, Grama, Gupta und Karypis. Introduction to Parallel Computing.
- JáJá. An Introduction to Parallel Algorithms

### Remarks

This course is offered irregularly.

**Course: Patent Law [24574]****Coordinators:** N.N.**Part of the modules:** Law of the Information Economy (p. 27)[IW4INJUNWI], Law of the Information Society (p. 28)[IW4INJURDIG]

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

**Learning Control / Examinations**

Assessment will consist of a written exam following §4, Abs. 2, 1 of the SPO.

**Conditions**

None.

**Learning Outcomes**

It is the aim of this course to provide students with knowledge in the area of patent law and the business of technical intellectual property that builds upon, and goes beyond the knowledge the students have already acquired in the general lecture of *Industrial and intellectual property law*. Students shall understand how the legal rules depend upon, and interact with, the economic background and the legislative policy in the field of technical intellectual property, particularly in the field of information and communication technologies. Students shall learn about the rules of national, European and international patent law as well as know-how protection law and to apply these legal rules in practical cases, in particular in the area of utilizing technical intellectual property through agreements and lawsuits. The conflict between the monopoly of a patent and the antitrust law policies in Europe will be reviewed with the students.

**Content**

The course deals with the subject matter of the law of technical intellectual property, in particular inventions, patents, utility models, design patents, know-how, the rights and obligations of employees as creators of technical IP, licensing, limitations and exceptions to patenting, term of protection, enforcement of the rights and defence against these in invalidation and revocation actions. The course does not merely focus on German patent law, but likewise puts European, US and international patent law into perspective. Students shall understand how the legal rules depend upon, and interact with, the economic background and the legislative policy in the field of technical intellectual property, particularly in the field of information and communication technologies. Students shall learn about the rules of national, European and international patent law as well as know-how protection law and to apply these legal rules in practical cases, in particular in the area of utilizing technical intellectual property through agreements and lawsuits. The conflict between the monopoly of a patent and the antitrust law policies in Europe will be reviewed with the students.

**Media**

transparencies

**Literature**

- Schulte, Rainer Patentgesetz Carl Heymanns Verlag, 7. Aufl. 2005 ISBN 3-452-25114-4
- Kraßer, Rudolf, Patentrecht Verlag C.H. Beck, 5. Aufl. 2004 ISBN 3-406-384552

**Elective literature:**

tba in the transparencies

## Course: Personalization and Recommender Systems [26506]

**Coordinators:** Andreas Geyer-Schulz

**Part of the modules:** Information, Market, and Service Engineering (p. 30)[IW4WWIMSE], Service Engineering (p. 33)[IW4WWIMSE2]

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

### Learning Control / Examinations

Assessment consists of a written exam of 1 hour length following §4 (2), 1 of the examination regulation and by submitting written papers as part of the exercise following §4 (2), 3 of the examination regulation.

The course is considered successfully taken, if at least 50 out of 100 points are acquired in the written exam. In this case, all additional points (up to 12) from exercise work will be added. The grades of this lecture are assigned following the table below:

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

### Conditions

None.

### Learning Outcomes

The student

- knows the options and opportunities of personalization especially in the area of Internet based services
- is proficient in different statistical, data-mining, and game theory methods of computing implicit and explicit recommendations
- evaluates recommender systems and compares these with related services

### Content

At first, an overview of general aspects and concepts of personalization and its relevance for service providers and customers is given. Next, different categories of recommender systems are discussed. This includes explicit recommendations like customer reviews as well as implicit services based on behavioral data. Furthermore, the course gives a detailed view of the current research on recommender systems at the Chair of Information Services and Electronic Markets.

### Media

Folien, Aufzeichnung der Vorlesung im Internet.

### Literature

Rakesh Agrawal, Tomasz Imielinski, and Arun Swami. Mining association rules between sets of items in large databases. In Sushil Jajodia Peter Buneman, editor, Proceedings of the ACM SIGMOD International Conference on Management of Data, volume 22, Washington, D.C., USA, Jun 1993. ACM, ACM Press.

Rakesh Agrawal and Ramakrishnan Srikant. Fast algorithms for mining association rules. In Proceedings of the 20th Very Large Databases Conference, Santiago, Chile, pages 487 – 499, Sep 1994.

Asim Ansari, Skander Essegaier, and Rajeev Kohli. Internet recommendation systems. Journal of Marketing Research, 37:363 – 375, Aug 2000.

Christopher Avery, Paul Resnick, and Richard Zweckhauser. The market for evaluations. American Economic Review, 89(3):564 – 584, 1999.

Ibrahim Cingil, Asuman Dogac, and Ayca Azgin. A Broader Approach to Personalization. Communications of the ACM, 43(8):136 – 141, Aug 2000.

Richard O. Duda, Peter E. Hart, and David G. Stork. Pattern Classification. Wiley-Interscience, New York, 2 edition, 2001.

Andreas Geyer-Schulz, Michael Hahsler, and Maximilian Jahn. A customer purchase incidence model applied to recommender services. In R. Kohavi et al., editor, *Proceedings of the WebKDD 2001 – Mining log data across all customer touchpoints*, volume 2356 of *Lecture Notes in Artificial Intelligence LNAI*, pages 25–47, Berlin, 2002. ACM, Springer-Verlag.

Jon M. Kleinberg. Authoritative sources in a hyperlinked environment. *JACM*, 46(5):604–632, sep 1999.

Joseph Konstan, Bradley Miller, David Maltz, Jonathan Herlocker, Lee Gordon, and John Riedl. Grouplens: Applying Collaborative Filtering to Usenet News. *Communications of the ACM*, 40(3):77 – 87, Mar 1997.

Paul Resnick, Neophytos Iacovou, Peter Bergstrom, and John Riedl. Grouplens: An open architecture for collaborative filtering of netnews. In *Proceedings of the conference on Computer supported cooperative work*, pages 175 – 186. ACM Press, 1994.

#### **Elective literature:**

Antoinette Alexander. The return of hardware: A necessary evil? *Accounting Technology*, 15(8):46 – 49, Sep 1999.

Christopher Avery and Richard Zeckhauser. Recommender systems for evaluating computer messages. *Communications of the ACM*, 40(3):88 – 89, Mar 1997.

Steven Bellman, Gerald Lohse, and Eric Johnson. Predictors of Online Buying Behavior. *Communications of the ACM*, 42(12):32 – 38, Dec 1999.

Thomas J. Blischok. Every transaction tells a story. *Chain Store Age Executive with Shopping Center Age*, 71(3):50–56, Mar 1995.

Hans Hermann Bock. *Automatische Klassifikation*. Vandenhoeck und Ruprecht, Göttingen, 1974.

Andrew S.C. Ehrenberg. *Repeat-Buying: Facts, Theory and Applications*. Charles Griffin & Company Ltd, London, 2 edition, 1988.

Wolfgang Gaul, Andreas Geyer-Schulz, Michael Hahsler, and Lars Schmidt-Thieme. eMarketing mittels Recommendersystemen. *Marketing ZFP*, 24:47 – 55, 2002.

Andreas Geyer-Schulz, Michael Hahsler, and Maximilian Jahn. myvu: a next generation recommender system based on observed consumer behavior and interactive evolutionary algorithms. In W. Gaul, O. Opitz, and M. Schader, editors, *Data Analysis – Scientific Modeling and Practical Applications*, volume 18 of *Studies in Classification, Data Analysis and Knowledge Organization*, pages 447 – 457, Heidelberg, Germany, 2000. Springer.

Andreas Geyer-Schulz, Michael Hahsler, and Maximilian Jahn. Educational and scientific recommender systems: Designing the information channels of the virtual university. *International Journal of Engineering Education*, 17(2):153 – 163, 2001.

Mark-Edward Grey. *Recommendersysteme auf Basis linearer Regression*, 2004.

John A. Hartigan. *Clustering Algorithms*. John Wiley and Sons, New York, 1975.

Kevin Kelly. *New Rules for the New Economy: 10 Radical Strategies for a Connected World*. Viking, 1998.

Taek-Hun Kim, Young-Suk Ryu, Seok-In Park, and Sung-Bong Yang. An improved recommendation algorithm in collaborative filtering. In K. Bauknecht, A. Min Tjoa, and G. Quirchmayr, editors, *E-Commerce and Web Technologies, Third International Conference, Aix-en-Provence, France*, volume 2455 of *Lecture Notes in Computer Science*, pages 254–261, Berlin, Sep 2002. Springer-Verlag.

Ron Kohavi, Brij Masand, Myra Spiliopoulou, and Jaideep Srivastava. Web mining. *Data Mining and Knowledge Discovery*, 6:5 – 8, 2002.

G. S. Maddala. *Introduction to Econometrics*. John Wiley, Chichester, 3 edition, 2001.

Andreas Mild and Martin Natter. Collaborative filtering or regression models for Internet recommendation systems? *Journal of Targeting, Measurement and Analysis for Marketing*, 10(4):304 – 313, Jan 2002.

Andreas Mild and Thomas Reutterer. An improved collaborative filtering approach for predicting cross-category purchases based on binary market basket data. *Journal of Retailing & Consumer Services*, 10(3):123–133, may 2003.

Paul Resnick and Hal R. Varian. Recommender Systems. *Communications of the ACM*, 40(3):56 – 58, Mar 1997.

Badrul M. Sarwar, Joseph A. Konstan, Al Borchers, Jon Herlocker, Brad Miller, and John Riedl. Using filtering agents to improve prediction quality in the grouplens research collaborative filtering system. In *Proceedings of ACM Conference on Computer-Supported Cooperative Work, Social Filtering, Social Influences*, pages 345 – 354, New York, 1998. ACM Press.

J. Ben Schafer, Joseph Konstan, and Jon Riedl. Recommender Systems in E-commerce. In *Proceedings of the 1st ACM conference on Electronic commerce*, pages 158 – 166, Denver, Colorado, USA, Nov 1999. ACM.

Upendra Shardanand and Patti Maes. Social information filtering: Algorithms for automating “word of mouth”. In *Proceedings of ACM SIGCHI*, volume 1 of *Papers: Using the Information of Others*, pages 210 – 217. ACM, 1995.

## Course: Lab Advanced Telematics [PrakATM]

**Coordinators:** Martina Zitterbart

**Part of the modules:** Advanced Infrastructures (p. 24)[IW4INNET]

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

### Learning Control / Examinations

#### Conditions

None.

### Learning Outcomes

Students can

- understand and master a concrete protocol or application in the domain of Telematics in detail
- implement protocols or applications in the domain computer networks in a common programming language
- work goal driven based on a given exercise of a given subject independently, but also in a team.

### Content

This lab course examines concrete subjects that were introduced in the corresponding lectures. It is advised but not compulsory to attend the respective lectures before the lab course.

The following subjects are covered:

- Project lab "Sensor Networks"
- Project lab "Future Internet Technologies"
- Lab "Mobile Communications"



## Course: Advanced Lab Applied Informatics [25070p]

**Coordinators:** Andreas Oberweis, Hartmut Schmeck, Detlef Seese, Rudi Studer, Stefan Tai

**Part of the modules:** e-Collaboration (p. 19)[IW4INECOLL]

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

### Learning Control / Examinations

The assessment of this course are practical work, presentations and a written seminar thesis according to §4(2), 3 of the examination regulation. Practical work, presentations and a written thesis are weighted according to the course.

### Conditions

None.

### Learning Outcomes

Students are able to

- implement a prototype at the computer based on the given topic.
- write the thesis with a minimal learning curve by using format requirements such as those recommended by well-known publishers.
- give presentations in a scientific context in front of an auditorium. These techniques are presented and learned during the course.
- present results of the research in written form as generally found in scientific publications.

### Content

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

### Media

Slides, access to internet resources

### Literature

Literature will be given individually.

### Remarks

The title of this course is a generic one. Specific titles and the topics of offered seminars will be announced before the start of a semester in the internet at <http://www.aifb.uni-karlsruhe.de/Lehre>

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

**Coordinators:** Klemens Böhm

**Part of the modules:** Large-Scale Information and Knowledge Management (p. 21)[IW4INLIKIM], Advanced Concepts of Information and Knowledge Management (p. 23)[IW4INLIKIM1]

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

### Learning Control / Examinations

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

### Conditions

None.

### Learning Outcomes

In this practical course, the students should transfer the theoretical knowledge from the lecture “Data Warehousing and Mining” into practice. In this process, the students will also learn how to work with common tools and how to deploy them. In the data warehousing block, the students should learn how to set up data warehouses and should become familiar with the data-cube model. In the data mining block, the students should become familiar with the common data-mining techniques. They will be confronted with the typical problems in data mining and will learn how to develop solutions. Furthermore, the students should learn to work in teams in order to work on various projects successfully.

### Content

The practical course data warehousing and mining will deepen the theoretical knowledge from the lecture “Data Warehousing and Mining”, with a focus on practical aspects and common tools. The course is divided into two blocks, data warehousing and data mining. The data warehousing block focuses on data preprocessing and building data warehouses. The data-mining block roughly follows the KDD process with practical knowledge-discovery examples in businesses. With such examples, the different data-mining concepts are investigated. The focus is on techniques for clustering, classification and discovering frequent itemsets and association rules. Working in teams is another important aspect in the whole course.

### Media

- Slides.
- Practical course notes.

### Literature

#### Elective literature:

- J. Han und M. Kamber: “Data Mining: Concepts and Techniques”, Morgan Kaufmann, 2006.
- I. H. Witten und E. Frank: “Data Mining - Practical Machine Learning Tools and Techniques”, Morgan Kaufmann, 2005.
- D. Hand, H. Mannila und P. Smyth: “Principles of Data Mining”, MIT Press, 2001.
- L. I. Kuncheva: “Combining Pattern Classifiers”, Wiley-Interscience, 2004.
- A. Bauer, H. Günzel: “Data Warehouse Systeme – Architektur, Entwicklung, Anwendung”, dpunkt.verlag, 2004.

## Course: Practical Course Distributed Data Management [praktvd]

**Coordinators:** Klemens Böhm

**Part of the modules:** Large-Scale Information and Knowledge Management (p. 21)[IW4INLIKIM]

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

### Learning Control / Examinations

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

### Conditions

Knowledge about database systems, e.g. from the lectures *Introduction in Computer Networks* and *Database Systems*, as well as basic knowledge of Java programming.

### Learning Outcomes

During this practical course, the students should

1. deepen selected topics from the lecture “Distributed Data Management” in the context of sensor networks,
2. gain experiences in programming sensor nodes,
3. develop self-containedly a solution for a given problem from the research-area of query processing in sensor networks and
4. get experience in developing and programming in teams as well as getting familiar with the according tools.

### Content

Characteristics of modern information systems like massively distributed data creation, query processing over the internet and an increased demand regarding the robustness of such systems require distributed storage and query processing. Traditional database systems initially did not meet these new requirements, but met them by offering additional software extensions. These extensions suffer from the fact that the original system was not designed with a distributed system in mind and therefore the extension either only offer limited functionality or their applicability is tailored to a specific scenario. This course offers a broad introduction into distributed database technology, that does not have the drawbacks of afore mentioned extensions. Furthermore the participants get an in-depth look on selected research topics through theoretical course work and hands-on experience with different distributed database systems: The first block of the course will introduce database schemas for distributed storage and based on this, the participants will use SQL to execute queries over distributedly stored data. The second block of the course will focus on query processing in sensor networks, which is an application of distributed databases, where extensions of standard database technology are not sufficient for several reasons. After an introductional phase into sensor databases, the students will develop a solution to a complex research problem over several weeks. For the development and testing of this solution, we will provide Sun SPOT sensor nodes ([www.sunspotworld.com](http://www.sunspotworld.com)).

### Media

- Slides.
- Practical course notes.

### Literature

Please refer to the literature from the lecture “Distributed Data Management”.

### Elective literature:

Please refer to the literature from the lecture “Distributed Data Management”.

### Remarks

The course is not offered in WS 10/11

## Course: Lab Class Web Services [25820]

**Coordinators:** Stefan Tai, Rudi Studer, Gerhard Satzger, Christian Zirpins

**Part of the modules:** Service Technologies (p. 26)[IW4INSERT]

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

### Learning Control / Examinations

The assessment of this course is according to §4(2), 3 of the examination regulation in form of an examination of the written seminar thesis, a presentation and a project. The final mark is based on the examination of the written seminar thesis and the project but can be upgraded or downgraded according to the quality of the presentation.

### Conditions

The lectures *Service Oriented Computing 1* or *Web Service Engineering* are recommended.

### Learning Outcomes

Students will acquire the technical expertise to apply service-oriented platforms and tools. Thereby, they will be enabled to develop practical solutions for concrete problems of constructing service-oriented IT infrastructure for provision of electronic services over the Internet.

### Content

The "Praktikum (lab class) Web Services" provides a practical introduction to fundamental Web service technologies and their application to support service value networks on the Internet. Based on concrete application scenarios for Web-based business service networks, the class focuses on the development of software solutions for specific aspects of service-oriented IT-infrastructure. This includes the complete development lifecycle of a large-scale software project and its implementation in small project teams.

### Literature

For introduction, the following books are recommended:

- M. P. Papazoglou. *Web Services: Principles and Technology*. Pearson, 2007.
  - G. Alonso, F. Casati, H. Kuno, and V. Machiraju. *Web Services - Concepts, Architectures and Applications*. Springer, 2004.
- Specific literature will be announced in the course.

## Course: Practical Course Web Technologies [24304/24873]

**Coordinators:** Sebastian Abeck, Gebhart, Hoyer, Link, Pansa  
**Part of the modules:** Complex Internet Applications (p. 20)[IW4INIAPP]

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

### Learning Control / Examinations

The assessment of this course consists of the documentation of the exercises and results of the practical course and various presentations as a "Erfolgskontrolle anderer Art" following §4, Abs. 2, 3 of the Prüfungsordnung für Informationswirtschaft.

### Conditions

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

### Learning Outcomes

To comprehend the Web technologies used in a real project environment.  
 To understand and to be able to formulate in one's own words the task of the practical work.  
 To apply the Web technologies in order to solve the task.  
 The results can be documented and presented in a clear and comprehensible way.

### Content

The student becomes a member of one of the project teams of the research group and receives a well-defined task, in which he/she develops a part of an advanced Web application using latest Web technologies.  
 Examples for such tasks are:

- Extension of a Web-based student support system using portal technologies
- Monitoring of an existing Web service implementation using the Java Framework
- Extension of an access control on a service-oriented web application using an existing identity management solution

### Media

Templates to efficiently document the results of the practical work (e.g. project documents, presentation material)

### Literature

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

### Elective literature:

Literature basis of the respective project team

## Course: Practical Course in Algorithm Design [24079p]

**Coordinators:** Peter Sanders, Dorothea Wagner, Marcus Krug

**Part of the modules:** Advanced Algorithms (p. 18)[IW4INAALG]

ECTS Credits	Hours per week	Term	Instruction language
5	4	Winter / Summer Term	de

### Learning Control / Examinations

The assessment consists of an oral exam according to sec. 4 subsec. 2 no. 2 study and examination regulations. In addition there will be multiple projects and a final presentation.

### Conditions

None.

### Recommendations

Knowledge of the lecture Algorithms II is recommended.

### Learning Outcomes

The purpose of the practical course in algorithm design is to make learned knowledge work. The students are given varying topics from algorithmics, which they have to implement in small working groups. Possible Topics are, for example, algorithms for flow problems, shortest path problems, or clustering techniques. In this way students learn to write efficient code.

### Content

In the practical course *Algorithm Engineering* the students are given miscellaneous questions from algorithmics, which they have to implement independently in small working groups. The main focus lies on object oriented programming with Java or C++. Linear programming may also occur.

## Course: Principles of Insurance Management [25055]

**Coordinators:** Ute Werner

**Part of the modules:** Operational Risik Management (p. 44)[IW4WWORM]

ECTS Credits	Hours per week	Term	Instruction language
4	3/0	Summer term	de

### Learning Control / Examinations

The assessment consists of oral presentations (incl. papers) within the lecture (according to Section 4 (2), 3 of the examination regulation) and a final oral exam (according to Section 4 (2), 2 of the examination regulation).

The overall grade consists of the assessment of the oral presentations incl. papers (50 percent) and the assessment of the oral exam (50 percent).

### Conditions

None.

### Learning Outcomes

See German version.

### Content

See German version.

### Literature

- D. Farny. *Versicherungsbetriebslehre*. 2006.
- P. Koch. *Versicherungswirtschaft - ein einführender Überblick*. 2005.
- M. Rosenbaum, F. Wagner. *Versicherungsbetriebslehre. Grundlegende Qualifikationen*. 2002.
- U. Werner. *Einführung in die Versicherungsbetriebslehre. Skript zur Vorlesung*.

### Elective literature:

Will be announced in the lecture.

### Remarks

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

**Course: Quality Control I [25674]****Coordinators:** Karl-Heinz Waldmann**Part of the modules:** Stochastic Methods in Economics and Engineering (p. 41)[IW4WWOQM1]

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

**Learning Control / Examinations**

The assessment consists of an 2h written exam following §4, Abs. 2, 1 of the Prüfungsordnung für Informationswirtschaft combined with quality management II. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3.

**Conditions**

None.

**Learning Outcomes**

The lecture provides students with knowledge of modern techniques in quality management. Students learn to use the techniques, such as control charts, experimental design, efficiently and targeted.

**Content**

Topics overview: Introduction to TQM, Statistical Process Control (control charts), Acceptance Sampling (sampling plans), Design and Analysis of Experiments

**Media**

Blackboard, Slides, Flash Animations.

**Literature**

Lecture Notes

**Elective literature:**

- Montgomery, D.C. (2005): Introduction to Statistical Quality Control (5e); Wiley.

**Remarks**

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



**Course: Quality Control II [25659]****Coordinators:** Karl-Heinz Waldmann**Part of the modules:** Stochastic Methods in Economics and Engineering (p. 41)[IW4WWOQM1]

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

**Learning Control / Examinations**

The assessment consists of an 2h written exam following §4, Abs. 2, 1 of the Prüfungsordnung für Informationswirtschaft combined with quality assurance I. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3.

**Conditions**

None.

**Learning Outcomes**

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

**Content**

Topics overview: Reliability Theory (structure function, reliability of complex systems, modeling and estimating lifetime distributions, systems with repair), Maintenance

**Media**

Blackboard, Slides, Flash Animations.

**Literature**

Lecture Notes

**Elective literature:**

- ROSS, S.M.: Introduction to Probability Models (5 ed). Academic Press, 1993.
- KOHLAS, J.: Zuverlässigkeit und Verfügbarkeit. B.G. Teubner, Stuttgart, 1987.
- BIROLINI, A: Qualität und Zuverlässigkeit technischer Systeme, Springer, Berlin, 1991.

**Remarks**

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

## Course: Randomized Algorithms [24171]

**Coordinators:** Thomas Worsch

**Part of the modules:** Advanced Algorithms (p. 18)[IW4INAALG]

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

### Learning Control / Examinations

Assessment will consist of an oral exam (20 min) following §4, Abs. 2, 2 of the Prüfungsordnung für Informationswirtschaft.

### Conditions

None.

### Learning Outcomes

Students know the important approaches and techniques for the use of randomization in algorithms, as well as tools for their analysis.

Students are able to find weak points in deterministic algorithms, to develop randomized approaches to eliminate them, and to assess them using tools from probabilistic theory.

### Content

Randomised algorithms are not deterministic. Their behavior depends on the outcome of random experiments. One of the first uses is Rabin's randomized test for primality. Meanwhile for a multitude of problems randomized algorithms have been described which are faster (at least in some sense) than deterministic algorithms. In addition sometimes randomized algorithms are easier to understand and/or implement than deterministic algorithms.

During the course not only different kinds of randomized algorithms (Las Vegas, Monte Carlo, ...) are presented; the foundations from probability theory needed e.g. for the analysis of the time complexity are presented, too. Also, important concepts like Markov chains are treated. Since stochastic methods are gaining importance in more and more areas in computer science, the course will also be useful outside the area of randomized algorithms.

Topics: probabilistic complexity classes, routing in hypercubes, game theory, random walks, randomized graph algorithms, randomized hashing, randomized online algorithms

### Media

lecture notes and slides in pdf format;

### Literature

- J. Hromkovic : Randomisierte Algorithmen, Teubner, 2004
- M. Mitzenmacher, E. Upfal: Probability and Computing, Cambridge Univ. Press, 2005
- R. Motwani, P. Raghavan: Randomized Algorithms, Cambridge Univ. Press, 1995

### Elective literature:

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

## Course: Risk Management of Microfinance and Private Households [26354]

**Coordinators:** Ute Werner

**Part of the modules:** Operational Risik Management (p. 44)[IW4WWORM]

ECTS Credits	Hours per week	Term	Instruction language
4.5	3/0	Winter / Summer Term	de

### Learning Control / Examinations

The assessment consists of oral presentations (incl. papers) within the lecture (according to Section 4 (2), 3 of the examination regulation) and a final oral exam (according to Section 4 (2), 2 of the examination regulation).

The overall grade consists of the assessment of the oral presentations incl. papers (50 percent) and the assessment of the oral exam (50 percent).

### Conditions

None.

### Learning Outcomes

Becoming acquainted with starting points for analysing the special risk situation of private households and micro enterprises; learning to synchronize various risk coping instruments, identifying risks of microfinance products and learning to design innovative microfinance products.

### Content

The course consists of two interlocking parts:

In the first part the socio-economic framework as well as the goals and strategies of private-sector risk management are discussed, with an emphasis on insurance decisions. In the second part the issue of small entrepreneurial entities and their specific risk related problems in covering their financial requirements is addressed. Typically their size and other specific characteristics lead to high risks for financial services institutions. After an introduction to the economic principles of microfinance, the institutions working in this sector are presented as well as innovative credit-, savings-, and insurance products (which are often combined), and we'll discuss approaches for performance measurement from the perspectives of customers, suppliers, and investors.

### Media

Scriptum.

### Literature

- H.-U. Vollenweider. *Risikobewältigung in Familie und Haushalt - eine sicherheitsökonomische Studie*. 1986.
- P. Zweifel, R. Eisen. *Versicherungsökonomie*. 2003
- J. Ledgerwood, I. Johnson, J.M. Severino. *Microfinance Handbook: An Institutional and Financial Perspective*. 2001.
- B.M. de Aghion, J. Morduch. *The Economics of Microfinance*. 2005.

### Remarks

This course is offered on demand. For further information, see: <http://insurance.fbv.uni-karlsruhe.de>

To attend the course please register at the secretary of the chair of insurance science.

## Course: Semantic Web Technologies I [25748]

**Coordinators:** Rudi Studer, Sebastian Rudolph, Andreas Harth  
**Part of the modules:** Complex Internet Applications (p. 20)[IW4INIAPP]

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

### Learning Control / Examinations

The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the examination regulation or of an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation.

The exam takes place every semester and can be repeated at every regular examination date.

### Conditions

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

### Learning Outcomes

- Basic knowledge about the main ideas and the realisation of Semantic Web Technologies

### Content

"Semantic Web" denotes an extension of the World Wide Web by meta data and applications in order to make the meaning (semantics) of data on the web usable by intelligent systems, e.g. in e-commerce and internet portals. Central to this is the representation and processing of knowledge in form of ontologies. This lecture provides the foundations for knowledge representation and processing for the corresponding technologies and presents example applications. It covers the following topics:

- Extensible Markup Language (XML)
- Resource Description Framework (RDF) and RDF Schema
- Web Ontology Language (OWL)
- Rule Languages
- Applications

### Media

Slides.

### Literature

- Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, York Sure: Semantic Web - Grundlagen, Springer, 2008 (ISBN 978-3-540-33993-9)
- S. Staab, R. Studer (Editors). Handbook on Ontologies. International Handbooks in Information Systems. Springer 2003.

### Elective literature:

1. Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, Foundations of Semantic Web Technologies. Textbooks in Computing, Chapman and Hall/CRC Press, 2009.
2. G. Antoniou, Grigoris Antoniou, Frank Van Harmelen, A Semantic Web Primer, MIT Press, 2004
3. Uwe Schöning. Logik für Informatiker. Spektrum Akademischer Verlag, 5. Auflage 2000
4. Steffen Hölldobler. Logik und Logikprogrammierung. Synchron Verlag, 3. Auflage 2003
5. Dieter Fensel. Spinning the Semantic Web. 2003 (ISBN 0262062321).
6. Handschuh, Staab. Annotation for the Semantic Web. 2003 (ISBN 158603345X).
7. J. Sowa. Knowledge Representation. Brooks/Cole 1999
8. Tim Berners-Lee. Weaving the Web. Harper 1999 geb. 2000 Taschenbuch.
9. Ian Jacobs, Norman Walsh. Architecture of the World Wide Web, Volume One. W3C Recommendation 15 December 2004. <http://www.w3.org/TR/webarch/>

## Course: Semantic Web Technologies II [25750]

**Coordinators:** Sudhir Agarwal, Stephan Grimm, Elena Simperl, Andreas Harth

**Part of the modules:** e-Collaboration (p. 19)[IW4INECOLL], Complex Internet Applications (p. 20)[IW4INIAPP]

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

### Learning Control / Examinations

Written Examination (60 min) according to §4, Abs. 2, 1 of the examination regulations or oral examination of 20 minutes according to §4, Abs. 2, 2 of the examination regulations.

The exam takes place every semester and can be repeated at every regular examination date.

### Conditions

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

### Learning Outcomes

- Detailed knowledge in knowledge representation with ontologies
- Detailed knowledge of acquisition and management of ontologies
- Introduction to Linked Open Data
- Modeling, acquisition and search of semantic web processes

### Content

The four central components of the Semantic Web are explained in more detail: knowledge representation, -processing, and -modeling; acquisition and management of ontologies and ontology-based meta data; Linked Open Data and its modeling as well as the modeling, the acquisition and search of semantic web processes.

### Media

Slides.

### Literature

- Pascal Hitzler, Sebastian Rudolph, Markus Krötzsch: Foundations of Semantic Web Technologies, Chapman & Hall/CRC, 2009 (ISBN 978-1-420-09050-5)
- S. Staab, R. Studer (Editors). Handbook on Ontologies. International Handbooks in Information Systems. Springer 2003.
- S. Agarwal: Formal Description of Web Services for Expressive Matchmaking Prof. Dr. Rudi Studer, Prof. Dr. Christof Weinhardt, 2007/05/04, Dissertation an der Universität Karlsruhe (TH), Fakultät für Wirtschaftswissenschaften

### Elective literature:

1. Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, Foundations of Semantic Web Technologies. Textbooks in Computing, Chapman and Hall/CRC Press, 2009.
2. G. Antoniou, Grigoris Antoniou, Frank Van Harmelen, A Semantic Web Primer, MIT Press, 2004
3. Uwe Schöning. Logik für Informatiker. Spektrum Akademischer Verlag, 5. Auflage 2000
4. Steffen Hölldobler. Logik und Logikprogrammierung. Synchron Verlag, 3. Edition 2003
5. Dieter Fensel. Spinning the Semantic Web. 2003 (ISBN 0262062321).
6. Handschuh, Staab. Annotation for the Semantic Web. 2003 (ISBN 158603345X).
7. J. Sowa. Knowledge Representation. Brooks/Cole 1999
8. Tim Berners-Lee. Weaving the Web. Harper 1999 geb. 2000 Taschenbuch.
9. Robin Milner. Communicating and Mobile Systems: The Pi Calculus.
10. Sudhir Agarwal, Sebastian Rudolph, Andreas Abecker: Semantic Description of Distributed Business Processes AAAI Spring Symposium - AI Meets Business Rules and Process Management, Stanford, USA, März, 2008
11. Sudhir Agarwal: Semi-Automatic Acquisition of Semantic Descriptions of Web Sites Proceedings of The Third International Conference on Advances in Semantic Processing, IEEE, Sliema, Malta, Oktober, 2009
12. Dean Allemang: Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL, Morgan Kaufmann 2008 (ISBN 978-0123735560)
13. Asuncion Gomez-Perez, Oscar Corcho, Mariano Fernando-Lopez: Ontological Engineering: with examples from the areas of Knowledge Management, e-Commerce and the Semantic Web, Springer 2004 (ISBN 978-1852335519)

## Course: Seminar in Applied Informatics [25070s]

**Coordinators:** Andreas Oberweis, Hartmut Schmeck, Detlef Seese, Rudi Studer, Stefan Tai

**Part of the modules:** e-Collaboration (p. 19)[IW4INECOLL]

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

### Learning Control / Examinations

The assessment is done according to §4(2), 3 of the examination regulation of the Master of Science programme in Information Engineering and Management in form of an evaluation of the seminar presentation and a written seminar report. The weighting of the individual marks (presentation and report) is announced at the beginning of the seminar.

### Conditions

None.

### Learning Outcomes

Students are able to

- do literature search based on a given topic: identify relevant literature, find, assess and evaluate this literature.
- write the seminar thesis (and later the Bachelor-/Masterthesis) with a minimal learning curve by using format requirements such as those recommended by well-known publishers.
- give presentations in a scientific context in front of an auditorium. These techniques are presented and learned during the seminar.
- present results of the research in written form as generally found in scientific publications.

### Content

The seminar intensifies and extends specific topics which are discussed within corresponding lectures. The actual topics are changing each semester. Knowledge of these lecture topics is an advantage but not a precondition.

### Media

Slides, Access to internet resources

### Literature

Literature will be given individually.

### Remarks

The title of this course is a generic one. Specific titles and the topics of offered seminars will be announced before the start of a semester in the internet at <http://www.aifb.uni-karlsruhe.de/Lehre>

## Course: Seminar in Telematics [24074s]

**Coordinators:** Martina Zitterbart, Hannes Hartenstein

**Part of the modules:** Advanced Infrastructures (p. 24)[IW4INNET]

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

### Learning Control / Examinations

The assessment of this course is according to § 4 Abs.2 Nr. 3 SPO in form of an examination of the written seminar thesis and a presentation.

The final mark is based on the examination of the written seminar thesis but can be upgraded or downgraded according to the quality of the presentation.

### Conditions

None.

### Learning Outcomes

Students learn how

- to do a literature study starting from a given subject to identify relevant literature and to review and to evaluate it.
- to identify independently issues that arise from sub-domains of Telematics and to classify approaches to a solution found in the literature.
- to prepare scientific presentations. Techniques are introduced that help to present a subject before an audience in a proper way. Part of this is also to present the topic in a given time frame and to answer questions that may arise from the topic.
- to identify open questions of other presentations and to contribute them to a discussion that follows each presentation.
- to present the results of the literature study in a written document in a way that is common practice for scientific publications.

### Content

In this seminar, the focus is on specific subjects that were introduced in the respective lectures, and on an in-depth discussion of those topics. Hereby, topics from different domains such as Future Internet research, sensor networks, network security, or highly distributed IT systems in the Internet are covered.

## Course: Seminar Information Systems [semis]

**Coordinators:** Klemens Böhm

**Part of the modules:** Large-Scale Information and Knowledge Management (p. 21)[IW4INLIK1M], Advanced Concepts of Information and Knowledge Management (p. 23)[IW4INLIK1M1]

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

### Learning Control / Examinations

The assessment consists of a written seminar thesis and a presentation thereof according to sec. 4 subsec. 2 no. 3 study and examination regulations. The final grade for the seminar will be the grade for the written thesis which can be increased or decreased by up to two grade points ("Notenstufen") according to the performance of the oral presentation. If the course is dropped after topics have been assigned, the seminar grade will be 5.0.

### Conditions

Lectures held at the Information Systems Group related to the current topic of the seminar are strongly recommended.

### Learning Outcomes

Independent preparation and presentation of a seminar topic from the field of information systems adhering to scientific standards.

### Content

The Information Systems Group offers at least one seminar covering selected topics from the wide area of information systems every semester (every seminar at the "Lehrstuhl für Systeme der Informationsverwaltung", which is not an undergraduate seminar, counts as "Seminar Information Systems"). Usually, the topics will be close to current research of the group, e.g., peer-to-peer networks, database systems, data mining, sensor networks and workflow-management systems.

Details will be announced each semester (announcements at the notice boards of the institute and at the homepage of the Information Systems Group).

### Media

Slides.

### Literature

Will be announced for every seminar.

### Elective literature:

Literature from lectures concerning the seminar topic.



## Course: Seminar Information Engineering and Management [SemiIW]

**Coordinators:** Christof Weinhardt

**Part of the modules:** Service Management (p. 35)[IW4WWSER1], Information, Market, and Service Engineering (p. 30)[IW4WWIMSE], Service Engineering (p. 33)[IW4WWIMSE2], Information and Market Engineering (p. 32)[IW4WWIMSE1]

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

### Learning Control / Examinations

The student is evaluated based on the written work, a presentation of the results in front of an audience and his contribution to the discussion

### Conditions

See corresponding module information.

*Business Engineering/Economics Engineering:* Preferably at least one module offered by the institute should have been chosen before attending this seminar.

### Learning Outcomes

The student should be able to do a literature review based on a predefined topic in the context of information engineering and management. The approach comprises the identification of relevant literature according to the topic and an analysis as well as an evaluation of the methods presented in the literature. The student learns to present his results in a paper and in front of an audience on an academic level. This process gives him the knowledge and practice for further research work like a master thesis or a doctoral thesis

### Content

In the seminar the student should learn to apply the research methods to a predefined topic area. The topics are based on research questions in Information Engineering and Management across different industry sectors. This problem analysis requires a interdisciplinary examination.

### Media

- Powerpoint,
- eLearning Platform Ilias
- Software Tools, if necessary

### Literature

The student will receive the necessary literature for his research topic.

### Remarks

- Students from Bachelor and Master Course can visit the seminar. The research topic as well as the evaluation of the work and the presentation will have a different focus between Bachelor and Master Course.
- All the seminars offered at the chair of Prof. Dr. Weinhardt can be chosen. The current topics of the seminars are available at the following homepage: <http://www.im.uni-karlsruhe.de/lehre>.

## Course: Seminar Service Science, Management & Engineering [26470]

**Coordinators:** Stefan Tai, Christof Weinhardt, Gerhard Satzger, Rudi Studer

**Part of the modules:** Service Management (p. 35)[IW4WWSER1], Service Technologies (p. 26)[IW4INSER], Service Engineering (p. 33)[IW4WWIMSE2]

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

### Learning Control / Examinations

The assessment of this course is according to §4(2), 3 SPO in form of an examination of the written seminar thesis (15-20 pages), a presentation and active participation in class.

The final mark is based on the examination of the written seminar thesis but can be upgraded or downgraded according to the quality of the presentation.

### Conditions

See corresponding module information.

Lecture *eServices* [26466] is recommended.

### Learning Outcomes

Autonomously deal with a special topic in the Service Science, Management and Engineering field adhering to scientific standards.

### Content

Each Semester, the seminar will cover topics from a different selected subfield of Service Science, Management & Engineering. Topics include service innovation, service economics, service computing, transformation and coordination of service value networks as well as collaboration for knowledge intensive services.

See the KSRI website for more information about this seminar: <http://www.ksri.kit.edu>

### Literature

The student will receive the necessary literature for his research topic.

## Course: Seminar: Management and Organization [25915/25916]

**Coordinators:** Hagen Lindstädt

**Part of the modules:** Business Organization: Theory and Management Perspective (p. 42)[IW4WWORG]

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

### Learning Control / Examinations

Term paper (50%) and presentation (50%).

### Conditions

See corresponding module information.

### Learning Outcomes

The aim of the seminar is to describe corporate and organisational management approaches, to assess them critically and clarify them using practical examples. The focus is on assessing the models with a view to their applicability and theoretical limits.

### Content

The subjects are redefined each semester on the basis of current issues.

### Media

Slides.

### Literature

The relevant sources are made known during the course.

## Course: Practical seminar Information Engineering and Management [26477]

**Coordinators:** Christof Weinhardt

**Part of the modules:** Information, Market, and Service Engineering (p. 30)[IW4WWIMSE], Service Management (p. 35)[IW4WWSER1], Service Engineering (p. 33)[IW4WWIMSE2], Information and Market Engineering (p. 32)[IW4WWIMSE1]

ECTS Credits	Hours per week	Term	Instruction language
1	0*	Winter / Summer Term	de

### Learning Control / Examinations

The student is evaluated based on the written work, a presentation of the results in front of an audience and his contribution to the discussion

### Conditions

The practical seminar is a supplement to the course seminar Information Engineering and Management [26474] and it can only be chosen in conjunction with the course [26474] in a given semester.

### Learning Outcomes

The student should be able to do a literature review based on a predefined topic in the context of information engineering and management. The approach comprises the identification of relevant literature according to the topic and an analysis as well as an evaluation of the methods presented in the literature. The student learns to present his results in a paper and in front of an audience on a academic level. This process gives him the knowledge and practice for further research work like a master thesis or a doctoral thesis

### Content

As a supplement to the seminar Information Management and Engineering [26474] the student has to analyse the selected topic from course [26474] by applying practical methods, e.g. implementation of algorithms or creating a market survey

### Media

- PowerPoint slides
- eLearning Platform Ilias
- Software Development Tools

### Literature

The student will receive the necessary literature for his research topic.

### Remarks

- Students from Bachelor and Master Course can visit the practical seminar. The research topic as well as the evaluation of the work and the presentation will have a different focus between Bachelor and Master Course.
- All the practical seminars offered at the chair of Prof. Dr. Weinhardt can be chosen. The current topics of the practical seminars are available at the following homepage: <http://www.iism.kit.edu/im/lehre>.
- \*) The practical seminar is a supplement to the seminar Seminar Information Engineering and Management [26474] and does not require additional semester periods per week.

## Course: Practical Seminar Knowledge Discovery [25810]

**Coordinators:** Rudi Studer

**Part of the modules:** Large-Scale Information and Knowledge Management (p. 21)[IW4INLIK1M], Advanced Concepts of Information and Knowledge Management (p. 23)[IW4INLIK1M]

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

### Learning Control / Examinations

The assessment of this course is according to §4(2), 3 of the Prüfungsordnung für Informationswirtschaft in form of an examination of the written seminar thesis, a presentation and a project. The final mark is based on the examination of the written seminar thesis and the project but can be upgraded or downgraded according to the quality of the presentation.

### Conditions

Lecture "Knowledge Discovery" recommended.

### Learning Outcomes

Independent preparation and presentation of a seminar topic from the fields of knowledge discovery or text mining adhering to scientific standards. In case of a practical course, additionally, example implementation and/or experiments.

### Content

The seminar/practical course will cover topics in the field of Knowledge Discovery. Each term, the seminar will cover a different specialization field, e.g.:

- Text Mining,
- Ontology Learning and Information Extraction,
- Inductive Logic Programming,
- Learning with Background Knowledge.

The topics are usually arranged as a seminar talk + practical work to be acknowledged as seminar/practical course. In individual cases, this course can also be acknowledged just as seminar (without practical work). Details will be announced every semester.

### Media

Slides.

### Literature

- Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining, 2005, Addison Wesley
- Christopher Manning and Hinrich Schütze. Foundations of Statistical NLP, MIT Press, 1999.
- Tom Mitchell, Machine Learning, McGraw Hill, 1997.
- Ricardo Baeza-Yates and Berthier Ribeiro-Neto, Modern Information Retrieval, Addison-Wesley, 1999.
- James Allen. Natural Language Understanding, 2nd edition.

**Course: Service Innovation [26468]**

**Coordinators:** Gerhard Satzger, Andreas Neus  
**Part of the modules:** Service Management (p. 35)[IW4WWSER1]

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

**Learning Control / Examinations**

The assessment consists of an 1h written exam following §4(2), 3 SPO and of assignments during the course as an "Erfolgskontrolle anderer Art" following §4(2), 3 SPO.

**Conditions**

None.

**Learning Outcomes**

Understand the difference between innovation and invention, and that disruptive effects can be fast and wide-reaching. Know examples for innovation via processes, organization, business models; see how service and product innovation differ. Understand the link between risk and innovation; be aware of obstacles to innovation and know how to address them.

**Content**

While innovation in manufacturing or agriculture can leverage a considerable body of research, experience and best practice, innovation in services has not reached the same level of maturity. In practice, while many organizations have a well-understood process for innovating in the product business, innovating in services is often still a fuzzy and complex undertaking. In this lecture we will discuss the state of research, compare product and service innovation, understand how innovation diffusion works, examine case studies of service innovation, open vs. closed innovation, how to leverage user communities to drive innovation and understand obstacles, and enablers and how to manage, incentivize and foster service innovation.

**Literature**

- Barras, Richard (1986) Towards a theory of innovation in services. Research Policy 15, 161-173
- Hauschildt, Jürgen und Salomo, Sören (2007) Innovationsmanagement. 4. Auflage, München: Vahlen.
- von Hippel, Erich (2007) Horizontal innovation networks - by and for users. Industrial and Corporate Change, 16:2
- Sundbo, Jon (1997) Management of Innovation in Services. The Service Industries Journal, Vo. 17, No. 3, pp. 432-455

**Elective literature:**

- Benkler, Yochai (2006) The Wealth of Networks: How Social Production Transforms Markets and Freedom. Yale University Press. (Online: <http://www.benkler.org>)
- Christensen, Clayton M. (2003) The Innovator's Dilemma, Harper Collins.
- Kanerva, M.; Hollanders, H. & Arundel, A. (2006) TrendChart Report: Can we Measure and Compare Innovation in Services?
- von Hippel, Erich (2005) Democratizing Innovation. The MIT Press, Cambridge, MA. (Online: <http://web.mit.edu/evhippel/www/books/>)
- Howells, Jeremy & Tether, Bruce (2004) Innovation in Services: Issues at Stake and Trends. Commission of the European Communities, Brussels/Luxembourg. (Online: <http://www.isi.fhg.de/publ/downloads/isi04b25/inno-3.pdf>)
- Miles, I. (2008) Patterns of innovation in service industries. IBM Systems Journal, Vol. 47, No 1
- Morison, Elting E. (1966) Gunfire at Sea: A Case Study of Innovation. In: Men, Machines and Modern Times. The MIT Press, pp. 17-44.

**Course: Service Oriented Computing 1 [25770 ]****Coordinators:** Stefan Tai**Part of the modules:** e-Collaboration (p. 19)[IW4INECOLL], Service Technologies (p. 26)[IW4INSER]

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

**Learning Control / Examinations**

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

**Conditions**

Lecture A/2 [25033] is recommended.

**Learning Outcomes**

The course introduces concepts, methods, and techniques of “service-oriented computing”, including languages for (Web) service description, methods and tools for the development of services, and platforms (middleware, runtimes) for the Web-based deployment, delivery, and execution of services. The course provides a solid technical foundation that enables the student to address the increasingly relevant challenges of developing “service-oriented architectures (SOA)” in the industry.

**Content**

Web services represent the next-generation of Web technology, and are an evolution of conventional distributed middleware. They enable new and improved ways for enterprise computing, including application interoperability and integration, and business process management. Modern software systems are being designed as service-oriented architectures (SOA), introducing increased agility and flexibility at both the software systems and the business level. Web services and SOA thus have a profound impact on software development and the businesses that they support. The course “Service-oriented Computing” introduces the concepts, methods and technology that provide a solid foundation in this area. Topics include:

- Service description
- Service engineering, including development and implementation
- Service composition (aggregation), including process-based service orchestration
- Interoperability formats and protocols
- Service platforms and runtimes (middleware)

**Media**

Slides, access to internet resources.

**Literature**

Will be announced in the lecture.

**Course: Service Oriented Computing 2 [25772]**

**Coordinators:** Stefan Tai, Rudi Studer  
**Part of the modules:** Service Technologies (p. 26)[IW4INSERT]

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

**Learning Control / Examinations**

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

**Conditions**

It is recommended to attend the course *Service-oriented Computing 1* [25770] beforehand.

**Learning Outcomes**

Students will extend their knowledge and proficiency in the area of modern service-oriented technologies. Thereby, they acquire the capability to understand, apply and assess concepts and methods that are of innovative and scientific nature.

**Content**

Building upon basic Web service technologies the lecture introduces select topics of advanced service computing and service engineering. In particular, focus will be placed on new Web-based architectures and applications leveraging Web 2.0, Cloud Computing, Semantic Web and other emerging technologies.

**Literature**

Literature will be announced in the lecture.



**Course: Simulation I [25662]****Coordinators:** Karl-Heinz Waldmann**Part of the modules:** Stochastic Modeling and Optimization (p. 45)[IW4WWSSM]

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

**Learning Control / Examinations**

The assessment consists of an 1h written exam according to Section 4 (2), 1 of the Prüfungsordnung für Informationswirtschaft. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3.

**Conditions**

Foundations in the following fields are required:

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

**Learning Outcomes**

The lecture provides insights into the typical process in planning and conducting simulation studies.

**Content**

As the world is getting more complex it is often not possible to analytically provide key figures of interest without overly simplifying the problem. Thus efficient simulation techniques become more and more important. In the lecture important basic concepts are presented in terms of selected case studies.

Topics overview: Discrete event simulation, generation of random numbers, generating discrete and continuous random variables, statistical analysis of simulated data.

**Media**

Blackboard, Slides, Flash Animations, Simulation Software

**Literature**

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

**Elective literature:**

- A. M. Law / W. D. Kelton: Simulation Modeling and Analysis (3rd ed); McGraw Hill (2000)

**Remarks**

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

**Course: Simulation II [25665]****Coordinators:** Karl-Heinz Waldmann**Part of the modules:** Stochastic Modeling and Optimization (p. 45)[IW4WWSSMI]

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

**Learning Control / Examinations**

The assessment consists of an 1h written exam following §4(2), 1 SPO. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3 ( §4(2), 3 SPO).

**Conditions**

Foundations in the following fields are required:

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

not any

**Learning Outcomes**

The lecture provides insights into the typical process in planning and conducting simulation studies.

**Content**

As the world is getting more complex it is often not possible to analytically provide key figures of interest without overly simplifying the problem. Thus efficient simulation techniques become more and more important. In the lecture important basic concepts are presented in terms of selected case studies.

Topics overview: Variance reduction techniques, simulation of stochastic processes, case studies.

**Media**

Blackboard, Slides, Flash Animations, Simulation Software

**Literature**

- Lecture Notes

**Elective literature:**

- A. M. Law / W. D. Kelton: *Simulation Modeling and Analysis* (3rd ed); McGraw Hill (2000)
- K.-H. Waldmann / U. M. Stocker: *Stochastische Modelle - Eine anwendungsorientierte Einführung*; Springer (2004).

**Remarks**

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

**Course: Software-Evolution [24164]**

**Coordinators:** Klaus Krogmann, Mircea Trifu  
**Part of the modules:** Software Systems (p. 25)[IW4INSW]

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

**Learning Control / Examinations**

The assessment is explained in the module description.

**Conditions**

The successful completion of the course *Software Engineering I* [24518] is required.

**Recommendations**

Knowledge on software engineering and software architectures is recommended.

**Learning Outcomes**

Students which participate in the lecture will learn the special challenges of long-living software systems. Furthermore, they will know the advantages of target-oriented software evolution in order to impact future development of a software system. The students will learn which means and concepts of software evolution are suitable for a certain scenario and which factors impact the software development process. To complement the theoretical foundations, the students will gain insights into practical examples and suitable tools which ease the handling of software-evolution. Participants of the lectures will get to know a cross section of implementation aspect, techniques, management, and concepts. The student will be able to analyse, evaluate, and improve software systems.

**Content**

The lecture software evolution covers the following topics: software development processes, specifics of long-living software systems, evolution scenarios of software systems, software architecture development, re-engineering, implementation techniques, architecture patterns, traceability, software evaluation approaches, maintainability analysis, and tools supporting software evolution.

**Media**

Slides.

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

**Coordinators:** Victor Pankratius, Walter F. Tichy, Frank Otto

**Part of the modules:** Software Systems (p. 25)[IW4INSW]

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

### Learning Control / Examinations

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

### Conditions

Basic knowledge in the fields of software engineering and programming languages.

Basic knowledge of the lecture *Multicore Computers and Computer Clusters* [24112] in the winter term is helpful.

### Recommendations

The course requires basic knowledge of C/C++, Java, operating systems, computer architecture. The course is self-contained, but can be taken in conjunction with the winter course „Multicore Computers and Computer Clusters“.

### Learning Outcomes

Understand basics of parallel programming for shared-memory parallel systems, programming models and languages, and debugging techniques for parallel programs.

### Content

Multicore processors make parallelism available for everyone. This course introduces the students to the basics of software development for parallel shared-memory architectures. In particular, it discusses parallel design patterns, parallelism in modern programming languages, parallel libraries, internals of OpenMP, and debugging techniques for shared memory parallel programs. The course also shows how to use graphics cards (GPGPU) for general-purpose data parallel computations. This course can be taken by Master's students in Computer Science and „Informationswirtschaft“.

### Literature

Will be announced in the lecture.

### Elective literature:

Will be announced in the lecture.

**Course: Software Engineering II [24076]**

**Coordinators:** Ralf Reussner, Walter F. Tichy  
**Part of the modules:** Software Systems (p. 25)[IW4INSW]

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

**Learning Control / Examinations**

The assessment consists of a written exam (approx. 60 minutes) according to section 4 subsection 2 no. 1 study and examination regulations.

**Conditions**

None.

**Recommendations**

The lecture *Software engineering I* should have been attended before.

**Learning Outcomes**

The students learn approaches and techniques for systematic software engineering. The lecture covers advanced topics, such as model-driven software development, maintainability, statistic testing, and others.

**Content**

Requirements engineering, software development processes, software quality, software architectures, MDD, Enterprise Software Patterns software maintainability, software security, dependability, embedded software, middleware, statistic testing

**Media**

Slides, secondary literature

**Literature**

Will be announced in the lecture.

## Course: Social Network Analysis in CRM [26518]

**Coordinators:** Bettina Hoser

**Part of the modules:** Information, Market, and Service Engineering (p. 30)[IW4WWIMSE], Service Engineering (p. 33)[IW4WWIMSE2]

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

### Learning Control / Examinations

Assessment consists of a written exam of 1 hour length following §4 (2), 1 of the examination regulation and by submitting written papers as part of the exercise following §4 (2), 3 of the examination regulation.

The course is considered successfully taken, if at least 50 out of 100 points are acquired in the written exam. In this case, all additional points (up to 12) from exercise work will be added. The grades of this lecture are assigned following the table below:

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

### Conditions

None.

### Learning Outcomes

The objectives of this course are to give students an introduction to and overview of social network analysis as a methodological approach for analysis in different areas of business administration, especially customer relationship management. Theory as well as application of social network analysis will be discussed. Students will learn how to perform and interpret analysis results.

### Content

The trend to view economic and social structures as networks allows to analyze these networks by well established and new methods from mathematics, business administration, sociology and physics. The goal of these analyses are to understand different aspects of these networks: In organizations (internal Marketing): Here networks analysis can help to detect whether hierarchies and official structures are 'alive' or if so called 'hidden organizations' have evolved. In addition such results can reveal inefficient procedures or structures within an organization. In CRM: Within analytical CRM the concept of customer value can be enriched by enclosing the network value that customer offers to the company (Customer Network Value). In Marketing: To successfully implement a viral marketing strategy the knowledge of the structure of customer networks is essential. The dynamics on these networks are relevant if one wants to use these networks for marketing purposes. Internetstructure: For information services, such as e.g. search engines, the identification of relevant nodes and clusters is a the major service provided and thus relevant for business success.

The analysis should identify the relevant (central) nodes in a network, find cliques, describe their connections and, if relevant, describe also the direction of information flow within the network. To achieve this different methods will be discussed during the course.

### Media

Folien

### Literature

Christian Grönroos. Service Management and Marketing : A Customer Relationship Management Approach. Wiley, Chichester, 2 edition, 2000.

Sabrina Helm. Viral marketing: Establishing customer relationships by word-of-mouth. Electronic Markets, 10(3):158–161, Jul 2000.

Dieter Jungnickel. Graphs, Networks and Algorithms. Number 5 in Algorithms and Computation in Mathematics. Springer Verlag, Berlin, 1999.

Leo Katz. A new status index derived from sociometric analysis. *Psychometrika*, 18(1):39–43, Mar 1953.

Jon M. Kleinberg. Authoritative sources in a hyperlinked environment. *JACM*, 46(5):604–632, sep 1999.

Barry Wellman Laura Garton. Social impacts of electronic mail in organizations: A review of research literature. *Communication Yearbook*, 18:434–453, 1995.

Carl D. Meyer. *Matrix Analysis and Applied Linear Algebra*. Society for Industrial and Applied Mathematics, Philadelphia, 2000.

Andrew Richards, William ; Seary. Eigen analysis of networks. *Journal of Social Structure*, 1(2), Feb 2000.

Pacey C. Foster Stepehen P. Borgatti. The network paradigm in organizational research: A review and typology. *Journal of Management*, 29(6):991–1013, 2003.

Mani R. Subramani and Balaji Rajagopalan. Knowledge-sharing and influence in online social networks via viral marketing. *Communications of the ACM*, 46(12):300–307, Dec 2003.

Stanley Wasserman and Katherine Faust. *Social Network Analysis: Methods and Applications*, volume 8 of *Structural Analysis in the Social Sciences*. Cambridge University Press, Cambridge, 1 edition, 1999.

Barry Wellman. Computer networks as social networks. *Science*, 293:2031–2034, Sep 2001.

## Course: Special Topics in Management: Management and IT [25907]

**Coordinators:** Hagen Lindstädt

**Part of the modules:** Strategy and Organization (p. 43)[IW4WWORG1], Business Organization: Theory and Management Perspective (p. 42)[IW4WWORG]

ECTS Credits	Hours per week	Term	Instruction language
2	1/0	Winter / Summer Term	de

### Learning Control / Examinations

The assessment consists of a written exam (30 min) at the beginning of the recess period (according to Section 4(2), 1 of the examination regulation).

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

### Conditions

None.

### Learning Outcomes

The course discusses management questions and concepts that are clearly motivating from a current and practical perspective. Here the integration of IT and process issues into corporate management from the management's perspective is one of the subjects of particular interest. The event takes place in close cooperation with leading, practical managers.

### Content

(Excerpt):

- A summary of current management concepts and questions.

### Media

Slides.

### Literature

The relevant excerpts and additional sources are made known during the course.



**Course: Game Theory II [25369]****Coordinators:** Siegfried Berninghaus**Part of the modules:** Stochastic Modeling and Optimization (p. 45)[IW4WWSSMI]

ECTS Credits	Hours per week	Term	Instruction language
6	2/2	Winter term	de

**Learning Control / Examinations**

Written exam (80 minutes).

**Conditions**

See corresponding module information.

Basic knowledge of mathematics and statistics is assumed.

**Learning Outcomes**

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

**Content**

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

**Media**

Folien, Übungsblätter.

**Literature**

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

**Elective literature:**

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

**Course: Tax Law I [24168]****Coordinators:** Detlef Dietrich**Part of the modules:** Law for Information Companies (p. [29](#))[IW4INJURDIU], Law of the Information Economy (p. [27](#))[IW4INJUIINWI]

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

**Learning Control / Examinations**

The assessment consists of a written exam (approx. 45 minutes) according to section 4 subsection 2 no. 1 study and examination regulations.

**Conditions**

None.

**Learning Outcomes**

The target of the lecture is an introduction to national business tax law. The legal norms, spread on several individual tax laws, which are decisive for the taxation of the companies and their owners, will be treated. The focus is on basic fiscal knowledge realizable in practice as a component of modern business economics.

**Content**

Except for a basic knowledge of the existing German company types and the annual financial statements (balance sheet, statement of earnings), no fiscal previous knowledge is required. The lecture intends to give a current global overview about the most important elements of law. The focus is on trade or business companies in the most common forms such like sole traders, partnerships and corporations.

**Media**

transparancies

**Literature**

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

**Course: Tax Law II [24646]****Coordinators:** Detlef Dietrich**Part of the modules:** Law for Information Companies (p. 29)[IW4INJURDIU], Law of the Information Economy (p. 27)[IW4INJUIINWI]

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

**Learning Control / Examinations**

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

**Conditions**

None.

**Learning Outcomes**

It is the target of the lecture to provide extended knowledge in business administration related theory of taxation in the field of economics and law, based on the general lecture "introduction to corporate tax law". The students obtain the basis for an economic examination of the fiscal prescriptions and are able to assess the impact on business decisions. The emphasis is on such tax law regulations which allow possibilities for action and decision to the taxpayer.

**Content**

The lecture requires basic knowledge of commercial law and company law as well as of earnings tax law. Basic and current questions of German corporate taxation are systematically prepared in topic blocs; foils, leaflets and supplementary references are distributed in the individual sessions. There is room for discussion. A recent text collection of the tax laws will be necessary.

**Media**

transparancies

**Literature**

- Grashoff, Steuerrecht, Verlag C.H. Beck, latest edition.
- Spangemacher, Gewerbesteuer, Band 5, Grüne Reihe, Erich Fleischer Verlag
- Falterbaum/Bolk/Reiß/Eberhart, Buchführung und Bilanz, Band 10, Grüne Reihe, Erich Fleischer Verlag
- Tipke, K./Lang, J., Steuerrecht, Köln, in der neuesten Auflage.
- Jäger/Lang Körperschaftsteuer, Band 6, Grüne Reihe, Erich Fleischer Verlag
- Lippross Umsatzsteuer, Band 11, Grüne Reihe, Erich Fleischer Verlag
- Plückebaum/Wendt/ Niemeier/Schlierenkämper Einkommensteuer, Band 3, Grüne Reihe, Erich Fleischer Verlag

**Course: Markov Decision Models I [25679]****Coordinators:** Karl-Heinz Waldmann**Part of the modules:** Stochastic Models in Information Engineering and Management (p. 14)[IW4WWOR], Stochastic Modeling and Optimization (p. 45)[IW4WWSSMI]

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

**Learning Control / Examinations**

The assessment consists of an 1h written exam following Section 4(2), 1 of the examination regulation. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3 ( according to Section 4(2), 3 of the examination regulation).

**Conditions**

None.

**Learning Outcomes**

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

**Content**

Markov Chains, Poisson Processes, Markov Chains in Continuous Time, Queuing Systems

**Media**

Blackboard, Slides, Flash Animations, Simulation Software

**Literature**

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

**Elective literature:**

Norris, J.R. (1997): Markov Chains; Cambridge University Press

Bremaud, P. (1999): Markov Chains, Gibbs Fields, Monte Carlo Simulation, and Queues; Springer

**Course: Markov Decision Models II [25682]****Coordinators:** Karl-Heinz Waldmann**Part of the modules:** Stochastic Modeling and Optimization (p. 45)[IW4WWSSMI]

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

**Learning Control / Examinations**

The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the Prüfungsordnung für Informationswirtschaft. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3.

**Conditions**

None.

**Learning Outcomes**

The lecture provides students with knowledge on Markov decision processes for analysis to control and optimize stochastic dynamic systems. They are able to apply the theory acquired and to adjust the models to actual problems. They develop the optimality criterion and can solve the resulting optimal value function efficiently to gain optimal policies and the optimal value.

**Content**

Markov decision models: Foundations, optimality criteria, solution of the optimality equation, optimality of simply structured decision rules, applications.

**Media**

Blackboard, Slides, Flash Animations, Simulation Software

**Literature**

Lecture Notes

**Elective literature:**

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

Puterman, M.L. (1994): Markov Decision Processes: Discrete Stochastic Dynamic Programming; John Wiley

**Remarks**

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

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

**Coordinators:** Bruno Neibecker

**Part of the modules:** Marketing (p. 36)[IW4WWMAR], Strategy, Innovation and Data Analysis (p. 40)[IW4WWMAR4]

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

### Learning Control / Examinations

Examination performance will consist of a written exam according to the description of the module (written exam following §4(2), 1 of the Prüfungsordnung Informationswirtschaft).

### Conditions

See corresponding module information.

### Learning Outcomes

(see description of the course)

### Content

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

### Literature

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

## Course: Strategic Management of Information Technology [25788]

**Coordinators:** Thomas Wolf  
**Part of the modules:** e-Collaboration (p. 19)[IW4INECOLL]

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

### Learning Control / Examinations

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

### Conditions

None.

### Learning Outcomes

Students know the outer frame of IT in an enterprise and know which functions IT has within an enterprise. They understand the organization and the content of these functions.

### Content

The following topics will be covered: strategic planning of ICT, architecture of ICT, overall planning of ICT, outsourcing, operation and controlling of ICT.

### Media

Slides, internet resources

### Literature

- Nolan, R., Croson, D.: Creative Destruction: A Six-Stage Process for Transforming the Organization. Harvard Business School Press, Boston Mass. 1995
- Heinrich, L. J., Burgholzer, P.: Informationsmanagement, Planung, Überwachung, Steuerung d. Inform.-Infrastruktur. Oldenbourg, München 1990
- Nolan, R.: Managing the crises in data processing. Harvard Business Review, Vol. 57, Nr. 2 1979
- Österle, H. et al.: Unternehmensführung und Informationssystem. Teubner, Stuttgart 1992
- Thome, R.: Wirtschaftliche Informationsverarbeitung. Verlag Franz Vahlen, München 1990

**Course: Telecommunications Law [24632]****Coordinators:** Indra Spiecker genannt Döhmann**Part of the modules:** Law of the Information Economy (p. 27)[IW4INJUNWI], Law of the Information Society (p. 28)[IW4INJURDIG]

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

**Learning Control / Examinations**

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

**Conditions**

None.

**Learning Outcomes**

Telecommunications is the technical basis of the Information Engineering and Management. In which way for example UMTS is regulated, is of relevant importance for the supply of services in the world of the mobile contents services. The central defaults of the telecommunications regulation are in the telecommunications law (TKG). This was completely amended due to community-legal defaults 2004. The lecture procures for apprehending the basics of legal framework of the information society the essential knowledge in telecommunication law.

**Content**

The lecture offers an overview of the new TKG. The whole range of the regulation is treated: Of the material-legal instruments of the competition-creative economic regulation (market -, entrance -, payment regulation as well as special supervision of abuse) and the non-economic regulation (customer protection; Broadcasting; Assignment of frequencies, numbers and rights of way; secrecy of telecommunications; Data security and public security) up to the institutional arrangement of the regulation. To assist in the understanding the technical and economic bases are clarified as well as community and constitutional default sat at the beginning of the lecture.

**Media**

Content structure

**Literature**

Since the law material is to be partly compiled in the discourse with the studying, a current version of the TKG is to be bring along to the lecture.

Further literature will be announced in the lecture.

**Elective literature:**

tba



**Course: Telematics [24128]****Coordinators:** Martina Zitterbart**Part of the modules:** Advanced Infrastructures (p. 24)[IW4INNET]

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

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

Knowledge of the lecture *Introduction in Computer Networks* [24519] or similar lectures is required.

**Learning Outcomes**

This course details selected protocols, architectures, techniques, and algorithms, which were already presented in the course *Introduction in Computer Networks*. Thus, overall knowledge and knowledge about problems that occur within a world-wide and dynamic network as well as solutions that are applied in order to avoid these problems is imparted in this course.

**Content**

This course addresses protocols, architectures, techniques, and algorithms that are used, e.g., for Internet routing and establishing of reliable end-to-end communication associations. In addition to different media access control mechanisms in local area networks further communication systems, e.g. line-switched ISDN, are detailed. It is intended that students additionally understand which possibilities for network management and administration currently exist.

**Media**

Slides.

**Literature**

S. Keshav. *An Engineering Approach to Computer Networking*. Addison-Wesley, 1997

J.F. Kurose, K.W. Ross. *Computer Networking: A Top-Down Approach Featuring the Internet*. 4rd Edition, Addison-Wesley, 2007

W. Stallings. *Data and Computer Communications*. 8th Edition, Prentice Hall, 2006

**Elective literature:**

- D. Bertsekas, R. Gallager. *Data Networks*. 2nd Edition, Prentice-Hall, 1991
- F. Halsall. *Data Communications, Computer Networks and Open Systems*. 4th Edition, Addison-Wesley Publishing Company, 1996
- W. Haaß. *Handbuch der Kommunikationsnetze*. Springer, 1997
- A.S. Tanenbaum. *Computer-Networks*. 4th Edition, Prentice-Hall, 2004
- Internet standards
- Selected journal articles

## Course: Ubiquitous Computing [24146]

**Coordinators:** Michael Beigl

**Part of the modules:** Complex Internet Applications (p. 20)[IW4INIAPP], Advanced Infrastructures (p. 24)[IW4INNET]

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

### Learning Control / Examinations

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

### Conditions

None.

### Learning Outcomes

The goal of this course is to introduce the foundations, the methods and the techniques of ubiquitous computing. After this course, students have gained knowledge and insights of existing ubiquitous computing systems and are enabled to design and evaluate such systems for the usage in everyday life and industrial environments.

### Content

The course starts with an survey on ubiquitous computing in general and introduces a selection of representative work in this field. Basic paradigms and concepts are introduced, which provide the methodological background for the analysis and evaluation of ubiquitous computing systems. The course continues with an in-depth examination of the requirements and the device technology for embedded ubiquitous systems, communication networks and standards (e.g. Zigbee, RFID). Further, ubiquitous computing middleware is considered. A major aspect is context-aware computing. The emphasis is on the investigation of architectures and algorithms for context recognition in respect to formal and practical aspects. Finally, new human-computer interfaces and possibilities of the human-computer interaction are presented and discussed.

### Media

Slides

### Literature

Mark Weiser The Computer of the 21st Century Scientific American, 1991

Weiser and Brown The Coming Age of Calm Technology Xerox PARC, 1996

Vannevar Bush As we may think The Atlantic Monthly, July 1945

J. Raskin Computers by the Millions An Apple Document from 1979

### Elective literature:

- Cooperstock, J., Fels, S., Buxton, W. & Smith, K.C. Reactive environments: Throwing away your keyboard and mouse Communications of the Association of Computing Machinery (CACM), 40(9), 65-73.
- Want, R., Schilit, B., Adams, N., Gold, R., Petersen, K., Goldberg, D., Ellis, J., Weiser, M. The ParcTab Ubiquitous Computing Experiment Technical Report CSL-95-1, Xerox Palo Alto Research Center, March 1995.
- L. Hallanäs, J. Redström Abstract Information Appliances Symposium on Designing Interactive Systems 2004
- Gemperle, F., Kasabach, C., Stivoric, J., Bauer, M., Martin, R. Design for wearability Wearable Computers Second International Symposium on , 1998 Page(s): 116 -122
- Sinem Coleri Ergen ZigBee/IEEE 802.15.4 Summary September 10, 2004
- Frank Siegemund, Michael Rohs Rendezvous Layer Protocols for Bluetooth-Enabled Smart Devices Extended version. Personal and Ubiquitous Computing Journal, pp. 91-101, October 2003, Springer-Verlag

## Course: Management and Strategy [25900]

**Coordinators:** Hagen Lindstädt

**Part of the modules:** Strategy and Organization (p. 43)[IW4WWORG1]

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

### Learning Control / Examinations

The assessment consists of a written exam (60 min) taking place at the beginn of the recess period (according to §4 (2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

### Conditions

None.

### Learning Outcomes

The participants learn about central concepts of strategic management along the ideal-typical strategy process: internal and external strategic analysis, concept and sources of competitive advantages, their importance when establishing competitive and corporate strategies as well as strategy assessment and implementation. This aims in particular to provide a summary of the basic concepts and models of strategic management, i.e. to provide in particular an action-oriented integration.

### Content

- Corporate management principles
- Strategic management principles
- Strategic analysis
- Competitive strategy: modelling and selection on a divisional level
- Strategies for oligopolies and networks: anticipation of dependencies
- Corporate strategy: modelling and evaluation on a corporate level
- Strategy implementation

### Media

Slides.

### Literature

- Grant, R.M.: *Contemporary Strategy Analysis*. Blackwell, 5. Aufl. Massachusetts 2005.
- Lindstädt, H.; Hauser, R.: *Strategische Wirkungsbereiche von Unternehmen*. Gabler, Wiesbaden 2004.

The relevant excerpts and additional sources are made known during the course.

**Course: Corporate Planning and Operations Research [25158]****Coordinators:** Wolfgang Gaul**Part of the modules:** Marketing (p. [36](#))[IW4WWMAR], Quantitative Marketing and OR (p. [38](#))[IW4WWMAR2]

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

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

Basics of operations research are assumed.

**Learning Outcomes****Content****Literature**

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

**Course: Copyright [24121]****Coordinators:** Thomas Dreier**Part of the modules:** Law of the Information Economy (p. 27)[IW4INJUNWI], Law of the Information Society (p. 28)[IW4INJURDIG]

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

**Learning Control / Examinations**

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

**Conditions**

None.

**Learning Outcomes**

It is the aim of this course to provide students with knowledge in the area of copyright that builds upon, and goes beyond the knowledge the students have already acquired in the general lecture of "Industrial and intellectual property law". Students shall understand how the legal rules depend upon, and interact with, the economic background, legislative policy and information and communication technologies. Students shall learn about the rules of national, European and international copyright law and to apply these legal rules in practical cases.

**Content**

The course deals with the subject matter of copyright, the rights of authors, licensing, limitations and exceptions to copyright, term of protection, neighbouring rights, enforcement and collective administration of rights. The course does not merely focus on German copyright law, but likewise puts European and international copyright law into perspective. Students shall understand how the legal rules depend upon, and interact with, the economic background, legislative policy and information and communication technologies. Students shall learn about the rules of national, European and international copyright law and to apply these legal rules in practical cases.

**Media**

transparencies

**Literature**

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

**Elective literature:**

Additional literature tba in class.

**Remarks**

It is possible that this course will be taught in the summer instead of the winter semester.

## Course: Behavioral Approaches in Marketing [25167]

**Coordinators:** Bruno Neibecker

**Part of the modules:** Marketing (p. 36)[IW4WWMAR], Behavioral Approaches in Marketing and Data Analysis (p. 39)[IW4WWMAR3]

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

### Learning Control / Examinations

Examination performance will consist of a written exam according to the description of the module (written exam following §4(2), 1 of the Prüfungsordnung Informationswirtschaft).

### Conditions

(see description of the module)

### Learning Outcomes

#### Content

This course gives an introduction to consumer behavior and the influence of cognitive and emotional information processing on consumer decision making. The contribution of advertising response models is considered and faced with social and environmental aspects (e.g. cross-cultural influences) on consumer behavior, mass communication and internet advertising. In addition, a scientific case study on the effectiveness of TV-commercials is discussed. Central issues of the course:

Case Studies in brand management and advertising response.

Psychological factors (research design and test marketing / arousal / effectiveness of TV-commercials as case studies).

Emotions in marketing.

Information processing and retention in memory (schema theory / visual information processing).

Complex advertising response models (attitude towards the ad / attitude towards the brand / persuasion / context effects in learning / decision making / Means-end-theory and strategic advertising).

Social processes (culture / subculture / cross cultural influence / product design).

Neuromarketing.

#### Literature

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

## Course: Networked IT-Infrastructures [24074]

**Coordinators:** Wilfried Juling

**Part of the modules:** Advanced Infrastructures (p. 24)[IW4INNET]

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

### Learning Control / Examinations

The assessment consists of a written exam (approx. 60 minutes) according to section 4 subsection 2 no. 1 study and examination regulations.

### Conditions

Dependencies according to the module.

### Learning Outcomes

The goal of this lecture is to introduce the fundamental models, approaches and technologies used in today's digital telecommunication networks. The topics covered in this lecture are strongly aligned with the OSI Reference Model, a broadly accepted layer model for describing communication systems.

### Content

The lecture introduces formal methods to describe communication in general. After a brief discussion covering the basics of signal processing as well as physical constraints of telecommunication technologies, the lecture follows the architectural pattern of the OSI Reference Model to point out its given systematics. Based on elementary network technologies like Ethernet and Token Ring the lecture outlines essential problems concerned with frame alignment, shared or controlled medium access or error processing. Further topics deal with the realization of worldwide networks regarding protocols, technologies and algorithms used to construct them. Particularly, technical solutions and algorithms from the TCP/IP stack of the Internet Reference Model are discussed. Furthermore, the functionality and application scope of modern components to interconnect heterogeneous networks are presented. Finally dedicated communication technologies like ISDN and higher level application protocols like HTTP or SMTP are introduced to indicate the pervasion of network communication technologies towards people.

### Media

Slides.

### Literature

- A.S. Tanenbaum, Computer Networks Prentice Hall, 4. Auflage, ISBN 0130661023, 2002.
- Larry L. Peterson, Bruce S. Davie, Computer Networks - A Systems Approach, 3rd ed., Morgan Kaufmann Publishers, 2003.

### Elective literature:

- F. Halsall, Data Communications, Computer Networks and OSI, Addison-Wesley, 4. Auflage, ISBN 0-201-18244-0, 1997.
- J.F. Kurose, K.W. Ross, Computer Networking - A Top-Down Approach featuring the Internet. Addison-Wesley, 2005.

**Course: Distributed Algorithms [25708]****Coordinators:** Hartmut Schmeck**Part of the modules:** Advanced Algorithms (p. [18](#))[IW4INAALG]

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

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

None.

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

Currently, this course will not be presented



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

**Coordinators:** Andreas Oberweis  
**Part of the modules:** e-Collaboration (p. 19)[IW4INECOLL]

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

### Learning Control / Examinations

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

### Conditions

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

### Learning Outcomes

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

### Content

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

### Media

Slides, access to internet resources.

### Literature

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

### Elective literature:

Further literature is given in each lecture.

## Course: Distributed Data Management [vdh]

**Coordinators:** Klemens Böhm

**Part of the modules:** Large-Scale Information and Knowledge Management (p. 21)[IW4INLIK1M], Advanced Concepts of Information and Knowledge Management (p. 23)[IW4INLIK1M]

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

### Learning Control / Examinations

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

### Conditions

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

### Learning Outcomes

At the end of the course, the participants should be able to explain the pros and cons of distributed data management. They should have understood that subtle differences in the problem formulation can lead to very different solutions. In particular, the participants should be able to explain and differentiate the fundamental approaches to guarantee consistency in a distributed environment and to explain and classify approaches for data management in highly distributed environments (e.g., Peer-to-Peer systems or sensor networks) and for query processing.

### Content

In modern information systems, distribution is a fundamental issue. Centralised, monolithic database architectures will probably not play an important role any more in many scenarios. However, there are various unsolved principal problems in the field of distributed data management, or issues where existing solutions are not satisfactory. Truly, there are many products available, promising to facilitate distributed data management. However, these solutions are not always appropriate, application programmers have to develop large parts of the functionality on their own, or elegant, theoretically solid solutions lead to unsatisfactory runtime behaviour. (Therefore, you should not just choose this course if you are interested in the fundamental problems of distributed data management. If you have a special interest in practical aspects and applications, these topics are important as well.) The course introduces you to the theory of distributed data management and makes you familiar with the corresponding algorithms and methods. Topics of this course include correct and fault-tolerant concurrent executions of transactions in distributed environments (classical solutions as well as very recent developments) and data management in highly distributed environments.

### Media

Slides.

### Literature

- Philip A. Bernstein, Vassos Hadzilacos, Nathan Goodman. Concurrency Control and Recovery In Database Systems. <http://research.microsoft.com/pubs/ccontrol/>
- Weikum, G., Vossen, G. Transactional Information Systems: Theory, Algorithms, and the Practice of Concurrency Control and Recovery, Morgan Kaufmann, 2001.

### Remarks

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

## Course: Civil Law for Advanced [24650]

**Coordinators:** Peter Sester

**Part of the modules:** Law of the Information Economy (p. [27](#))[IW4INJUNWI], Law for Information Companies (p. [29](#))[IW4INJURDIU]

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

### Learning Control / Examinations

The assessment consists of a written exam following §4, Abs. 2, 1 of the Prüfungsordnung für Informationswirtschaft.

### Conditions

None.

### Learning Outcomes

The course intends to build up extensive knowledge in german corporate law, trade law and civil law especially in contract law. It is designed for students who have already passed the courses *Civil Law for Beginners* [24012], *Advanced Civil Law* [24504], and *Commercial and Corporate Law* [24011/24509]. At the end students should be able to think through complex legal and economic questions.

### Content

The course will focus on corporate law, trade law and civil law, especially contract law. We will discuss legal problems on the basis of selected examples in a application orientated way.

### Literature

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

**Course: Law of Contracts [24671]****Coordinators:** Peter Sester**Part of the modules:** Contract Drafting and Internet Law (p. 15)[IW4INJURA]

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

**Learning Control / Examinations**

Assessment will consist of a written exam following §4, Abs. 2, 1 of the SPO.

**Conditions**

None.

**Learning Outcomes**

The course will provide an overview of the forming of an contract. The purpose is to translate legal and economic aspects in a contract to secure the volitional position. The course will also consider international questions.

**Content**

The purpose of the course is to provide students with an understanding of the legal basics of forming a business contract. By means of special examples an overview of typical corporate contracts will be given. The course discusses the Limited (GmbH), ordinary partnership (OHG), limited partnership (KG), European Economic Interest Grouping (EWIV), club (Verein) and the public limited company (Aktiengesellschaft). In addition it will also focus on international relations.

**Literature**

Tba at the beginning of the course.

## Course: Computer Contract Law [24583]

**Coordinators:** Michael Bartsch

**Part of the modules:** Law for Information Companies (p. 29)[IW4INJURDIU], Law of the Information Economy (p. 27)[IW4INJUIINWI]

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

### Learning Control / Examinations

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

### Conditions

None.

### Learning Outcomes

It is the aim of this course to provide students with knowledge in the area of contract formation and formulation in practice that builds upon the knowledge the students have already acquired concerning the legal protection of computer programs. Students shall understand how the legal rules depend upon, and interact with, the economic background and the technical features of the subject. The contract drafts shall be prepared by the students and will be corporately completed during the lecture. It is the aim of the course that students will be able to formulate contracts by themselves.

### Content

The course deals with contracts from the following areas:

- Contracts of programming, licencing and maintaining software
- Contracts in the field of IT employment law
- IT projects and IT Outsourcing
- Internet Contracts

From these areas single contracts will be chosen and discussed (e.g. software maintenance, employment contract with a software engineer). Concerning the respective contract the technical features, the economic background and the subsumption in the national law of obligation (BGB-Schuldrecht) will be discussed. As a result different contractual clauses will be developed by the students. Afterwards typical contracts and conditions will be analysed with regard to their legitimacy as standard business terms (AGB). It is the aim to show the effects of the german law of standard business terms (AGB-Recht) and to point out that contracts are a means of drafting business concepts and market appearance.

### Media

transparancies

### Literature

- Langenfeld, Gerrit Vertragsgestaltung Verlag C.H.Beck, III. Aufl. 2004
- Heussen, Benno Handbuch Vertragsverhandlung und Vertragsmanagement Verlag C.H.Beck, II. Aufl. 2002
- Schneider, Jochen Handbuch des EDV-Rechts Verlag Dr. Otto Schmidt KG, III. Aufl. 2002

### Elective literature:

tba in the transparencies

**Course: Web Engineering [24124]****Coordinators:** Martin Nußbaumer**Part of the modules:** Complex Internet Applications (p. 20)[IW4INIAPP]

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

**Learning Control / Examinations**

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

**Conditions**

None.

**Learning Outcomes**

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

**Content**

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

**Media**

Slides

**Literature**

Will be announced in the lecture.

**Course: Web Service Engineering [25774]**

**Coordinators:** Christian Zirpins  
**Part of the modules:** Service Technologies (p. 26)[IW4INSERT]

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

**Learning Control / Examinations**

The assessment consists of an oral exam (20 min) (following §4(2), 2 SPO).

**Conditions**

The course might be combined with the lectures “Applied Informatics II - IT Systems for e-Commerce” and “Service Oriented Computing 1”.

**Learning Outcomes**

Students will acquire a deep and systematic understanding of service-oriented software systems and their embedding in organizations. Equipped with practical and research-based knowledge, they will be enabled to engineer state-of-art service-oriented applications with Web technologies and gain a broad understanding of tools and methodologies for their own work.

**Content**

The lecture “Web Service Engineering” covers technical and organizational aspects with respect to the development of modern service-oriented software as socio-technical systems in enterprises and Web environments. It introduces background, state-of-technology and emerging trends of methods, tools and processes for application development with Web services. The topics of the lecture include e.g.:

- Web service foundations and base technologies
- Service-oriented software and enterprise architectures (SOA)
- SOA life cycle and development processes
- Analysis and requirements engineering for SOA
- Service-oriented design and modeling
- Construction and testing of Web service applications
- Web service development tools
- Trends: e.g. development with service mashups / cloud services

**Media**

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

**Literature**

Compulsory literature will be announced in the course.

## Course: Knowledge Management [25740]

**Coordinators:** Rudi Studer

**Part of the modules:** Advanced Concepts of Information and Knowledge Management (p. 23)[IW4INLIK1M1]

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

### Learning Control / Examinations

Written Examination (60 min) according to §4, Abs. 2, 1 of the examination regulations or oral examination of 20 minutes according to §4, Abs. 2, 2 of the examination regulations. The exam takes place every semester and can be repeated at every regular examination date.

### Conditions

Basics in logic, e.g. from lecture Foundations of Informatics 1.

### Learning Outcomes

Making students sensitive to the problems of corporate knowledge management, knowledge about the central dimensions of influence as well as of relevant technologies for supporting knowledge management.

### Content

In modern companies, knowledge is increasingly important for fulfilling central tasks (such as continuous business process improvement, increasing innovation, increasing customer satisfaction, strategic planning etc). Therefore, knowledge management has become a critical success factor.

The lecture covers different types of knowledge that play a role in knowledge management, the corresponding knowledge processes (generation, capture, access and usage of knowledge) as well as methodologies for the introduction of knowledge management solutions.

The lecture will emphasize computer-based support for knowledge management, such as:

- Ontology-based Knowledge Management
- Communities of Practice, Collaboration Tools, Social Software
- Business-process Oriented Knowledge Management
- Personal Knowledge Management
- Case Based Reasoning (CBR)

### Media

Slides and scientific publications as reading material.

### Literature

- I. Nonaka, H. Takeuchi: The Knowledge Creating Company. Oxford University Press 1995.
- G. Probst, S. Raub, K. Romhardt: Wissen managen: Wie Unternehmen ihre wertvollste Ressource optimal nutzen. Gabler, Wiesbaden, 5. überarb. Auflage, 2006.
- S. Staab, R. Studer (eds.): Handbook on Ontologies, ISBN 3-540-70999-1, Springer Verlag, 2009.
- A. Back, N. Gronau, K. Tochtermann: Web 2.0 in der Unternehmenspraxis - Grundlagen, Fallstudien und Trends zum Einsatz von Social Software. Oldenbourg Verlag München 2008.
- C. Beierle, G. Kern-Isberner: Methoden wissensbasierter Systeme, Vieweg, Braunschweig/Wiesbaden, 2. überarb. Auflage, 2005

### Elective literature:

1. P. Hitzler, M Krötzsch, S. Rudolph, Y. Sure: Semantic Web: Grundlagen, ISBN 3-540-33993-0, Springer Verlag, 2008
2. Abecker, A., Hinkelmann, K., Maus, H., Müller, H.J., (Ed.): Geschäftsprozessorientiertes Wissensmanagement, Mai 2002.VII, 472 S. 70 Abb. Geb. ISBN 3-540-42970-0, Springer Verlag
3. Dieter Fensel. Spinning the Semantic Web. 2003 (ISBN 0262062321).
4. Tim Berners-Lee. Weaving the Web. Harper 1999 geb. 2000 Taschenbuch.



## Course: Workflowmanagement-Systems [wms]

**Coordinators:** Jutta Mülle

**Part of the modules:** Advanced Concepts of Information and Knowledge Management (p. 23)[IW4INLIK1], Large-Scale Information and Knowledge Management (p. 21)[IW4INLIK1]

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

### Learning Control / Examinations

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

### Conditions

None.

### Recommendations

Knowledge about database systems, e.g. from the lecture *Database Systems* [24516].

### Learning Outcomes

A goal of the course is that the participants are able to model workflows, to explain modelling aspects and their relationships, to compare modelling methods, and to evaluate the usability of these methods in different application areas. They should understand the technical construction of workflow-management systems with the most important components and different architectures and implementation alternatives. Finally, the participants should have obtained an overview on actual relevant standardization proposals and how to use these approaches, and they should be aware of actual research topics.

### Content

Workflow Management Systems (WFMS) support the management of business processes according to pre-defined process descriptions. Managing processes flexibly, i.e., handle deviations, e.g., in order to catch exceptions, adapt processes to modified process environments or to support ad-hoc workflows, becomes more and more important.

The course starts with discussing WFMS in the context of business-information systems and their relationship with the more common business-process modelling. Petri nets and pi-calculus are introduced as basic formalisms. Then, methods to model workflows and the design process for workflow-management applications are presented in detail and supplemented with exercises.

An advanced aspect is new research in WFMS technology. In particular, the use of internet techniques like web services and standardization approaches for process modeling, orchestration, and choreography in service-oriented architectures will be presented.

In the realization part of the course, various implementation techniques and architectural issues to realize workflow-management systems as well as diverse system types and concrete workflow-management systems are presented.

### Media

Slides.

### Literature

- W.M.P. van der Aalst. The Application of Petri Nets to Workflow Management. The Journal of Circuits, Systems and Computers, Seiten 1-45, Band 7:1, 1998.
- S. Jablonski, M. Böhm, W. Schulze (Hrsg.): Workflow-Management - Entwicklung von Anwendungen und Systemen. dpunkt-Verlag, Heidelberg, 1997
- Frank Leymann, Dieter Roller: Production Workflows - Concepts and Techniques. Prentice-Hall, 2000
- W.M.P. van der Aalst: Workflow Management: Models, Methods, and Systems. MIT Press, 368 pp., 2002
- Michael Havey: Essential Business Process Modeling. O'Reilly Media, Inc., 2005

### Elective literature:

- M. Dumas, Wil M. P. van der Aalst, Arthur H. M. ter Hofstede (eds.): Process-Aware Information Systems. Wiley, 2005
- D. Harel: Statecharts: A Visual Formalism for Complex Systems, Science of Computer Programming Vol. 8, 1987.
- Dirk Wodtke, Gerhard Weikum A Formal Foundation for Distributed Workflow Execution Based on State Charts. Foto N. Afrati, Phokion Kolaitis (Eds.): Database Theory - ICDT '97, 6th International Conference, Delphi, Greece, January 8-10, 1997, Proceedings. Lecture Notes in Computer Science 1186, Springer Verlag, Seiten 230-246, 1997.
- H.M.W. Verbeek, T. Basten, and W.M.P. van der Aalst Diagnosing workflow processes using Woflan. Computing Science Report 99/02, Eindhoven University of Technology, Eindhoven, 1999.

**Remarks**

The module is no longer offered, examination is possible until summer term 2011.

Starting with the winter term 2010/11 the new module *Konzepte und Anwendungen von Workflowsystemen* [IN4INKAW] (5 credit points) is offered.

## Prüfungs- und Studienordnung der Universität Karlsruhe (TH) für den Master-Studiengang Informationswirtschaft

vom 30. April 2006

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.

Aufgrund von §34 Abs. 1, Satz 1 des Landeshochschulgesetzes (LHG) vom 1. Januar 2005 hat der Senat der Universität Karlsruhe (TH) am 25. April 2006 die folgende Studien- und Prüfungsordnung für den Master-Studiengang Informationswirtschaft beschlossen.

Der Rektor hat seine Zustimmung am 30. April 2006 erteilt.

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## **I. Allgemeine Bestimmungen**

### **§ 1 Geltungsbereich; Zweck der Prüfung**

- (1) Diese Master-Prüfungsordnung regelt Studienablauf, Prüfungen und den Abschluss des Studiums im Master-Studiengang Informationswirtschaft an der Universität Karlsruhe (TH).
- (2) Die Master-Prüfung (§17 – 19) 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 Master-Prüfung soll festgestellt werden, ob der Kandidat 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**

- § 2. Aufgrund der bestandenen Master-Prüfung wird der akademische Grad „Master of Science“ (abgekürzt: „M.Sc.“) für den Master-Studiengang Informationswirtschaft (englischsprachig: for the Master Programme Information Engineering and Management) verliehen.

### **§ 3 Regelstudienzeit, Studienaufbau, Umfang des Lehrangebots**

- (1) Die Regelstudienzeit beträgt vier Semester. Sie umfasst Prüfungen und die Master-Arbeit.
- (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. Art, Umfang und Zuordnung der Module zu einem Fach, sowie die Möglichkeiten, Module untereinander zu kombinieren, beschreibt der Studienplan. Die Fächer und ihr Umfang werden in §17 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 30h.
- (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 auch in englischer Sprache angeboten werden.

### **§ 4 Aufbau der Prüfungen**

- (1) Die Master-Prüfung besteht aus einer Master-Arbeit und Fachprüfungen, jede der Fachprüfungen aus einer oder mehreren Modulprüfungen, jede Modulprüfung aus einer oder mehreren Lehrveranstaltungsprüfungen. Eine Lehrveranstaltungsprüfung 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).

### **§ 5 Prüfungsausschuss**

(1) Für den Master-Studiengang 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 wissenschaftlichen 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 Master-Studiengang 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 Master-Studiengang 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 wissenschaftlichen 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 Prüfungsordnung in die Prüfungspraxis der Fakultäten. Er achtet darauf, dass die Bestimmungen der Prüfungsordnung eingehalten werden. 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 Prüfungsordnung.

(4) 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.

(5) 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.

**§ 6 Prüfer und Beisitzer**

- (1) Der Prüfungsausschuss bestellt die Prüfer und die Beisitzenden. Er kann die Bestellung dem Vorsitzenden übertragen.
- (2) Zur Abnahme von Erfolgskontrollen (§4 Abs. 2) sind vorrangig Professoren, Juniorprofessoren, Hochschul- und Privatdozenten zu bestellen.
- (3) Soweit Lehrveranstaltungen von anderen als den unter §6 Abs. 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.

**§ 7 Anmeldung und Zulassung zu den Prüfungen**

- (1) Um zu schriftlichen und/oder mündlichen Prüfungen (§4 Abs. 2, Nr. 1 und 2) in einem bestimmten Modul zugelassen zu werden, muss der Student 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. Darüber hinaus muss sich der Student für jede einzelne Lehrveranstaltungsprüfung, die in Form einer schriftlichen oder mündlichen Prüfung (§4 Abs. 2, Nr. 1 und 2) durchgeführt wird, beim Studienbüro anmelden. Dies gilt auch für die Zulassung zur Master-Arbeit.
- (2) Die Zulassung darf nur abgelehnt werden, wenn der Kandidat in einem mit der Informationswirtschaft vergleichbaren oder einem verwandten Studiengang bereits eine Diplomvorprüfung, Diplomprüfung, Bachelor- oder Masterprüfung nicht bestanden hat, sich in einem Prüfungsverfahren befindet oder den Prüfungsanspruch in einem solchen Studiengang verloren hat. In Zweifelsfällen entscheidet der Prüfungsausschuss.

**§ 8 Durchführung von Prüfungen und Erfolgskontrollen**

- (1) Erfolgskontrollen werden 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 von dem 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 der Prüfer müssen mindestens 6 Wochen vor Semesterbeginn bekanntgegeben werden.

Im Einvernehmen zwischen Prüfer und Kandidat kann die Art der Erfolgskontrolle auch nachträglich geändert werden. Dabei ist jedoch §4 Abs. 3 zu berücksichtigen.

- (3) Eine schriftlich durchzuführende Prüfung kann auch mündlich, eine mündlich durchzuführende Prüfung kann auch schriftlich abgenommen werden. Diese Änderung muss mindestens sechs Wochen vor der Prüfung bekannt gegeben werden.
- (4) Weist ein Kandidat 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, Erfolgskontrol-

len in einer anderen Form zu erbringen.

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

(6) Schriftliche Prüfungen (§4 Abs. 2, Nr. 1) sind in der Regel von zwei Prüfern nach §6 Abs. 2 oder §6 Abs. 3 zu bewerten. Die Note ergibt sich aus dem arithmetischen Mittel der Einzelbewertungen. Entspricht das arithmetische Mittel keiner der in §9 Abs. 2, Satz 2 definierten Notenstufen, so ist auf die nächst bessere 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 Kandidat.

(8) Die wesentlichen Gegenstände und Ergebnisse der mündlichen Prüfung in den einzelnen Fächern sind in einem Protokoll festzuhalten. Das Ergebnis der Prüfung ist dem Kandidaten jeweils am Tag der mündlichen 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 Kandidaten 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 Kandidaten 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.

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

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

(2) Im Master-Zeugnis dürfen nur folgende Noten verwendet werden:

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

Für die Master-Arbeit und die Lehrveranstaltungsprüfungen 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) und
- 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 Leistungsnachweise 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. Module, Lehrveranstaltungen oder Erfolgskontrollen, die bereits in einem Bachelor-Studiengang angerechnet wurden, dürfen in diesem Studiengang nicht noch einmal geprüft und angerechnet werden.

**(6)** Erfolgskontrollen können in Form von Leistungsnachweisen dokumentiert werden. Leistungsnachweise dürfen in Lehrveranstaltungsprüfungen oder Modulprüfungen nur eingerechnet werden, wenn die Benotung nicht nach §9 Abs. 3 erfolgt ist. Die durch Leistungsnachweise zu dokumentierenden Erfolgskontrollen und die daran geknüpften Bedingungen werden im Studienplan festgelegt.

**(7)** Eine Lehrveranstaltungsprüfung 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 wird im Studienplan geregelt. Die differenzierten Lehrveranstaltungsnoten (§9 Abs. 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 Lehrveranstaltungsprüfung endgültig nicht bestanden wurde.



(9) Die Ergebnisse der Modulprüfungen und der Lehrveranstaltungsprüfungen, der Leistungsnachweise und der Master-Arbeit sowie die erworbenen Leistungspunkte werden beim 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 nachgewiesen wird.

(11) Innerhalb der Regelstudienzeit, einschließlich der Urlaubssemester für das Studium an einer ausländischen Hochschule (Regelprüfungszeit), können in einem Fach auch mehr Leistungspunkte erworben werden, als für das Bestehen der Fachprüfung erforderlich sind. In diesem Fall werden bei der Festlegung der Fachnote nur die Modulnoten berücksichtigt, die unter Abdeckung der erforderlichen Leistungspunkte die beste Fachnote ergeben.

(12) Die Gesamtnote der Master-Prüfung, die Fachnoten und die Modulnoten lauten: bei einem Durchschnitt bis 1.5 „sehr gut“ (very good)

bei einem Durchschnitt über 1.5 bis 2.5 „gut“ (good)

bei einem Durchschnitt über 2.5 bis 3.5 „befriedigend“ (satisfactory)

bei einem Durchschnitt über 3.5 bis 4.0 „ausreichend“ (sufficient).

(13) Zusätzlich zu den Noten nach §9 Abs. 2 werden ECTS-Noten für Fachprüfungen, Modulprüfungen und für die Master-Prüfung 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> (Fail) - es sind Verbesserungen erforderlich, bevor die Leistungen anerkannt werden
F		<i>nicht bestanden</i> (FAIL) - es sind erhebliche Verbesserungen erforderlich.

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

(14) Bis zum Aufbau einer entsprechenden Datenbasis wird als Übergangsregel folgende Abbildung von Noten auf ECTS-Noten zur Bildung dieser Skala für alle Module des Masterstudiengangs herangezogen:

Note	ECTS-Note
1.0	A
1.3	A
1.7	B
2.0	B
2.3	B
2.7	C
3.0	C
3.3	C
3.7	D
4.0	E
4.7	FX
5.0	F

Diese Verteilung wird jährlich gleitend über mindestens fünf Jahre mit mindestens 30 Studenten 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.

#### **§ 10 Erlöschen des Prüfungsanspruchs, Wiederholung von Prüfungen und Erfolgskontrollen**

- (1) Kandidaten 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) Kandidaten können eine nicht bestandene mündliche Prüfung (§4 Abs. 2, Nr. 2) einmal wiederholen.
- (3) Wiederholungsprüfungen nach §10 Abs. 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. Ist auch die Wiederholung einer schriftlichen oder mündlichen Prüfung mit nicht ausreichend bewertet worden, so kann der Kandidat einen Antrag an den Rektor auf eine letzte mündliche Prüfung stellen, darüber entscheidet der Rektor. §8 Abs. 3 findet keine Anwendung auf die letzte mündliche Prüfung.
- (6) Hat ein Kandidat eine Erfolgskontrolle nicht bestanden, so sind ihm Umfang und Fristen der Wiederholung der Erfolgskontrolle in geeigneter Weise bekannt zu machen.
- (7) Die Wiederholung einer bestandenen Erfolgskontrolle ist nicht zulässig.
- (8) Eine Fachprüfung ist endgültig nicht bestanden, wenn mindestens ein Modul des Faches endgültig nicht bestanden ist.

(9) Die Master-Arbeit kann bei einer Bewertung mit „nicht ausreichend“ einmal wiederholt werden. Eine zweite Wiederholung der Master-Arbeit ist ausgeschlossen.

(10) Ist gemäß §34 Abs. 2, Satz 3 LHG die Master-Prüfung bis zum Beginn der Vorlesungszeit des achten Fachsemesters dieses Studiengangs einschließlich etwaiger Wiederholungen nicht vollständig abgelegt, so erlischt der Prüfungsanspruch im Studiengang, es sei denn, dass der Student die Fristüberschreitung nicht zu vertreten hat. Die Entscheidung darüber trifft der Prüfungsausschuss.

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

(1) Die Abmeldung von einer Prüfung muss in schriftlicher Form erfolgen. Die Abmeldung von einer schriftlichen Prüfung ohne Angabe von Gründen ist bis zur Ausgabe der Prüfungsaufgaben möglich. Bei mündlichen Prüfungen muss der Rücktritt spätestens drei Werktage vor dem betreffenden Prüfungstermin erklärt werden. Erscheint der Kandidat zum Termin einer schriftlichen oder mündlichen Prüfung (§4 Abs. 2, Nr. 1 und 2) ohne triftige Gründe nicht oder tritt er nach Beginn der Prüfung ohne triftige Gründe von der Prüfung zurück, so gilt die Prüfung als mit „nicht ausreichend“ (5.0) bewertet. Die Sätze 1–4 gelten für Erfolgskontrollen anderer Art (§4 Abs. 2, Nr. 3) entsprechend.

(2) Die für den Rücktritt oder das Versäumnis geltend gemachten Gründe müssen dem Prüfer unverzüglich schriftlich angezeigt und glaubhaft gemacht werden. Bei Krankheit des Kandidaten bzw. eines von ihm zu versorgenden Kindes oder pflegebedürftigen Angehörigen kann die Vorlage eines ärztlichen Attestes verlangt werden. Werden die Gründe anerkannt, so soll der Kandidat die Prüfung zum nächstmöglichen Termin ablegen. Ergebnisse bereits bestandener Erfolgskontrollen sind in diesem Falle anzurechnen.

(3) Versucht der Kandidat, 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. Ein Kandidat, der den ordnungsgemäßen Ablauf der Prüfung stört, kann von dem jeweiligen Prüfer oder Aufsichtsführenden 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 Kandidaten von der Erbringung weiterer Prüfungen ausschließen. Die Sätze 1–3 gelten für Erfolgskontrollen anderer Art (§4 Abs. 2, Nr. 3) entsprechend.

(4) Der Kandidat kann innerhalb von 14 Tagen verlangen, dass die Entscheidung nach §11 Abs. 3, Satz 1 und 2 vom Prüfungsausschuss überprüft wird. Belastende Entscheidungen des Prüfungsausschusses sind dem Kandidaten unverzüglich schriftlich mitzuteilen, zu begründen und mit einer Rechtsbehelfsbelehrung zu versehen.

#### **§ 12 Mutterschutz**

(1) Werdende Mütter müssen in den letzten sechs Wochen vor der Entbindung und bis zum Ablauf von acht Wochen nach der Entbindung nicht an Erfolgskontrollen teilnehmen. §6 Abs. 1 Satz 2 des Mutterschutzgesetzes (Regelung für Früh- und Mehrlingsgeburten) gilt entsprechend. Anträge auf Inanspruchnahme des Mutterschutzes sind an den Prüfungsausschuss zu richten. Wird der Mutterschutz in Anspruch genommen, so verlängern sich alle Fristen dieser Prüfungsordnung entsprechend.

**§ 13 Anerkennung von Studienzeiten, Studienleistungen und Prüfungsleistungen**

(1) Studienzeiten, Studienleistungen und Prüfungsleistungen im Master-Studiengang Informationswirtschaft an einer Universität oder einer gleichgestellten Hochschule in Deutschland werden angerechnet, sofern Gleichwertigkeit nachgewiesen wird. Studienzeiten, Studienleistungen und Prüfungsleistungen in anderen Studiengängen werden anerkannt, soweit die Gleichwertigkeit festgestellt ist. Die Anerkennung von Teilen der Master-Prüfung wird in der Regel versagt, wenn die Anerkennung von mehr als der Hälfte der Leistungspunkte oder mehr als der Hälfte der Modulprüfungen oder die Anerkennung der Master-Arbeit beantragt worden ist.

(2) Für Studienzeiten, Studienleistungen und Prüfungsleistungen in staatlich anerkannten Fernstudien gilt §13 Abs. 1 entsprechend. Das gleiche gilt außerdem auch für Studienzeiten, Studienleistungen und Prüfungsleistungen an anderen Bildungseinrichtungen, insbesondere an staatlichen oder staatlich anerkannten Berufsakademien sowie an Fach- und Ingenieurschulen.

(3) Über die Gleichwertigkeit von Studien- bzw. Prüfungsleistungen entscheidet der Prüfungsausschuss im Einvernehmen mit dem zuständigen Prüfer. Gleichwertigkeit ist festzustellen, wenn die Studienzeiten, Studienleistungen und Prüfungsleistungen in Inhalt, Umfang und in den Anforderungen denjenigen des entsprechenden Studiums an der Universität Karlsruhe (TH) im Wesentlichen entsprechen. Dabei ist kein schematischer Vergleich, sondern eine Gesamtbetrachtung und Gesamtbewertung vorzunehmen. Bei der Anerkennung von Studienzeiten, Studienleistungen und Prüfungsleistungen, die außerhalb Deutschlands erbracht wurden, sind die von Kultusministerkonferenz und Hochschulrektorenkonferenz gebilligten Äquivalenzvereinbarungen sowie Absprachen im Rahmen von Hochschulpartnerschaften zu beachten. Soweit solche nicht vorliegen, kann die Zentralstelle für ausländisches Bildungswesen gehört werden. §13 Abs. 1, Satz 1 gilt entsprechend.

(4) Der Prüfungsausschuss entscheidet in Abhängigkeit von Art und Umfang der anzurechnenden Studien- und Prüfungsleistungen über die Einstufung in ein höheres Fachsemester.

(5) Werden Studien- und Prüfungsleistungen anerkannt, so werden die Noten im Falle der Vergleichbarkeit der Notensysteme übernommen und entsprechend §9 in die Berechnung der Gesamtnote einbezogen. Bei unvergleichbaren Notensystemen wird der Vermerk „anerkannt“ aufgenommen. Bei der Berechnung der Gesamtnote wird die entsprechende Leistung ausgeschlossen.

(6) Bei Vorliegen der Voraussetzungen nach §13 Abs. 1– 4 besteht ein Rechtsanspruch auf Anrechnung. Die Anrechnung von Studienzeiten, Studienleistungen und Prüfungsleistungen, die in Deutschland erbracht wurden, erfolgt von Amts wegen. Die Studierenden haben die für die Anrechnung erforderlichen Unterlagen vorzulegen.

(7) Erbringt ein Student 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 Student nach §16 der Prüfungs- und Studienordnung der Universität Karlsruhe (TH) vom 12.8.2005 für den Bachelor-Studiengang Informationswirtschaft erbracht hat und die im Studienplan dieses Studiengangs vorgesehen sind, werden auf Antrag des Studierenden an den Prüfungsausschuss anerkannt.

**§ 14 Interdisziplinäres Seminar**

(1) Im Master-Studiengang Informationswirtschaft müssen Studierende ein interdisziplinäres Modul, das in Form eines Seminars organisiert ist, im Umfang von 6 Leistungspunkten absolvieren, das von je einem Prüfer nach §6 Abs. 2 aus der Informatik, dem Recht und den Wirtschaftswissenschaften betreut wird.

**§ 15 Master-Arbeit**

(1) Die Master-Arbeit soll zeigen, dass der Kandidat 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 Master-Arbeit werden 30 Leistungspunkte zugeordnet. Die Bearbeitungsdauer beträgt 6 Monate. Die Master-Arbeit kann auch in englischer Sprache geschrieben werden.

(2) Die Master-Arbeit kann von jedem Prüfer nach §6 Abs. 2 vergeben werden. Soll die Master-Arbeit außerhalb der beiden nach §1 Abs. 2, Satz 1 beteiligten Fakultäten angefertigt werden, so bedarf dies der Genehmigung des Prüfungsausschusses. Dem Kandidaten ist Gelegenheit zu geben, für das Thema Vorschläge zu machen. Die Master-Arbeit kann auch in Form einer Gruppenarbeit zugelassen werden, wenn der als Prüfungsleistung zu bewertende Beitrag des einzelnen Kandidaten aufgrund objektiver Kriterien, die eine eindeutige Abgrenzung ermöglichen, deutlich unterscheidbar ist und die Anforderung nach §15 Abs. 1 erfüllt.

(3) Auf Antrag des Kandidaten sorgt ausnahmsweise der Vorsitzende des Prüfungsausschusses dafür, dass der Kandidat innerhalb von vier Wochen nach Antragstellung von einem Betreuer ein Thema für die Master-Arbeit erhält. Die Ausgabe des Themas erfolgt in diesem Fall über den Vorsitzenden des Prüfungsausschusses.

(4) Thema, Aufgabenstellung und Umfang der Master-Arbeit sind vom Betreuer so zu begrenzen, dass die Master-Arbeit mit dem in §15 Abs. 1 festgelegten Arbeitsaufwand bearbeitet werden kann.

(5) Die Master-Arbeit hat 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.“ Wenn diese Erklärung nicht enthalten ist, wird die Arbeit nicht angenommen.

(6) Der Zeitpunkt der Ausgabe des Themas der Master-Arbeit und der Zeitpunkt der Abgabe der Master-Arbeit sind beim Prüfungsausschuss aktenkundig zu machen. Der Kandidat kann das Thema der Master-Arbeit nur einmal und nur innerhalb der ersten zwei Monate der Bearbeitungszeit zurückgeben. Auf begründeten Antrag des Kandidaten kann der Prüfungsausschuss die in §15 Abs. 1 festgelegte Bearbeitungszeit um höchstens drei Monate verlängern. Wird die Master-Arbeit nicht fristgerecht abgeliefert, gilt sie als mit „nicht ausreichend“ bewertet, es sei denn, dass der Kandidat dieses Versäumnis nicht zu vertreten hat. §12 Abs. 1 (Mutterschutz) gilt entsprechend.

(7) Die Master-Arbeit 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 Master-Arbeit fest. Der Bewertungszeitraum soll 8 Wochen nicht überschreiten.

**§ 16 Zusatzmodule und Zusatzleistungen**

- (1) Der Kandidat kann sich weiteren Prüfungen in Modulen unterziehen. §3 und §4 der Prüfungsordnung bleiben davon unberührt.
- (2) Das Ergebnis maximal zweier Module, die jeweils mindestens 9 Leistungspunkte umfassen müssen, wird auf Antrag des Kandidaten in das Master-Zeugnis als Zusatzmodule aufgenommen und als solche gekennzeichnet. Zusatzmodule werden bei der Festsetzung der Gesamtnote nicht mit einbezogen. Alle Zusatzleistungen werden im Transcript of Records automatisch aufgenommen und als Zusatzleistungen gekennzeichnet. Zusatzleistungen werden mit den nach §9 vorgesehenen Noten gelistet. Diese Zusatzleistungen gehen nicht in die Festsetzung der Gesamt-, Fach- und Modulnoten ein.
- (3) Der Kandidat hat bereits bei der Anmeldung zu einer Prüfung in einem Modul diese als Zusatzleistung zu deklarieren.

**II. Master-Prüfung****§ 17 Umfang und Art der Master-Prüfung**

- (1) Die Master-Prüfung besteht aus den Fachprüfungen nach §17 Abs. 2, dem interdisziplinären Seminarmodul nach §14 sowie der Master-Arbeit nach §15.
- (2) In den ersten beiden Studienjahren sind Fachprüfungen aus folgenden Fächern durch den Nachweis von Leistungspunkten in einem oder mehreren Modulen abzulegen:

- aus dem Fach Betriebswirtschaftslehre: im Umfang von 9 Leistungspunkten,
- aus dem Fach Operations Research: im Umfang von 4 Leistungspunkten,
- aus dem Fach Recht: im Umfang von 6 Leistungspunkten.

Des weiteren sind Fachprüfungen

- aus einem wirtschaftswissenschaftlichen Fach durch 1 Modul im Umfang von 20 Leistungspunkten oder durch 2 Module im Umfang von je 10 Leistungspunkten,
- aus dem Fach Informatik durch ein Modul im Umfang von 16 Leistungspunkten und ein Modul im Umfang von 17 Leistungspunkten,
- aus dem Fach Recht im Umfang von 12 Leistungspunkten

abzulegen. In jedem Fach kann ein wissenschaftliches Seminar mit mindestens 2 und höchstens 4 Leistungspunkten enthalten sein. Wirtschaftswissenschaftliche Fächer sind Betriebswirtschaftslehre, Operations Research, Statistik und Volkswirtschaftslehre. Ein Modul in BWL, OR oder Statistik im Umfang von 20 Leistungspunkten muß zumindest eine Vorlesung aus dem Fach Volkswirtschaftslehre im Umfang von 4 Leistungspunkten enthalten, ein Modul VWL im Umfang von 20 Leistungspunkten eine Vorlesung aus einem der Fächer Betriebswirtschaftslehre, Operations Research oder Statistik im Umfang von 4 Leistungspunkten. Werden zwei wirtschaftswissenschaftliche Module mit 10 Leistungspunkten gewählt, gilt dies entsprechend.

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 §7 erfüllt.

- (3) Als eine weitere Prüfungsleistung ist eine Master-Arbeit gemäß §15 anzufertigen.

#### **§ 18 Bestehen der Master-Prüfung, Bildung der Gesamtnote**

- (1) Die Master-Prüfung ist bestanden, wenn alle in §17 genannten Prüfungsleistungen mindestens mit „ausreichend“ bewertet wurden.
- (2) Die Gesamtnote der Master-Prüfung errechnet sich als ein mit Leistungspunkten gewichteter Notendurchschnitt. Dabei werden alle Prüfungsleistungen nach §17 mit ihren Leistungspunkten gewichtet.
- (3) Hat der Kandidat die Master-Arbeit mit der Note 1.0 und die Master-Prüfung mit einem Durchschnitt von 1.0 abgeschlossen, so wird das Prädikat „mit Auszeichnung“ (with distinction) verliehen. Mit einer Masterarbeit mit der Note 1.0 und bis zu einem Durchschnitt von 1.3 kann auf Antrag an den Prüfungsausschuß das Prädikat „mit Auszeichnung“ (with distinction) verliehen werden.

#### **§ 19 Master-Zeugnis und Urkunde**

- (1) Über die Master-Prüfung wird nach Bewertung der letzten Prüfungsleistung eine Master-Urkunde und ein Zeugnis erstellt. Die Ausfertigung von Master-Urkunde und Zeugnis soll nicht später als sechs Wochen nach der Bewertung der letzten Prüfungsleistung erfolgen. Master-Urkunde und Master-Zeugnis werden in deutscher und englischer Sprache ausgestellt. Master-Urkunde und Zeugnis tragen das Datum der erfolgreichen Erbringung der letzten Prüfungsleistung. Sie werden dem Kandidaten gleichzeitig ausgehändigt. In der Master-Urkunde wird die Verleihung des akademischen Master-Grades beurkundet. Die Master-Urkunde 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 Master-Arbeit 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 Kandidat 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 Kandidaten (Transcript of Records).
- (4) Die Abschrift der Studiendaten (Transcript of Records) enthält in strukturierter Form alle vom Kandidaten 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 soll die Zugehörigkeit von Lehrveranstaltungen zu den einzelnen Modulen und die Zugehörigkeit der Module zu den einzelnen Fächern deutlich erkennbar sein.
- (5) Die Master-Urkunde, das Master-Zeugnis und das Diploma-Supplement ein-

schließlich des Transcript of Records werden vom Studienbüro der Universität ausgestellt.

### **III. Schlussbestimmungen**

#### **§ 20 Bescheid über Nicht-Bestehen, Bescheinigung von Prüfungsleistungen**

- (1) Der Bescheid über die endgültig nicht bestandene Master-Prüfung wird dem Kandidaten durch den Prüfungsausschuss in schriftlicher Form erteilt. Der Bescheid ist mit einer Rechtsbehelfsbelehrung zu versehen.
- (2) Hat der Kandidat die Master-Prüfung endgültig nicht bestanden, wird ihm auf Antrag und gegen Vorlage der Exmatrikulationsbescheinigung eine schriftliche Bescheinigung ausgestellt, die die erbrachten Prüfungsleistungen und deren Noten sowie die zur Prüfung noch fehlenden Prüfungsleistungen enthält und erkennen lässt, dass die Prüfung insgesamt nicht bestanden ist. Dasselbe gilt, wenn der Prüfungsanspruch erloschen ist.

#### **§ 21 Ungültigkeit der Master-Prüfung, Entziehung des Master-Grades**

- (1) Hat der Kandidat 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 Kandidat 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 Kandidat hierüber täuschen wollte, so wird dieser Mangel durch das Bestehen der Prüfung geheilt. Hat der Kandidat die Zulassung vorsätzlich zu Unrecht erwirkt, so entscheidet der Prüfungsausschuss nach Maßgabe des Landesverwaltungsverfahrensgesetzes in der jeweils gültigen Fassung.
- (3) Dem Kandidaten ist vor einer Entscheidung nach §21 Abs. 1 und §21 Abs. 2, Satz 2 Gelegenheit zur Äußerung zu geben.
- (4) Das unrichtige Prüfungszeugnis ist einzuziehen und gegebenenfalls ein neues zu erteilen. Dies bezieht sich auch auf alle davon betroffenen Anlagen (Transcript of Records und Diploma Supplement). Mit dem unrichtigen Prüfungszeugnis sind auch die Master-Urkunde, das Master-Zeugnis und alle Anlagen (Transcript of Records und Diploma Supplement) einzuziehen, wenn die Prüfung aufgrund einer Täuschung für „nicht bestanden“ erklärt wurde.
- (5) Die Entziehung des akademischen Master-Grades richtet sich nach den gesetzlichen Bestimmungen.
- (6) Eine Entscheidung nach §21 Abs. 1 oder §21 Abs. 2, Satz 2 ist nach einer Frist von fünf Jahren ab dem Datum des Prüfungszeugnisses ausgeschlossen.

#### **§ 22 Einsicht in die Prüfungsakten**

- (1) Innerhalb eines Jahres nach dem Ablegen einer Erfolgskontrolle §4 Abs. 2 ist einem Kandidaten auf Antrag in angemessener Frist Einsicht in die ihn betreffenden Unterlagen dieser Erfolgskontrolle zu gewähren. Der Vorsitzende des Prüfungsausschusses bestimmt Ort und Zeit der Einsichtnahme. Kann der Kandidat einen festgesetzten Termin zur Einsichtnahme nicht wahrnehmen, muss er dies gegenüber dem Prüfungsausschuss anzeigen und begründen. Der Prüfungsausschuss entscheidet über



eine weitere Gelegenheit zur Einsichtnahme.

- (2) §22 Abs. 1 gilt entsprechend für die Einsicht in die Prüfungsakte.
- (3) Prüfungsunterlagen sind mindestens 5 Jahre aufzubewahren.

### **§ 23 In-Kraft-Treten**

- (1) Diese Studien- und Prüfungsordnung tritt am 1. Oktober 2006 in Kraft.
  - (2) Auf Antrag können Studierende, die auf Grundlage der Prüfungsordnung für den Diplomstudiengang Informationswirtschaft vom 19. August 1999 ihr Studium an der Universität Karlsruhe (TH) aufgenommen haben, ihr Studium auf Grundlage der Prüfungsordnung für den Master-Studiengang Informationswirtschaft vom 30. April 2006 fortsetzen, wenn sie im Diplomstudiengang mindestens ins 7. Fachsemester eingestuft werden und wenn eine Bachelor-äquivalente Studien- und Prüfungsleistung vorliegt. Dies ist durch den Prüfungsausschuss zu prüfen. Leistungen im Diplomstudiengang können auf Antrag eines Studierenden vom Prüfungsausschuß anerkannt werden.
- Karlsruhe, den 30. April 2006

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

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