Module Handbook
Information Engineering and Management (B.Sc.)
Winter Term 2014/2015
Long version SPO 2009
21.08.2014

Department of Economics and Management
Department of Informatics
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<tr>
<td>Management and Strategy- 2577900</td>
<td>261</td>
<td></td>
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<tr>
<td>Capability maturity models for software and systems engineering - 2511216</td>
<td>262</td>
<td></td>
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<tr>
<td>Economics I: Microeconomics- 2600012</td>
<td>263</td>
<td></td>
</tr>
<tr>
<td>Economics III: Introduction in Econometrics- 2520016/2520017</td>
<td>264</td>
<td></td>
</tr>
<tr>
<td>Web Engineering- 24124</td>
<td>265</td>
<td></td>
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<td>- 24522</td>
<td>266</td>
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<tr>
<td>Competition in Networks- 26240</td>
<td>267</td>
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</tr>
<tr>
<td>Seminar Economic Theory- SemWIOR2</td>
<td>268</td>
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<tr>
<td>Knowledge Management- 2511300</td>
<td>269</td>
<td></td>
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<tr>
<td>Welfare Economics- 2520517</td>
<td>270</td>
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<tr>
<td>Workflow-Management- 2511204</td>
<td>271</td>
<td></td>
</tr>
</tbody>
</table>

7 Anhang: Qualifikationsziele Informationswirtschaft (B.Sc.) 272

8 Appendix: Study- and Examination Regulation (15/04/2009, in German) 273

Index 288
1 Structure of the Bachelor Programme in Information Engineering and Management

The Bachelor programme in *Information Engineering and Management* has 6 terms. The first four terms have a methodological orientation and provides the student with the foundations of informatics, business administration, economics and law. Terms 5 and 6 aim at the specialization and application of this knowledge. Figure 1 shows the structure of the subjects and the credits (CP) allocated to the subjects. According to the European Credit Transfer System, one credit corresponds to a workload of 30 hours.

<table>
<thead>
<tr>
<th>Semester</th>
<th>Core Programme</th>
<th>Specialization Programme</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Subject</td>
<td>INFO</td>
</tr>
<tr>
<td>1</td>
<td>Foundations in Informatics 10 CP</td>
<td>INFO</td>
</tr>
<tr>
<td></td>
<td>Algorithms I 6 CP</td>
<td>INFO</td>
</tr>
<tr>
<td>3</td>
<td>Theor. Inform. 7 CP</td>
<td>INFO</td>
</tr>
<tr>
<td>4</td>
<td>Computer Eng. 6 CP</td>
<td>INFO</td>
</tr>
<tr>
<td></td>
<td>Internship 8 CP</td>
<td>INFO</td>
</tr>
<tr>
<td>5</td>
<td>Modules 18 CP</td>
<td>INFO</td>
</tr>
<tr>
<td>6</td>
<td>Bachelor Thesis 12 CP</td>
<td>INFO</td>
</tr>
</tbody>
</table>

Figure 1: Structure of Bachelor Programme in Information Engineering and Management

Based on a solid mathematical education, the modules of the first four terms of the Bachelor programme in information engineering and management are allocated in the proportion 40/40/20 to informatics (informatics, applied informatics, and computer engineering), economic sciences (business administration, economics, operations research), and law. The internship prepares the student for his profession. Table 1 shows the allocation of courses to modules and the curriculum for the first four terms.
### STRUCTURE OF THE BACHELOR PROGRAMME IN INFORMATION ENGINEERING AND MANAGEMENT

<table>
<thead>
<tr>
<th>ModulID</th>
<th>Course</th>
<th>Hours per week</th>
<th>CP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1st Term</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IW1BWL1</td>
<td>Business Administration: Finance and Accounting</td>
<td>2/0/2</td>
<td>4.0</td>
</tr>
<tr>
<td>IW1VWL</td>
<td>Economics I</td>
<td>3/0/2</td>
<td>5.0</td>
</tr>
<tr>
<td>IW1MATH1</td>
<td>Mathematics I</td>
<td>4/2/2</td>
<td>8.0</td>
</tr>
<tr>
<td>IW1INF1</td>
<td>Basic Notions of Computer Science</td>
<td>2/1/2</td>
<td>5.0</td>
</tr>
<tr>
<td>IW1INF2</td>
<td>Programming</td>
<td>2/0/2</td>
<td>5.0</td>
</tr>
<tr>
<td>IW1JURA1</td>
<td>Civil Law for Beginners</td>
<td>4/0</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td>31.0</td>
</tr>
<tr>
<td><strong>2nd Term</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IW1BWL1</td>
<td>Introduction to Information Engineering and Management</td>
<td>2/2</td>
<td>4.0</td>
</tr>
<tr>
<td>IW1STAT</td>
<td>Statistics I</td>
<td>4/0/2</td>
<td>5.0</td>
</tr>
<tr>
<td>IW1OR</td>
<td>Introduction to Operations Research I</td>
<td>2/2/2</td>
<td>4.5</td>
</tr>
<tr>
<td>IW1MATH2</td>
<td>Mathematics II</td>
<td>4/2/2</td>
<td>8.0</td>
</tr>
<tr>
<td>IW2INF2</td>
<td>Algorithms I</td>
<td>3/1/2</td>
<td>6.0</td>
</tr>
<tr>
<td>IW1JURA2</td>
<td>Advanced Civil Law</td>
<td>2/0</td>
<td>3.0</td>
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<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td>30.5</td>
</tr>
<tr>
<td><strong>3rd Term</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>IW1BWL2</td>
<td>Financial Accounting and Cost Accounting</td>
<td>2/0/2</td>
<td>4.0</td>
</tr>
<tr>
<td>IW1STAT</td>
<td>Statistics II</td>
<td>4/0/2</td>
<td>5.0</td>
</tr>
<tr>
<td>IW1OR</td>
<td>Introduction to Operations Research II</td>
<td>2/2/2</td>
<td>4.5</td>
</tr>
<tr>
<td>IW2INF3</td>
<td>Theoretical Foundation of Computer Science</td>
<td>3/1</td>
<td>7.0</td>
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<tr>
<td>IW1INF5</td>
<td>Applied Informatics I</td>
<td>2/1</td>
<td>4.0</td>
</tr>
<tr>
<td>IW1JURA2</td>
<td>Commercial and Corporate Law</td>
<td>2/0</td>
<td>3.0</td>
</tr>
<tr>
<td>IW1JURA3</td>
<td>Public Law I</td>
<td>2/0</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td>30.5</td>
</tr>
<tr>
<td><strong>4th Term</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IW1BWL2</td>
<td>Business Administration: Production Economics and Marketing</td>
<td>2/2</td>
<td>4.0</td>
</tr>
<tr>
<td>IW1INF5</td>
<td>Applied Informatics II</td>
<td>2/2/2</td>
<td>4.0</td>
</tr>
<tr>
<td>IW2INF4</td>
<td>Computer Engineering</td>
<td>3/1/2</td>
<td>6.0</td>
</tr>
<tr>
<td>IW1JURA3</td>
<td>Public Law II</td>
<td>2/0</td>
<td>3.0</td>
</tr>
<tr>
<td>IW1JURA2</td>
<td>Exercises in Civil Law</td>
<td>2/0</td>
<td>3.0</td>
</tr>
<tr>
<td>IW1PRAK</td>
<td>Internship</td>
<td></td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td>28.0</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td>120.0</td>
</tr>
</tbody>
</table>

Table 1: Curriculum in the terms 1-4
In the 3rd year (5th and 6th term) of the Bachelor programme the student must pass

1. module(s) with 18 credits in informatics
2. a module with 9 credits in the subject Business Administration
3. a module with 9 credits in the subject BA/OR/EC,
4. a module with 6 credits in law,
5. two out of the three seminar modules with 3 credits each,
6. and the bachelor thesis with 12 credits.
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://studium.kit.edu/Seiten/FAQ.aspx

Repeating exams

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

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

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

Further information

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

---

**Used abbreviations**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>German Abbreviation</th>
<th>English Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>LP/CP</td>
<td>Leistungspunkte/ECTS</td>
<td>Credit Points/ECTS</td>
</tr>
<tr>
<td>LV</td>
<td>Lehrveranstaltung</td>
<td>course</td>
</tr>
<tr>
<td>RÜ</td>
<td>Rechnerübung</td>
<td>computing lab</td>
</tr>
<tr>
<td>S</td>
<td>Sommersemester</td>
<td>summer term</td>
</tr>
<tr>
<td>Sem.</td>
<td>Semester</td>
<td>semester/term</td>
</tr>
<tr>
<td>ER/SPO</td>
<td>Studien- und Prüfungsordnung</td>
<td>examination regulations</td>
</tr>
<tr>
<td>KS/SQ</td>
<td>Schlüsselqualifikationen</td>
<td>key skills</td>
</tr>
<tr>
<td>SWS</td>
<td>Semesterwochenstunde</td>
<td>contact hour</td>
</tr>
<tr>
<td>Ü</td>
<td>Übung</td>
<td>excercise course</td>
</tr>
<tr>
<td>V</td>
<td>Vorlesung</td>
<td>lecture</td>
</tr>
<tr>
<td>W</td>
<td>Wintersemester</td>
<td>winter term</td>
</tr>
</tbody>
</table>
3 Actual Changes

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

**IW3BWLISM4 - CRM and Service Management (S. 38)**

**Anmerkungen**

The lecture *Customer Relationship Management* [2540508] is given in English.

The courses *Analytical CRM* and *Operative CRM* will take place in an alternating way from winter term 14/15. Analytical CRM is offered for a last time in the summer term 14. Details on the cycle and on the exams can be found on http://www.em.uni-karlsruhe.de/studies/.

**IW3BWLISM5 - Specialization in Customer Relationship Management (S. 40)**

**Anmerkungen**

The courses *Analytical CRM* and *Operative CRM* will take place in an alternating way from winter term 14/15. Analytical CRM is offered for a last time in the summer term 14. Details on the cycle and on the exams can be found on http://www.em.uni-karlsruhe.de/studies/.

**2511402 - Intelligent Systems in Finance (S. 154)**

**Anmerkungen**

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.

The course “Intelligent Systems in Finance” will not be offered any more from summer term 2015 on. The examination will be offered latest until summer term 2015 (repeaters only).

**2540520 - Operative CRM (S. 182)**

**Anmerkungen**

As of winter term 2014/15 this lecture is hold in alternation with “2540522 - Analytical CRM”. The current schedule can be seen on the chair’s website (http://www.em.uni-karlsruhe.de/studies/).

**2540522 - Analytical CRM (S. 96)**

**Anmerkungen**

The lecture ultimately takes place in summer term of 2014. Afterwards the lecture is hold in alternation with “2540520 - Operative CRM”. The current schedule can be seen on the chair’s website (http://www.em.uni-karlsruhe.de/studies/).

**26240 - Competition in Networks (S. 267)**

**Anmerkungen**

This lecture will not take place in wintersemester 2014/15 due to a research period. All exams will take place as usually.

**24124 - Web Engineering (S. 265)**

**Anmerkungen**

The course is lectured for the last time in the summer term 2014. Examination is possible until summer term 2015.

**2595466 - eServices (S. 139)**

**Anmerkungen**

The credits have been changed from 5 to 4.5.

The lecture is not offered in the M.Sc. modules anymore, starting with the summer term 2012.

**2530210 - Cost and Management Accounting (S. 157)**

**Anmerkungen**

This lecture will not be provided any more, the corresponding exams, however, will be provided each semester.
### 2550491 - Seminar in Discrete Optimization (S. 235)

**Erfolgskontrolle**

- The assessment consists of a written seminar thesis of 20-25 pages and a presentation of 35-40 minutes (according to §4(2), 3 of the examination regulation).
- The final mark for the seminar consists of the seminar thesis, the seminar presentation, the handout, and if applicable further material such as programming code.
- The seminar can be attended both by Bachelor and Master students. A differentiation will be achieved by different valuation standards for the seminar thesis and presentation.

### 2560550 - Auction & Mechanism Design (S. 103)

**Erfolgskontrolle**

- The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).
- The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.
- Students can earn a bonus to the final grade by successfully participating in the exercises.

### 2560141 - Seminar on Morals and Social Behavior (S. 226)

**Erfolgskontrolle**

- Students write a seminar paper on an assigned topic (10 pages), present it in class and discuss results during seminar sessions.
- These three elements are graded individually. The seminar grade is the weighted average of these individual grades where the weighting is announced on the course syllabus.

### 2520517 - Welfare Economics (S. 270)

**Anmerkungen**

- The next course will be held in the summer 2015 and afterwards every two years in the summer.
4 Modules of term 1-4

4.1 Informatics

Module: Foundations in Informatics [IW1INF1]

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

<table>
<thead>
<tr>
<th>ECTS Credits</th>
<th>Cycle</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Every 2nd term, Winter Term</td>
<td>1</td>
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</tbody>
</table>

Courses in module

<table>
<thead>
<tr>
<th>ID</th>
<th>Course</th>
<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
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</thead>
<tbody>
<tr>
<td>24001</td>
<td>Basic Notions of Computer Science (p. 148)</td>
<td>2/1/2</td>
<td>W</td>
<td>5</td>
<td>T. Worsch</td>
</tr>
<tr>
<td>24004</td>
<td>Programming (p. 199)</td>
<td>2/0/2</td>
<td>W</td>
<td>5</td>
<td>R. Reussner</td>
</tr>
</tbody>
</table>

Learning Control / Examinations
The assessment of this module consists of

1. Completion of Basic Notions of Computer Science [24001]
2. Completion of Programming [24004]

Assessment is described in the courses of this module. The overall grade is determined by weighting the grades from each course according to the number of credits.

Attention: This module is part of the so-called “orientation” examination according to §8 (1) of the examination regulation 2009. The examination for this module (including repetitions if necessary) must be passed until the end of the examination period of the third term in order not to be forced to drop out of the degree programme.

Conditions
None.

Learning Outcomes
Students should learn

- methods of defining properties and how to read and understand definitions.
- the difference between syntax and semantics
- basic concepts of discrete mathematics and informatics and the ability to apply them to problem descriptions and proofs.
- basic structures of the programming language Java and how to apply them (in particular control and simple data structures, object orientation and implementation of basic algorithms) as well as basics of programming methodology
- the ability to autonomously write executable small to medium sized executable Java programs

Content
This module and the associated courses cover an introduction to foundations in informatics as well as basic programming skills with Java. Topics in „Grundbegriffe der Informatik“ are for example algorithms, formal languages, definitions, relations, functions, graphs and syntax and semantics. The discussed concepts will be exemplified by the associated exercies. Programming covers the concepts and methodology of programming using the programming language Java. Both courses come along with exercies which apply the theoretical knowledge and reinforce them.
Module: Algorithms I [IW2INF2]

Coordination: P. Sanders, D. Wagner
Degree programme: Informationswirtschaft (B.Sc.)
Subject: Informatics

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

Courses in module

<table>
<thead>
<tr>
<th>ID</th>
<th>Course</th>
<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24500</td>
<td>Algorithms I (p. 90)</td>
<td>3/1/2</td>
<td>S</td>
<td>6</td>
<td>P. Sanders</td>
</tr>
</tbody>
</table>

Learning Control / Examinations
The assessment of this module consists of a written exam (120 min) according to sec. 4 subsec. 2 no. 1 study and examination regulations. The grade of the module corresponds to the grade of the written exam.

Conditions
None.

Learning Outcomes
The student is supposed to

- know and understand basic, frequently used algorithms, their conception, analysis of their efficiency, implementation, documentation and application
- be able to use their comprehension to work on new algorithmic problems
- apply the knowledge acquired in the module Grundlagen der Informatik (B.Sc. Information Engineering and Management) to non-trivial algorithms
- apply the knowledge acquired in the module “Grundbegriffe der Informatik” (Bachelor Informatics) or in “Grundlagen der Informatik” (B.Sc. Information Engineering and Management) and the mathematical methodologies learned in the mathematics lectures to solve problems, the focus being on mathematical efficiency analysis

Content
The module provides basic algorithms and data structures.
The following topics are covered in particular:

- basic terms of algorithm engineering
- asymptotic algorithm analysis (worst case, average case, probabilistic, amortised)
- data structures like arrays, heaps, queues and linked lists
- hash tables
- sorting: comparison based algorithms (e.g. mergesort, quicksort), lower border, radix sort
- sorted sequences, search trees and selection
- graphs (representation, traversing: breadth search, deep search, shortest path, spanning trees)
- generic optimisation algorithms (greedy, dynamic programming, systematic search, local search)
- geometric algorithms
# Module: Theoretical Informatics [IW2INF3]

**Coordination:** D. Wagner, J. Müller-Quade  
**Degree programme:** Informationswirtschaft (B.Sc.)  
**Subject:** Informatics

<table>
<thead>
<tr>
<th>ECTS Credits</th>
<th>Cycle</th>
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<tbody>
<tr>
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<td>Every 2nd term, Winter Term</td>
<td>1</td>
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## Courses in module

<table>
<thead>
<tr>
<th>ID</th>
<th>Course</th>
<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24005</td>
<td>Theoretical Foundations of Computer Science (p. 259)</td>
<td>3/1</td>
<td>W</td>
<td>7</td>
<td>J. Müller-Quade, D. Wagner</td>
</tr>
</tbody>
</table>

## Learning Control / Examinations

The assessment of the module consists of a written examination according to §4(2), 1 of the examination regulations. The grade of the module corresponds to the grade of the written examination. Further details see the german section.

## Conditions

None.

## Learning Outcomes

The student

- has a deeper insight into the fundamentals of theoretical computer science and knows the computation models and proof techniques,
- understands the limits and possibilities of computer science in relation to the solution of definable but only partially predictable problems,
- knows basic aspects of computer science in contrast to specific circumstances, such as specific computers or programming languages and also can phrase general statements about the solvability of problems,
- is able to apply the proof techniques learned for the specification of systems of computer science and for the systematic design of programs and algorithms

## Content

There are important problems whose solutions can clearly be defined but one will never be able to calculate such a solution systematically. Other problems are "likely" to be solved only through trial and error. Other topics of the module provide the basis for circuit design, design of compilers, and many others. Most results are rigorously proved. The proof techniques learned by the way are important for the specification of systems of computer science and for the systematic design of programs and algorithms.

The module provides a deep insight into the principles and methods of theoretical computer science. In particular, this will be discussed on the basic properties of Formal Languages as foundations of programming languages and communication protocols (regular, context-free Chomsky hierarchy), machine models (finite automata, pushdown automata, Turing machines, non determinism, and relations to families of formal languages), equivalence of sufficiently powerful computation models (Church's thesis), non computable important functions (halting problem,...), Gödel's incompleteness theorem and introduction to complexity theory, NP-complete problems and polynomial reductions.
Module: Computer Engineering [IW2INF4]

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

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

Courses in module

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<th>Course</th>
<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
</tr>
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</table>

Learning Control / Examinations
The assessment consists of a written examination (60 minutes) according to sec. 4 subsec. 2, no. 1 study and examination regulations.

Conditions
None.

Learning Outcomes
The students are to be enabled to
- gain fundamental knowledge of computer organization, i.e. the architecture and the operation principle of computer systems,
- understand the relationship between hardware concepts and their effects on the software, in order to build efficient programs,
- comprehend the fundamental principles of the design process and being able to apply them, based on the understanding of the interdependencies of technology, computer concepts and applications,
- build up a computer from basic components.

Content
This course deals with the fundamentals of computer organisation; the instruction set architecture in conjunction with the discussion RISC – CISC; pipelining, pipeline constraints and methods for the resolution of pipeline conflicts; memory organization, cache memory; I/O system and interface modules; interrupt handling; bus systems; support of operating system functions: virtual memory management and protection mechanisms.
Module: Applied Informatics [IW1INF5]

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

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<tr>
<td>2511030</td>
<td>Applied Informatics I - Modelling (p. 98)</td>
<td>2/1</td>
<td>W</td>
<td>4</td>
<td>A. Oberweis, R. Studer, S. Agarwal</td>
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<tr>
<td>2511032</td>
<td>Applied Informatics II - IT Systems for e-Commerce (p. 99)</td>
<td>2/1</td>
<td>S</td>
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<td>N.N.</td>
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**Learning Control / Examinations**  
See german version.

**Conditions**  
None.

**Recommendations**  
Knowledge of the module *Foundations in Informatics* [IW1INF1] as well as *Algorithms I* [IW2INF2] is expected.

**Learning Outcomes**  
The student should:

- Becomes familiar with relevant modelling languages for describing application domains and aspects of early software system design.
- Gains insight into methods and systems of computer science for the design and development of distributed information systems (supporting electronic business),
- is able to select, design, and apply these methods and systems in a way that is appropriate for the application context.

**Content**  
The course Applied Informatics I [2511030] mainly addresses the early phases of the development of database-supported information systems, distributed systems for information services, intelligent systems and software systems in general. Main topics are modelling concepts and languages for describing application domains as well as static and dynamic aspects of early software system design. The course addresses in detail the following approaches: Entity-Relationship model, advanced aspects of UML, description logic, relational model, Petri nets, and event-driven process chains.

The course Applied Informatics II [2511032] covers various facets of electronic commerce which have to be supported by adequate and efficient distributed information systems. Key topics are middleware technologies and distributed application architectures. Document description and exchange (incl. XML), Java EE, Web technologies, and Web services are additional topics.
4.2 Business Administration

Module: Foundations in Business Administration [IW1BWL3]

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

<table>
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<tr>
<th>ID</th>
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<th>CP</th>
<th>Responsible Lecturer(s)</th>
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<tr>
<td>2600026</td>
<td>Business Administration: Finance and Accounting (p. 109)</td>
<td>2/0/2</td>
<td>W</td>
<td>4</td>
<td>M. Ruckes, M. Uhrig-Homburg</td>
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<tr>
<td>2540490</td>
<td>Introduction to Information Engineering and Management (p. 131)</td>
<td>2/2</td>
<td>S</td>
<td>4</td>
<td>C. Weinhardt, A. Geyer-Schulz</td>
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</table>

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

Conditions
None.

Learning Outcomes
The objectives of this module are that the student is capable of dealing with issues in finance, investments, accounting and information engineering and management.

Content
The institutional framework and the modelling and formal description of a company’s decisions play an essential role in this module. The basic idea and the foundations of static and dynamic investment rules are presented and applied to problems in procurement and materials management as well as in logistics. Modern production processes for goods and services are systematically presented. Marketing research and knowledge of the range of marketing instruments are fundamental for decisions in a competitive market environment. The foundations of corporate finance are treated with a strong emphasis of the links to the capital market. Investment rules and corporate finance are instrumental for answering questions of source and application of funds, comparable to the lending and deposit business in banking. also an introduction to financial and management accounting is provided. The organisation of company and the problems of management and control constitute an other important aspect of business administration and management science. Finally, the process of value creation and distribution as well as the principles of the taxation of a company are treated with an emphasis on the analysis of the profit and loss statement.

Two case studies, namely the foundation of an innovative information service company and the process chain of a B2B direct marketing company from the customer to the producer, focus on the interdisciplinary links between legal framework, advanced information technology, and the resulting design options for business processes.
Module: Foundations in Business Administration [IW1BWL1]

Co ordination: C. Weinhardt, M. Uhrig-Homburg
Degree programme: Informationswirtschaft (B.Sc.)
Subject: Business Administration

<table>
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Courses in module

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<th>CP</th>
<th>Responsible Lecturer(s)</th>
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<tbody>
<tr>
<td>2600002</td>
<td>Financial Accounting and Cost Accounting (p. 208)</td>
<td>2/2</td>
<td>W</td>
<td>4</td>
<td>T. Lüdecke</td>
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<tr>
<td>2540490</td>
<td>Introduction to Information Engineering and Management (p. 131)</td>
<td>2/2</td>
<td>S</td>
<td>4</td>
<td>C. Weinhardt, A. Geyer-Schulz</td>
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</table>

Learning Control / Examinations

The assessment is carried out as partial exams (according to §4(2), 1-3 of the examination regulation) of the single courses of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions

None.

Learning Outcomes

The institutional framework and the modelling and formal description of a company’s decisions play an essential role in this module. The basic idea and the foundations of static and dynamic investment rules are presented and applied to problems in procurement and materials management as well as in logistics. Modern production processes for goods and services are systematically presented. Marketing research and knowledge of the range of marketing instruments are fundamental for decisions in a competitive market environment. The foundations of corporate finance are treated with a strong emphasis of the links to the capital market. Investment rules and corporate finance are instrumental for answering questions of source and application of funds, comparable to the lending and deposit business in banking. The organisation of company and the problems of management and control constitute an other important aspect of business administration and management science. Finally, the process of value creation and distribution as well as the principles of the taxation of a company are treated with an emphasis on the analysis of the profit and loss statement.

Two case studies, namely the foundation of an innovative information service company and the process chain of a B2B direct marketing company from the customer to the producer, focus on the interdisciplinary links between legal framework, advanced information technology, and the resulting design options for business processes.

Content

The institutional framework and the modelling and formal description of a company’s decisions play an essential role in this module. The basic idea and the foundations of static and dynamic investment rules are presented and applied to problems in procurement and materials management as well as in logistics. Modern production processes for goods and services are systematically presented. Marketing research and knowledge of the range of marketing instruments are fundamental for decisions in a competitive market environment. The foundations of corporate finance are treated with a strong emphasis of the links to the capital market. Investment rules and corporate finance are instrumental for answering questions of source and application of funds, comparable to the lending and deposit business in banking. The organisation of company and the problems of management and control constitute an other important aspect of business administration and management science. Finally, the process of value creation and distribution as well as the principles of the taxation of a company are treated with an emphasis on the analysis of the profit and loss statement.

Two case studies, namely the foundation of an innovative information service company and the process chain of a B2B direct marketing company from the customer to the producer, focus on the interdisciplinary links between legal framework, advanced information technology, and the resulting design options for business processes.

Remarks

The module Foundations in Business Administration [IW1BWL1] will not be offered from winter semester 2012/13. It will be replaced by module Foundations in Business Administration [IW1BWL3]. Students who have already been enrolled in the summer semester 2012 can complete the module.
Module: Business Administration [IW1BWL4]

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

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Courses in module

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<tr>
<td>2600002</td>
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<td>T. Lüdecke</td>
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<tr>
<td>2600024</td>
<td>Business Administration: Production Economics and Marketing (p. 110)</td>
<td>2/0/2</td>
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<td>M. Ruckes, W. Fichtner, M. Klarmann, Th. Lützkendorf, F. Schultmann</td>
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Learning Control / Examinations
The assessments of the courses are written examinations (90 minutes each) according to §4(2), 1 of the examination regulation. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
None.

Recommendations
It is highly recommended to fulfill this module only after completing the module Foundations in Business Administration [IW1BWL1].

Learning Outcomes
The student should be able to

• deal with advanced topics in accounting,
• describe the impacts and features of marketing instruments,
• knows the problem formulation and theories of production management, including the areas of energy, construction, real-estate and ergonomics,
• evaluate information as a competitive factor and is in control of the terminology and the methods to assess information.

Content
The institutional framework and the modelling and formal description of a company’s decisions play an essential role in this module. This module contains problems in procurement and materials management as well as in logistics. Modern production processes for goods and services are systematically presented. Marketing research and knowledge of the range of marketing instruments are fundamental for decisions in a competitive market environment. Advanced topics in accounting are also taught.
Module: Business Administration [IW1BWL2]

**Coordination:** C. Weinhardt, M. Uhrig-Homburg

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

**Subject:** Business Administration

**ECTS Credits**

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**Courses in module**

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<tr>
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<td>M. Ruckes, M. Uhrig-Homburg</td>
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<tr>
<td>2600024</td>
<td>Business Administration: Production Economics and Marketing (p. 110)</td>
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<td>M. Ruckes, W. Fichtner, M. Klarmann, Th. Lützkendorf, F. Schultmann</td>
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</table>

**Learning Control / Examinations**

The assessments of the courses are written examinations (90 minutes each) according to §4(2), 1 of the examination regulation. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Conditions**

None.

**Recommendations**

It is highly recommended to fulfil this module only after completing the module Foundations in Business Administration [IW1BWL1].

**Learning Outcomes**

The student should be able to

- formulate, assess and choose strategies, and is in control of the terminology, the goals and the requirements of organisational management,
- know three kinds of information asymmetry in organisations and their implications on the designing of contracts,
- know the basics of the capital market theory and methods of business financing,
- know the notions, functions, areas and tools of controlling,
- describe the impacts and features of marketing instruments,
- knows the problem formulation and theories of production management, including the areas of energy, construction, real-estate and ergonomics,
- evaluate information as a competitive factor and is in control of the terminology and the methods to assess information.

**Content**

The institutional framework and the modelling and formal description of a company’s decisions play an essential role in this module. This module contains problems in procurement and materials management as well as in logistics. Modern production processes for goods and services are systematically presented. Marketing research and knowledge of the range of marketing instruments are fundamental for decisions in a competitive market environment. The foundations of corporate finance are treated with a strong emphasis of the links to the capital market. Investment rules and corporate finance are instrumental for answering questions of source and application of funds, comparable to the lending and deposit business in banking. The organisation of company and the problems of management and control constitute an other important aspect of business administration and management science. Finally, the process of value creation and distribution as well as the principles of the taxation of a company are treated with an emphasis on the analysis of the profit and loss statement.

**Remarks**

The module Business Administration [IW1BWL2] will not be offered from winter semester 2012/13. It will be replaced by module Business Administration [IW1BWL4]. Students who have already been enrolled in the summer semester 2012 can complete the module.
4.3 Economics

**Module: Economics [IW1VWL]**

**Coordination:** C. Puppe

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

**Subject:** Economics

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**Courses in module**

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<tr>
<td>2600012</td>
<td>Economics I: Microeconomics (p. 263)</td>
<td>3/0/2</td>
<td>W</td>
<td>5</td>
<td>C. Puppe, P. Reiss</td>
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</table>

**Learning Control / Examinations**

The assessment of the module is a written examination according to §4(2), 1 of the examination regulation. The grade of the module corresponds to the grade of this examination. Additionally, there can be a midterm written examen where students can improve their grades in the final examen. Attention: This module is part of the Orientierungsprüfung according to §10 (1), SPO 2009 resp. §8 (1) SPO 2005. The examen needs to be passed until the end of the examination period of the second semester or in case of repetition until the the end of the examination period of the third semester.

**Conditions**

None.

**Learning Outcomes**

It is the main aim of this module to provide basic knowledge in economic modelling. In particular, the student should be able to analyze market processes and the determinants of market results. Furthermore, she should be able to evaluate the effects of economic policy measures on market behavior and propose alternative, more effective policy measures. In particular, the student should learn

- to apply simple microeconomic concepts,
- to analyze the structure of real world economic phenomena,
- to judge the possible effects of economic policy measures on the behavior of economic agents (in simple decision problems),
- to suggest alternative policy measures,
- to analyze as a participant of a tutorial simple economic problems by solving written exercises and to present the results of the exercises on the blackboard,
- to become familiar with the basic literature on microeconomics.

The student should gain basic knowledge in order to help in practical problems

- to analyze the structure of microeconomics relationships and to present own problem solutions,
- solve simple economic decision problems.

**Content**

In the two main parts of the course, problems of microeconomic decision making (household and firm behavior) and problems of commodity allocation on markets (market equilibria and their efficiency properties of markets) are discussed. In the final part of the course, basics of imperfect competition (oligopolistic markets) and of game theory as well as welfare economics are presented.

**Remarks**

When personal resources are available students’ tutorials will be established.
4.4 Operations Research

Module: Introduction to Operations Research [IW1OR]

Coordination: S. Nickel, O. Stein, K. Waldmann
Degree programme: Informationswirtschaft (B.Sc.)
Subject: Operations Research

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

Courses in module

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<tr>
<td>2550040</td>
<td>Introduction to Operations Research I (p. 127)</td>
<td>2/2/2</td>
<td>S</td>
<td>4,5</td>
<td>S. Nickel, O. Stein, K. Waldmann</td>
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<tr>
<td>2530043</td>
<td>Introduction to Operations Research II (p. 128)</td>
<td>2/2/2</td>
<td>W</td>
<td>4,5</td>
<td>S. Nickel, O. Stein, K. Waldmann</td>
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</table>

Learning Control / Examinations
The assessment of the module is carried out by a written examination (120 minutes) according to Section 4(2), 1 of the examination regulation.
In each term (usually in March and July), one examination is held for both courses.
The overall grade of the module is the grade of the written examination.

Conditions
None.

Recommendations
Mathematics I und II. Programming knowledge for computing exercises.
It is strongly recommended to attend the course Introduction to Operations Research I [2550040] before attending the course Introduction to Operations Research II [2530043].

Learning Outcomes
The student
- names and describes basic notions of the essential topics in Operations Research (Linear programming, graphs and networks, integer and combinatorial optimization, nonlinear programming, dynamic programming and stochastic models),
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems and chooses the appropriate solution methods to solve optimization problems independently,
- validates, illustrates and interprets the obtained solutions.

Content
This module treats the following topics: linear programming, network models, integer programming, nonlinear programming, dynamic programming, queuing theory, heuristic models.
This module forms the basis of a series of advanced lectures with a focus on both theoretical and practical aspects of Operations Research.
4.5 Statistics

Module: Statistics [IW1STAT]

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

<table>
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<tr>
<td>2600008</td>
<td>Statistics I (p. 253)</td>
<td>4/0/2</td>
<td>S</td>
<td>5</td>
<td>W. Heller</td>
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<tr>
<td>2600020</td>
<td>Statistics II (p. 254)</td>
<td>4/0/2</td>
<td>W</td>
<td>5</td>
<td>W. Heller</td>
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</table>

Learning Control / Examinations

The assessment of this module consists of two written examinations according to Section 4(2), 1 of the examination regulation (one for each of the courses Statistics I and II).

The overall grade of the module is the average of the grades of these two written examinations.

Conditions
None.

Recommendations
To some extend knowledge of the content of the module Mathematics is assumed. Therefore it is advisable to pass the course Mathematik I für Informationswirtschaft [01360] before attending the module Statistics [IW1STAT].

It ist recommended to attend the course Statistics I [25008/25009] before the course Statistics II [25020/25021].

Each course is complemented by an exercise, a tutorium and a computing laboratory. It highly recommended to attend these too.

Learning Outcomes
See German version.

Content
The module contains the fundamental methods and scopes of Statistics.
A. Descriptive Statistics: univariate und bivariate analysis
B. Probability Theory: probability space, conditional and product probabilities, transformation of probabilities, parameters of location and dispersion, most important discrete and continuous distributions, covariance and correlation, convolution and limit distributions
C. Theory of estimation and testing: suffiency of statistics, point estimation (optimality, ML-method ), internal estimations, theory of tests (optimality, most important examples of tests)
4.6 Law

Module: Introduction to Civil Law [IW1JURA1]

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

<table>
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Courses in module

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<tr>
<td>24012</td>
<td>Civil Law for Beginners (p. 111)</td>
<td>4/0</td>
<td>W</td>
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<td>T. Dreier, O. Knöfel</td>
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</table>

Learning Control / Examinations
The assessment of this module consists of a written examination according to § 4(2), 1 of the examination regulation. The grade of the module is the grade of the written examination.

Conditions
None.

Learning Outcomes
The student

Content
The module generally introduces into law. What is law, why are legal rules valid, and what is the role of law in conjunction with social behaviour, technological and market developments? What is the relationship between law and justice? Moreover, the distinction between civil law, public law and criminal law will be highlighted. The basics of jurisdiction, international conflicts and alternative dispute settlement will be discussed. The main focus of the course is on the fundamental notions of civil law as defined and regulated in the German Civil Code (Bürgerliches Gesetzbuch, BGB), such as subjects and objects of law, legally binding declarations, agency, the formation of contracts, standard terms and conditions, consumer protection, performance of contractual promises. The course ends with an outlook to the law of contracts and property law.
Module: Commercial Law [IW1JURA2]

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

ECTS Credits: 9
Cycle: Every term
Duration: 2

Courses in module

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<td>T. Dreier</td>
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<tr>
<td>24011</td>
<td>Commercial and Corporate Law (p. 150)</td>
<td>2/0</td>
<td>W</td>
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<td>Z. (ZAR), O. Knöfel</td>
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<td>24017</td>
<td>Exercises in Civil Law (p. 196)</td>
<td>2/0</td>
<td>W/S</td>
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<td>T. Dreier</td>
</tr>
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</table>

Learning Control / Examinations

Conditions
None.

Learning Outcomes

The student

• possesses in-depth knowledge of the general and specific law of obligations and of property law;
• is able to penetrate the interaction of the statutory provisions of the German Civil Code (different types of contracts and the respective rules on liability; performance: impairment of performance; the different ways by which property may be transferred and the in rem security rights) and of commercial and company law (especially in respect of the peculiarities of commercial transactions, commercial agency, the law of merchants as well as German law of business organizations);
• in the Private Law Exercises (“Privatrechtliche Übung”) gains the skill to solve legal problems using legal methods.

Content

The module is based on the module “Introduction in Civil Law”. The students get profound Knowledge in special contract types of the German Civil Law as well as in complex constructions in business law. In addition to that the module wants to impart the competence in solving legal problems with legal methods.
Module: Constitutional and Administrative Law [IW1JURA3]

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

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<tr>
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Courses in module

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<tr>
<td>24016</td>
<td>Public Law I - Basic Principles (p. 180)</td>
<td>2/0</td>
<td>W</td>
<td>3</td>
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<tr>
<td>24520</td>
<td>Public Law II - Public Economic Law (p. 181)</td>
<td>2/0</td>
<td>S</td>
<td>3</td>
<td>G. Sydow</td>
</tr>
</tbody>
</table>

Learning Control / Examinations
The assessment of this module consists of a written examination according to § 4(2), 1 of the examination regulation for each course. The grade of the module is the average of the single grades weighted by the related credit points.

Conditions
None.

Recommendations
• Parallel to the lectures tutoria are offered in which legal thinking and argumentation is practised. Their attendance is strongly recommended.
• During the semester, test exams to each lecture are offered with extensive coaching. During the lecture-free time, a Q-and-A-lecture is offered.
• Details on the homepage of the ZAR (www.kit.edu/zar)
• The course Public Law I [24016] should be attend before the course Public Law II [24520].

Learning Outcomes
The lecture covers the core principles of public law. Students shall become acquainted with the basics of constitutional law, the fundamental rights which route governmental actions and the entire legal system, as well as possibilities of actions and instruments (especially law, administrative act, public-private contract) of the public authority. Furthermore the distinction between public and private law will be clarified. Moreover, possibilities of legal protection regarding administrative behavior will be addressed. Students shall learn to classify problems in public law and to solve (simple) administrative and constitutional cases.

Content
The course covers core material of constitutional and administrative law. It begins with the differentiation between public and private law. In the constitutional law part, the course will concentrate on the rule of law and individual rights, especially those protecting communication and entrepreneurship. The administrative law part will explain the different legal instruments of the administration how to act (rule, order, contract, etc.) and their propositions. Also, court proceedings to sue the administrative will be discussed. Students will learn the technique how to solve (simple) administrative and constitutional cases.
4.7 Mathematics

Module: Mathematics I [IW1MATH1]

Coordination: C. Wieners
Degree programme: Informationswirtschaft (B.Sc.)
Subject: Mathematics

ECTS Credits | Cycle | Duration
--- | --- | ---
8 | Every 2nd term, Winter Term | 1

Courses in module

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<tr>
<td>01360</td>
<td>Mathematics I for Information Engineering and Management (p. 169)</td>
<td>4/2/2</td>
<td>W</td>
<td>8</td>
<td>A. Rieder, C. Wieners</td>
</tr>
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</table>

Learning Control / Examinations
The assessment in this module consists of

1. a graded certificate of exercise following §4(2), 3 of the examination regulation from the exercises to mathematics I (1 credit) and
2. a written examination of 60 minutes on the lectures mathematics I following §4(2), 1 of the examination regulations (7 credits).

The grade of the module is computed as a weighted sum, where the grade of the written examination has a weight of 80% and the certificate a weight of 20%.

Conditions
None.

Learning Outcomes
Mathematical models are an important part in economical sciences. Therefore, the students need a basic knowledge in mathematics. The aim is the instruction in a comprehension of basic methods in analysis and linear algebra.

The students learn

- to use simple concepts and structures in mathematics;
- to recognize the mathematical structure of practical applications and to solve in simple cases mathematical problems;
- to comprehend the mathematical structure of more complex applications;
- to understand the mathematical basics to develop mathematical models for applications in cooperation with experts;
- to explain as a group member in the tutorial elementary mathematical structures and to stimulate in the discussion of examples the success of the group;
- to be in time for the tutorial group and for the preparation of homeworks;
- to work with basic mathematical literature.

The provides the foundations for

- comprehending the mathematical structure of more complex applications;
- developing mathematical models for applications in cooperation with experts;
- constructing algorithmical solutions of mathematical models for applications in cooperation with experts.

Content
The lectures mathematics I and II give an overview in basic mathematical knowledge which is required to understand modern computer science and economical sciences. Part I consist of linear algebra including the basic algebraic structures, vector spaces and linear mappings. Many algebraic concepts are important for computer science. Part II consists of analysis including an introduction into the calculus of functions of one or several variables.

Remarks
None.
Module: Mathematics II [IW1MATH2]

Coordinations: C. Wieners
Degree programme: Informationswirtschaft (B.Sc.)
Subject: Mathematics

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

Courses in module

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<th>CP</th>
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<tr>
<td>01877</td>
<td>Mathematics II for Information Engineering and Management (p. 170)</td>
<td>4/2/2</td>
<td>S</td>
<td>8</td>
<td>A. Rieder, C. Wieners</td>
</tr>
</tbody>
</table>

Learning Control / Examinations
The assessment in this module consists of
1. a graded certificate of exercise following §4(2), 3 of the examination regulation from the exercises to mathematics II and
2. a written examination of 60 minutes on the lectures mathematics II following §4(2), 1 of the examination regulations.

The grade of the module is computed as a weighted sum, where the grade of the written examination has a weight of 80% and the certificate a weight of 20%.

Conditions
None.

Learning Outcomes
Mathematical models are an important part in economical sciences. Therefore, the students need a basic knowledge in mathematics. The aim is the instruction in a comprehension of basic methods in analysis and linear algebra.

The students learn
• to use simple concepts and structures in mathematics;
• to recognize the mathematical structure of practical applications and to solve in simple cases mathematical problems;
• to comprehend the mathematical structure of more complex applications;
• to understand the mathematical basics to develop mathematical models for applications in cooperation with experts;
• to explain as a group member in the tutorial elementary mathematical structures and to stimulate in the discussion of examples the success of the group;
• to be in time for the tutorial group and for the preparation of homeworks;
• to work with basic mathematical literature.

The provides the foundations for
• comprehending the mathematical structure of more complex applications;
• developing mathematical models for applications in cooperation with experts;
• constructing algorithmical solutions of mathematical models for applications in cooperation with experts.

Content
The lectures mathematics I and II give an overview in basic mathematical knowledge which is required to understand modern computer science and economical sciences. Part I consist of linear algebra including the basic algebraic structures, vector spaces and linear mappings. Many algebraic concepts are important for computer science. Part II consists of analysis including an introduction into the calculus of functions of one or several variables.
5 Modules of term 5-6

5.1 Law

Module: Intellectual Property and Data Protection [IW3JURA]

| Coordination: | T. Dreier |
| Degree programme: | Informationswirtschaft (B.Sc.) |
| Subject: | Law (Specialization) |
| ECTS Credits | 6 |
| Cycle | Every 2nd term, Winter Term |
| Duration | 1 |

Courses in module

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<tr>
<td>24070</td>
<td>Industrial Property and Copyright Law (p. 145)</td>
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<td>24018</td>
<td>Data Protection Law (p. 121)</td>
<td>2/0</td>
<td>W</td>
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</table>

Learning Control / Examinations

Conditions

From the law modules in the core programme, Introduction to Civil Law [IW1INJURA1], Commercial Law [IW1INJURA2], and Constitutional and Administrative Law [IW1INJURA2], 2 out of 3 have to be completed successfully.

Learning Outcomes

Content

Building onto what the students have learned in law during the first two years of Bachelor studies, the module Law in the third Bachelor years has the purpose of both deepening and specialising the legal studies in areas of practical importance for information economics and management...
5.2 Business Administration

Module: eBusiness and Service Management [IW3BWLISM1]

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

<table>
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<td>2595466</td>
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<td>C. Weinhardt, H. Fromm</td>
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<tr>
<td>2590452</td>
<td>Management of Business Networks (p. 164)</td>
<td>2/1</td>
<td>W</td>
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<td>C. Weinhardt</td>
</tr>
<tr>
<td>2540454</td>
<td>eFinance: Information Engineering and Management for Securities Trading (p. 126)</td>
<td>2/1</td>
<td>W</td>
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<tr>
<td>2540498</td>
<td>Special Topics in Information Engineering &amp; Management (p. 246)</td>
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<td>W/S</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

Conditions
Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

Learning Outcomes
The students

- understand the strategic and operative design of information and information products,
- analyze the role of information on markets,
- evaluate case studies regarding information products,
- develop solutions in teams.

Content
This module gives an overview of the mutual dependencies of strategic management and information systems. The central role of information is exemplified by the structuring concept of the information life cycle. The single phases of this life cycle from generation over allocation until dissemination and use of the information are analyzed from a business and microeconomic perspective, applying classical and new theories. The state of the art of economic theory on aspects of the information life cycle are presented. The lecture is complemented by exercise courses.

The courses “Management of Business Networks”, “eFinance: Information engineering and management in finance” and “eServices” constitute three different application domains in which the basic principles of the Internet Economy are deepened. In the course “Management of Business Networks” the focus is set on the strategic aspects of management and information systems. It is held in English and teaches parts of the syllabus with the support of a case study elaborated with Lecturers from Concordia University, Montreal, or if applicable, Rotterdam School of Management. Thus the matter of strategic enterprise networks, a.k.a. smart business networks is also analysed by employing an international perspective.

The course “eFinance: information engineering and management for securities tradingprovides theoretically profound and also practical-oriented background about the functioning of international financial markets. The focus is placed on the economic and technical design of markets as information processing systems.

In “eServices” the increasing impact of electronic services compared to the traditional services is outlined. The Information- und Communication Technologies enable the provision of services, which are mainly characterized by interactivity and individuality. This course provides basic knowledge about the development and management of ICT-based services.
The theoretic fundamentals of Information Engineering and Management can be enriched by a practical experience in Special Topics in Information Engineering and Management. Any practical Seminar at the IM can be chosen for the course Special Topics in Information Engineering and Management.

Remarks
All practical Seminars offered at the IM can be chosen for Special Topics in Information Engineering & Management. Please update yourself on www.iism.kit.edu/im/lehre
Module: Supply Chain Management [IW3BWLISM2]

**Coordination:** S. Nickel

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

**Subject:** Business Administration (Specialization)

**ECTS Credits**

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<th>CP</th>
<th>Responsible Lecturer(s)</th>
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<tr>
<td>2590452</td>
<td>Management of Business Networks (p. 164)</td>
<td>2/1 W</td>
<td>4,5</td>
<td>C. Weinhardt</td>
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<tr>
<td>2540496</td>
<td>Management of Business Networks (Introduction) (p. 165)</td>
<td>2 W</td>
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<tr>
<td>2550486</td>
<td>Facility Location and Strategic Supply Chain Management (p. 251)</td>
<td>2/1 W</td>
<td>4,5</td>
<td>S. Nickel</td>
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<tr>
<td>2118078</td>
<td>Logistics - organisation, design and control of logistic systems (p. 162)</td>
<td>3/1 S</td>
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<td>2550488</td>
<td>Tactical and Operational Supply Chain Management (p. 257)</td>
<td>2/1 S</td>
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**Learning Control / Examinations**
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Conditions**
At least one of the courses Management of Business Networks [2590452] and Management of Business Networks (Introduction) [2540496] has to be taken. Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

**Recommendations**
It is recommended that exactly one out of the lectures

- Management of Business Networks
- Management of Business Networks (Introduction)

is taken.

**Learning Outcomes**
The students

- are able to understand and evaluate the control of cross-company supply chains based on a strategic and operative view,
- are able to analyse the coordination problems within the supply chains,
- are able to identify and integrate adequate information system infrastructures to support the supply chains,
- are able to apply theoretical methods from the operations research and the information management,
- learn to elaborate solutions in a team

**Content**
The module “Supply Chain Management” gives an overview of the mutual dependencies of information systems and of supply chains spanning several enterprises. The specifics of supply chains and their information needs set new requirements for the operational information management. In the core lecture “Management of Business Networks” the focus is set on the strategic aspects of management and information systems. The course is held in English and teaches parts of the syllabus with the support of a case study elaborated with Prof Kersten from Concordia University, Montreal, Canada. The course MBN introduction is consisting out of the first part of the regular MBN lecture, but as it has less credits will not include the analysis of the case study.
The module is completed by an elective course addressing appropriate optimization methods for the Supply Chain Management and for modern logistic approaches.

Remarks
The planned lectures in the next terms can be found on the websites of the respective institutes IIIM, IFL and IOR.
Module: eFinance [IW3BWLSM3]

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

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Courses in module

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<td>2540454</td>
<td>eFinance: Information Engineering and Management for Securities Trading</td>
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<td>C. Weinhardt</td>
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<td>2511402</td>
<td>Intelligent Systems in Finance (p. 154)</td>
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<td>S</td>
<td>5</td>
<td>D. Seese</td>
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<td>2530550</td>
<td>Derivatives (p. 122)</td>
<td>2/1</td>
<td>S</td>
<td>4.5</td>
<td>M. Uhrig-Homburg</td>
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<td>2530296</td>
<td>Exchanges (p. 113)</td>
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<td>2530570</td>
<td>International Finance (p. 156)</td>
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<td>S</td>
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<td>M. Uhrig-Homburg, Dr. Walter</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

Conditions
Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.
The course eFinance: Information Engineering and Management for Securities Trading [2540454] is compulsory and must be examined.

Learning Outcomes
The students

- are able to understand and analyse the value creation chain in stock broking,
- are able to adequately identify, design and use methods and systems to solve problems in finance,
- are able to evaluate and criticize investment decisions by traders,
- are able to apply theoretical methods of econometrics,
- learn to elaborate solutions in a team.

Content
The module “eFinance: Information engineering and management in finance” addresses current problems in the finance sector. It is investigated the role of information and knowledge in the finance sector and how information systems can solve or extenuate them. Speakers from practice will contribute to lectures with their broad knowledge. Core courses of the module deal with the background of banks and insurance companies and the electronic commerce of stocks in global finance markets. In addition the course Derivatives offers an insight into future and forward contracts as well as the assessment of options. Exchanges and International Finance are also alternatives which provide a supplementary understanding for capital markets.

Information management topics are in the focus of the lecture “eFinance: information engineering and management for securities trading”. For the functioning of the international finance markets, it is necessary that there is an efficient information flow. Also, the regulatory frameworks play an important role. In this context, the role and the functioning of (electronic) stock markets, online brokers and other finance intermediaries and their platforms are presented. Not only IT concepts of German finance intermediaries are presented, but also international system approaches will be compared. The lecture is supplemented by speakers from the practice (and excursions, if possible) coming from the Deutsche Börse and the Stuttgart Stock Exchange.

Remarks
The current seminar courses for this semester, which are complementary to this module, are listed on following webpage: the http://www.iism.kit.edu/im/lehre
Module: CRM and Service Management [IW3BWLISM4]

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

<table>
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Courses in module

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<th>CP</th>
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<tbody>
<tr>
<td>2540508</td>
<td>Customer Relationship Management (p. 115)</td>
<td>2/1 W</td>
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<tr>
<td>2540522</td>
<td>Analytical CRM (p. 96)</td>
<td>2/1 S</td>
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<td>2540520</td>
<td>Operative CRM (p. 182)</td>
<td>2/1 W</td>
<td>4,5</td>
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</table>

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. Every lecture is examined by a written exam (according to Section 4(2), 1 of the examination regulation) and by successful completion of exercises (according to Section 4 (2), 3 of the examination regulation).

The grades of the individual lectures consists of the grade of the written exam (approximately 90 percent resp. 100 of 112 points) and of the exercise performance (approximately 10 percent resp. 12 of 112 points). In the case of passing the written exam (50 points) the points of the exercise performance will be added to the points of the written exam. The assessment procedures are described for each course of the module separately.

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

Conditions
Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

Learning Outcomes

The student

- understands service management as the managerial foundation of customer relationship management and the resulting implications for strategic management, the organisational structure, and the functional areas of the company,
- develops and designs service concepts and service systems on a conceptual level,
- works in teams on case studies and respects project dates, integrates international literature of the discipline,
- knows the current developments in CRM in science as well as in industry,
- knows the scientific methods (from business administration, statistics, informatics) which are most relevant for analytic CRM and he autonomously applies these methods to standard cases,
- designs, implements, and analyzes operative CRM processes in concrete application domains (e.g. campaign management, call center management, ...).

Content

In the module CRM and Service Management [IW3BWLISM4] we teach the principles of modern customer-oriented management and its support by system architectures and CRM software packages. Choosing customer relationship management as a company’s strategy requires service management and a strict implementation of service management in all parts of the company. For operative CRM we present the design of customer-oriented, IT-supported business processes based on business process modelling and we explain these processes in concrete application scenarios (e.g. marketing campaign management, call center management, sales force management, field services, ...).

Analytic CRM is dedicated to improve the use of knowledge about customers in the broadest sense for decision-making (e.g. product-mix decisions, bonus programs based on customer loyalty, ...) and for the improvement of services. A requirement for this is the tight integration of operative systems with a data warehouse, the development of customer-oriented and flexible reporting systems, and – last but not least – the application of statistical methods (clustering, regression, stochastic models, ...).
Remarks
The lecture *Customer Relationship Management* [2540508] is given in English.
The courses *Analytical CRM* and *Operative CRM* will take place in an alternating way from winter term 14/15. Analytical CRM is offered for a last time in the summer term 14. Details on the cycle and on the exams can be found on http://www.em.uni-karlsruhe.de/studies/.
Module: Specialization in Customer Relationship Management [IW3BWLISM5]

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

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### Courses in module

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<th>ID</th>
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<tr>
<td>2540522</td>
<td>Analytical CRM (p. 96)</td>
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<td>4,5</td>
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<td>A. Geyer-Schulz</td>
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<td>26240</td>
<td>Competition in Networks (p. 267)</td>
<td>2/1</td>
<td>W</td>
<td>4,5</td>
<td>K. Mitusch</td>
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<tr>
<td>2595466</td>
<td>eServices (p. 139)</td>
<td>2/1</td>
<td>S</td>
<td>4,5</td>
<td>C. Weinhardt, H. Fromm</td>
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</tbody>
</table>

### Learning Control / Examinations

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

### Conditions

- Successful completion of the modules in semester 1–4 except for up to two modules is required. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.
- It is only possible to choose this module in combination with the module CRM and Servicemanagement [IW3BWLISM4]. The module is passed only after the final partial exam of CRM and Servicemanagement is additionally passed.
- At least, one of the courses Analytic CRM [2540522] and Operative CRM [2540520] has to be taken.

### Learning Outcomes

The student

- knows the scientific methods (from business administration, statistics, informatics) which are most relevant for analytic CRM and he autonomously applies these methods to standard cases,
- gains an overview of the market for CRM software,
- designs, implements, and analyzes operative CRM processes in concrete application domains (e.g. campaign management, call center management, . . . ),
- is aware of the problems of protecting the privacy of customers and the implications of privacy law.

### Content

In this module, analysis methods and techniques for the management and improvement of customer relations are presented. Furthermore, modelling, implementation, introduction, change, analysis and valuation of operative CRM processes are treated. Regarding the first part, we teach analysis methods and techniques suitable for the management and improvement of customer relations. For this goal we treat the principles of customer- and service-oriented management as the foundation of successful customer relationship management. In addition, we show how knowledge of the customer can be used for decision-making at an aggregate level (e.g. planning of sortiments, analysis of customer loyalty, . . . ). A basic requirement for this is the integration and collection of data from operative processes in a suitably defined data-warehouse in which all relevant data is kept for future analysis. The process of transferring data from the operative systems into the data warehouse is known as the ETL process (Extraction / Translation / Loading). The process of modelling a data-warehouse as well as the so-called extraction, translation, and loading process for building and maintaining a data-warehouse are discussed in-depth. The data-warehouse serves as a base for flexible management reporting. In addition, various statistic methods (e.g. cluster analysis, regression analysis, stochastic models, . . . ) are presented which help in computing suitable key performance indicators or which support decision-making.

Regarding the operative part, we emphasize the design of operative CRM processes. This includes the modelling, implementation, introduction and change, as well as the analysis and evaluation of operative CRM processes. Petri nets and their extensions are the scientific foundation of process modelling. The link of Petri nets to process models used in industry as e.g. UML activity
diagrams is presented. In addition, a framework for process innovation which aims at a radical improvement of key business processes is introduced. The following application areas of operative CRM processes are presented and discussed:

- Strategic marketing processes
- Operative marketing processes (campaign management, permission marketing, . . .)
- Customer service processes (sales force management, field services, call center management, . . .)

Remarks
The courses Analytical CRM and Operative CRM will take place in an alternating way from winter term 14/15. Analytical CRM is offered for a last time in the summer term 14. Details on the cycle and on the exams can be found on http://www.em.uni-karlsruhe.de/studies/.
Module: Strategy and Organization [IW3BWLUO1]

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

ECTS Credits: 9
Cycle: Every term
Duration: 2

Courses in module

<table>
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<tr>
<th>ID</th>
<th>Course</th>
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<th>CP</th>
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<tr>
<td>2577900</td>
<td>Management and Strategy (p. 261)</td>
<td>2/0</td>
<td>S</td>
<td>4</td>
<td>H. Lindstädt</td>
</tr>
<tr>
<td>2577902</td>
<td>Managing Organizations (p. 186)</td>
<td>2/0</td>
<td>W</td>
<td>4</td>
<td>H. Lindstädt</td>
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<tr>
<td>2577910</td>
<td>Problem solving, communication and leadership (p. 197)</td>
<td>1/0</td>
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Learning Control / Examinations
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

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

Conditions
Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

Learning Outcomes
See German version.

Content
Module: Industrial Production I [IW3BWLIIIP1]

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

<table>
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<td>2581950</td>
<td>Fundamentals of Production Management (p. 149)</td>
<td>2/2</td>
<td>S</td>
<td>5.5</td>
<td>F. Schultmann</td>
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<tr>
<td>2581960</td>
<td>Production Economics and Sustainability (p. 198)</td>
<td>2/0</td>
<td>W</td>
<td>3.5</td>
<td>M. Fröhling</td>
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<tr>
<td>2581996</td>
<td>Logistics and Supply Chain Management (p. 161)</td>
<td>2/0</td>
<td>S</td>
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<td>M. Wiens</td>
</tr>
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</table>

**Learning Control / Examinations**
The assessment is carried out as partial exams (according to section 4 (2), 1 SPO) of the core course “Fundamentals of Production Management” [2581950] and one further single course of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Conditions**
Specific precondition “Information Engineering and Management” (B.Sc.): Successful passing of all modules in semesters 1-4 (keys [IW1. . . ]) with at maximum two modules left to complete, not considering the internship [IW1EXPRAK] and “Business and Public Law” [IW1INJURA] modules.
The course “Fundamentals of Production Management” [2581950] and one additional activity have to be chosen.

**Recommendations**
All courses are specifically designed to be taken independently.
Bearing in mind the master programme, we recommend combining this module with “Industrial Production II” [WW4BWLIIIP2] and/or “Industrial Production III” [WW4BWLIIIP6].

**Learning Outcomes**
- Students shall be aware of the important role of industrial production and logistics for production management.
- Students shall use relevant concepts of production management and logistics in an adequate manner.
- Students shall be able to reflect on decision principles in firms and their circumstances in the light of the production management aspects studied.
- Students shall be proficient in describing essential tasks, difficulties and solutions to problems in production management and logistics.
- Students shall be able to describe relevant approaches of modeling production and logistic systems.
- Students shall be aware of the important role of material and energy-flows in production systems.
- Students shall be proficient in using exemplary methods for solving selected problems.

**Content**
This module is designed to introduce students into the wide area of industrial production and logistics management. It focuses on strategic production management under the aspect of sustainability. The courses use interdisciplinary approaches of systems, also theory to describe the central tasks of industrial production management and logistics. Herein, attention is drawn upon strategic corporate planning, research and development as well as site selection. Students will obtain knowledge in solving internal and external transport and storage problems with respect to supply chain management and disposal logistics.
Module: Energy Economics [IW3BWL1IP2]

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

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Courses in module

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<th>CP</th>
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<tr>
<td>2581010</td>
<td>Introduction to Energy Economics (p. 129)</td>
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<td>S</td>
<td>5,5</td>
<td>W. Fichtner</td>
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<tr>
<td>2581012</td>
<td>Renewable Energy – Resources, Technology and Economics (p. 209)</td>
<td>2/0</td>
<td>W</td>
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<td>R. McKenna</td>
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<td>2581005</td>
<td>Corporate Governance in Energy Economics (p. 260)</td>
<td>2/0</td>
<td>S</td>
<td>3,5</td>
<td>H. Villis</td>
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<td>2581959</td>
<td>Energy Policy (p. 136)</td>
<td>2/0</td>
<td>S</td>
<td>3,5</td>
<td>M. Wietschel</td>
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</table>

Learning Control / Examinations

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) about the lecture Introduction into Energy Economics [2581010] and one optional lecture of the module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

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

Conditions

Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation. The lecture Introduction into Energy Economics [2581010] has to be examined.

Recommendations

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

Learning Outcomes

The student

- is able to understand interdependencies in energy economics and to evaluate ecological impacts in energy supply,
- is able to assess the different energy carriers and their characteristics,
- knows the energy political framework conditions,
- gains knowledge about new market-based conditions and the cost and potentials of renewable energies in particular.

Content

Introduction to Energy Economics: Characterisation (reserves, suppliers, cost, technologies) of different energy carriers (coal, gas, oil, electricity, heat etc.).
Renewable Energy - Resources, Technology and Economics: Characterisation of different renewable energy carriers (wind, solar, hydro, geothermal etc.).
Corporate Governance in Energy Economics: Challenges of the management of a large company in energy economics (superior leadership role, structures, processes and projects from a leadership perspective etc.).
Energy Policy: Management of energy flows, energy-political targets and instruments (emission trading etc.).

Remarks

Upon request, the authorisation for taking the examinations for modules of specialisation can be granted by the examination committee even if the mentioned conditions are not fulfilled. The approving statement of the coordinator of the module of specialisation claimed on the application form is not required for the module Energy Economics [TVWL1IP2]. The application form has to be submitted to the examination committee of the faculty along with a current transcript of records (e.g. via letterbox). Upon request at the institute, additional recognition of studies (e.g. from other universities) is possible in the module.
Module: Essentials of Finance [IW3BWLFBV1]

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

<table>
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Courses in module

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<tr>
<td>2530575</td>
<td>Investments (p. 158)</td>
<td>2/1</td>
<td>S</td>
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<td>M. Uhrig-Homburg</td>
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<tr>
<td>2530216</td>
<td>Financial Management (p. 141)</td>
<td>2/1</td>
<td>S</td>
<td>4.5</td>
<td>M. Ruckes</td>
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Learning Control / Examinations
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

Learning Outcomes
The student
- has fundamental skills in modern finance
- has fundamental skills to support investment decisions on stock, bond and derivative markets
- applies concrete models to assess investment decisions on financial markets as well as corporate investment and financing decisions.

Content
The module Essentials of Finance deals with fundamental issues in modern finance. The courses discuss fundamentals of the valuation of stocks. A further focus of this module is on modern portfolio theory and analytical methods of capital budgeting and corporate finance.
Module: Topics in Finance I [IW3BWLFBV5]

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

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

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<td>2530210</td>
<td>Cost and Management Accounting (p. 157)</td>
<td>2/1</td>
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<td>2530232</td>
<td>Financial Intermediation (p. 142)</td>
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<td>W</td>
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<td>2530550</td>
<td>Derivatives (p. 122)</td>
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<td>4,5</td>
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<td>2530296</td>
<td>Exchanges (p. 113)</td>
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<td>Business Strategies of Banks (p. 144)</td>
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<td>2530570</td>
<td>International Finance (p. 156)</td>
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<td>M. Uhrig-Homburg, Dr. Walter</td>
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<td>2540454</td>
<td>eFinance: Information Engineering and Management for Securities Trading (p. 126)</td>
<td>2/1</td>
<td>W</td>
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<td>2561129</td>
<td>Specific Aspects in Taxation (p. 250)</td>
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<td>B. Wigger, Armin Bader</td>
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<td>2530219</td>
<td>Asset Management (p. 102)</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

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

Conditions
Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.
It is only possible to choose this module in combination with the module Essentials in Finance [IW3BWLFBV1]. The module is passed only after the final partial exam of Essentials in Finance is additionally passed.

Learning Outcomes
The student
• has advanced skills in modern finance
• is able to apply these skills in practice in the fields of finance and accounting, financial markets and banking

Content
The module Topics in Finance I is based on the module Essentials of Finance. The courses deal with advanced issues concerning the fields of finance and accounting, financial markets and banking from a theoretical and practical point of view.
Module: Risk and Insurance Management [IW3BWLFBV3]

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

<table>
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<tr>
<td>2550055</td>
<td>Principles of Insurance Management</td>
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<td>(p. 195)</td>
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<td>2530326</td>
<td>Enterprise Risk Management (p. 138)</td>
<td>3/0</td>
<td>W</td>
<td>4.5</td>
<td>U. Werner</td>
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**Learning Control / Examinations**  
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The lectures are examined by oral presentations and related term papers in the context of the lectures. Furthermore, there is a final oral examination.

The grade of each examination consists of the oral presentation and the term paper (50 percent) and the oral examination (50 percent). The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Conditions**  
Successful completion of the modules in semester 1–4 except for up to two modules. The module *Internship [IW1EXPRAK]* and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

**Learning Outcomes**  
See German version.

**Content**  
See German version.
Module: Design, Construction and Sustainability Assessment of Buildings [IW3BWLOOW1]

Coordination: T. Lützkendorf
Degree programme: Informationswirtschaft (B.Sc.)
Subject: Business Administration (Specialization)

<table>
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Courses in module

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<tr>
<td>26404w</td>
<td>Design and Construction of Buildings (p. 107)</td>
<td>2/1</td>
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<td>T. Lützkendorf</td>
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<tr>
<td>2585404/2586404</td>
<td>Sustainability Assessment of Buildings (p. 108)</td>
<td>2/1</td>
<td>S</td>
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<td>T. Lützkendorf</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

Recommendations
The combination with the module Real Estate Management [IW3BWLOOW2] is recommended.
Furthermore a combination with courses in the area of
- Industrial production (energy flow in the economy, energy politics, emissions)
- Civil engineering and architecture (building physics, building construction)
is recommended.

Learning Outcomes
The student
- knows the basics of sustainable design, construction and operation of buildings with an emphasis on building ecology
- has knowledge of building ecology assessment procedures and tools for design and assessment
- is capable of applying this knowledge to assessing the ecological advantageousness of buildings as well as their contribution to a sustainable development.

Content
Sustainable design, construction and operation of buildings currently are predominant topics of the real estate sector, as well as “green buildings”. Not only designers and civil engineers, but also other actors who are concerned with project development, financing and insurance of buildings or portfolio management are interested in these topics.
On the one hand the courses included in this module cover the basics of energy-efficient, resource-saving and health-supporting design and construction of buildings. On the other hand fundamental assessment procedures for analysing and communicating the ecological advantageousness of technical solutions are discussed. With the basics of green building certification systems the lectures provide presently strongly demanded knowledge.
Additionally, videos and simulation tools are used for providing a better understanding of the content of teaching.
Module: Real Estate Management [IW3BWLOOW2]

**Coordination:** T. Lützkendorf  
**Degree programme:** Informationswirtschaft (B.Sc.)  
**Subject:** Business Administration (Specialization)

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### Courses in module

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<tr>
<td>26400w</td>
<td>Real Estate Management I (p. 204)</td>
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<td>2585400/2586400</td>
<td>Real Estate Management II (p. 205)</td>
<td>2/2</td>
<td>S</td>
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<td>T. Lützkendorf</td>
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### Learning Control / Examinations

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

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

### Conditions

Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

### Recommendations

The combination with the module Design Constructions and Assessment of Green Buildings [IW3BWLOOW1] is recommended. Furthermore a combination with courses in the area of
- Finance
- Insurance
- Civil engineering and architecture (building physics, building construction, facility management)

is recommended.

### Learning Outcomes

The student
- possesses an overview concerning the different facets and interrelationships within the real estate business, the important decision points in real estate lifecycle and the different views and interests of the actors concerned, and
- is capable of applying basic economic methods an procedures to problems within the real estate area.

### Content

The real estate business offers graduates very interesting jobs and excellent work- and advancement possibilities. This module provides an insight into the macroeconomic importance of this industry, discusses problems concerned to the administration of real estate and housing companies and provides basic knowledge for making decisions both along the lifecycle of a single building and the management of real estate portfolios. Innovative operating and financing models are illustrated, as well as the current development when looking at real estate as an asset-class.

This module is also suitable for students who want to discuss macroeconomic, business-management or financial problems in a real estate context.
Module: Foundations of Marketing [IW3BWLMAR]

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

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Courses in module

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<td>2572177</td>
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<td>2572158</td>
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Learning Control / Examinations

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

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

Conditions

Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

The course Marketing Mix is compulsory and must be examined.

Learning Outcomes

The aim of this module is to prepare the students properly for tasks in a marketing or sales department. Especially technical oriented companies choose engineers with technical knowledge and understanding for marketing and sales.

Students
- know the most important concepts, approaches, and theories of the marketing mix (product management, price management, communication management and sales management)
- can make decisions about current and future products (innovation management and management of established products; e.g. conjoint analysis)
- know how customers perceive brands and how to influence that
- comprehend how customers respond to prices (e.g. price-demand function)
- know how to determine prices based on conceptual and quantitative considerations
- know the basics of price differentiation
- are familiar with the instruments of communication and are able to design them accurately
- know how to allocate the communication budget
- know how to target consumers via market segmentation
- know how to position a product
- know how to analyze the significance and satisfaction of a customer
- know how create a relationship to the customer and to the retailer
- are familiar with the particularities in specific marketing contexts (Business-to-Business Marketing, Marketing of Services, International Marketing)

Content

The core course of the module is “Marketing Mix”. This course is compulsory and must be examined. “Marketing Mix” contains instruments and methods that enable you to goal-oriented decisions in the operative marketing management (product management, pricing, promotion and sales management).

To deepen the marketing knowledge students can complete the module in two ways:
- by choosing the course “Brand Management”.
- by choosing the combination of the courses “Services- and B2B-Marketing” and “International Marketing”.

Information Engineering and Management (B.Sc.)
Module Handbook, Date: 21.08.2014
Remarks
For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).
Module: Management of public- and private-sector organizations [IW3BWLIWW1]

Coordination: B. Wigger, N. Edwards
Degree programme: Informationswirtschaft (B.Sc.)
Subject: Business Administration (Specialization), Business Administration

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Learning Control / Examinations

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) for each individual course in 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 for the module is calculated as weighted average of the individual grades for all courses. Individual course grades are weighted according to the number of credits (LPs) for that course. The final grade is then rounded-off to the first decimal place.

Conditions

Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

Each course in this module is a compulsory element of the entire module; therefore, a passing grade in each course is required in order to receive credit for completion of the module.

Both the lecture „Introduction to Public Management“ and the course „Case Studies in Public Management“ must be taken at the same time.

Recommendations

A good proficiency in the English language (written and oral).

Learning Outcomes

The aim of the module is to provide students with a comprehensive understanding of management in private and public sector organizations, as well as in the provision of public services. Topics covered in the module include the following: strategic management; marketing; financial management; contracting for public service provision; information and communication technologies; human resource management; performance, quality and process management; change management; internal control of organizational processes; auditing and controlling; and, ideal-typical organizational forms.

In addition to the two lectures, the module includes a third course, "Case Studies in Public Management", in which student achievement of learning goals is realized by the use of case studies. This course utilizes a problem-based learning (PBL) format, which offers students the opportunity to apply knowledge acquired both in the accompanying lectures as well as through independent research, in solving contemporary problems in public management. Students actively participate in the course and contribute to the overall learning experience.

Please also refer to the learning goals related to the individual courses in the module.

Content

Topics covered in the module include, but are not limited to, the following: Strategic management; marketing; financial management; contracting for public service provision; information and communication technologies; human resource management; performance, quality and process management; change management; internal control of organizational processes; auditing and controlling; and, ideal-typical organizational forms.
5.3 Economics

Module: Introduction to Public Finance and Public Management [IW3VWL11]

Coordination: B. Wigger, N. Edwards
Degree programme: Informationswirtschaft (B.Sc.)
Subject: Economics (Specialization)

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Courses in module

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<td>1</td>
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<td>B. Wigger, N. Edwards</td>
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Learning Control / Examinations
The final grade for the module is determined by means of a written exam and the grades on the other assignments. The written exam encompasses all material covered in the individual courses included in this module. The exam is offered every summer semester. The ratio of the final grade for the courses is as follows: 55% written final exam and 45% other assignments (both written and oral).

A re-sit exam (written exam) will be offered during the first week of the following winter semester, for which participation is obligatory for all students who failed the exam on their first attempt. Only students who took the first exam will be allowed to participate in the re-sit exam. Only in exceptional circumstances may the re-sit exam be taken as an oral exam rather than as a written exam.

Conditions
Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

Each course in this module is a compulsory element of the entire module. Both the lecture „Introduction to Public Management“ and the course „Case Studies in Public Management“ must be taken at the same time.

Recommendations
A good proficiency in the English language (written and spoken).

Learning Outcomes
The module Introduction to Public Finance and Public Management is comprised of three courses, Introduction to Public Finance, Introduction to Public Management, and Case Studies in Public Management. This multidisciplinary module aims to provide students with an understanding of the complexities surrounding the economic role of the state in a market economy.

While the course Introduction to Public Finance deals with issues such as the determination of the appropriate size and scope of the state as economic actor, the course Introduction to Public Management then looks at the management of the public sector organizations that are tasked with executing the resulting government programs. There are numerous topics on which the two courses overlap and converge, with the result that students are able to analyze single issues by applying theory from several disciplines; namely, economics, management and organization studies. Finally, the course Case Studies in Public Management offers students the opportunity to evaluate and synthesize the material learned in the lecture courses and then apply it in solving contemporary problems in public sector management and governance.

Please also refer to the learning goals related to the individual courses in the module.

Content
Topics covered in the module include, but are not limited to, the following: welfare economics; public choice theory; market failure; collective action problems; Weber’s theory of bureaucracy; the influence of politics on the management of public sector organizations; strategic management and marketing in public sector organizations; modes of public service provision; human resource management in public sector organizations; and performance, quality and process management in public sector organizations.
Module: Economic Theory [IW3VWL12]

**Coordination:** C. Puppe

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

**Subject:** Economics (Specialization)

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**Courses in module**

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**Learning Control / Examinations**

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

**Conditions**

Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

**Learning Outcomes**

See German version.

**Content**
Module: Applied Microeconomics [IW3VWL13]

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

ECTS Credits: 9
Cycle: Every term
Duration: 1

Courses in module

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

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

Conditions
Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

Recommendations
None.

Learning Outcomes
Students

- are introduced to the basic theoretical analysis of strategic interaction situations and shall be able to analyze situations of strategic interaction systematically and to use game theory to predict outcomes and give advice in applied economics settings, (course „Introduction to Game Theory‟);
- are exposed to the basic problems of imperfect competition and its implications for policy making; (course „Industrial Organization‟);
- are provided with the basic economics of network industries (e.g., telecom, utilities, IT, and transport sectors) and should get a vivid idea of the special characteristics of network industries concerning planning, competition, competitive distortion, and state intervention, (course „Competition in Networks‟).

Content
The module’s purpose is to extend and foster skills in microeconomic theory by investigating a variety of applications. Students shall be able to analyze real-life problems using microeconomics.

Remarks
The course „Introduction into Game Theory‟ was known as „Game Theory I‟ earlier.
5.4 Statistics


Coordination: W. Heller
Degree programme: Informationswirtschaft (B.Sc.)
Subject: Economics (Specialization)

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Learning Control / Examinations
The assessment is carried out as partial exams of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

Conditions
Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

The lecture Statistics and Econometrics in Business and Economics has to be taken.

Learning Outcomes
See German version.

Content
5.5 Operations Research

Module: Applications of Operations Research [IW3OR5]

Coordination: S. Nickel
Degree programme: Informationswirtschaft (B.Sc.)
Subject: OR (Specialization)

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<td>2550488</td>
<td>Tactical and Operational Supply Chain Management (p. 257)</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to § 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

Conditions
Successful completion of the modules from terms 1-4 except for at most two modules. The module internship [IW1EXPRAK] as well as modules of Law [IW1JURA1,2,3] are not considered.
At least one of the courses Facility Location and strategic Supply Chain Management [2550486] and Tactical and operational Supply Chain Management [2550488] has to be taken.

Learning Outcomes
The student

- is familiar with basic concepts and terms of Supply Chain Management,
- knows the different areas of Supply Chain Management and their respective optimization problems,
- is acquainted with classical location problem models (in the plane, on networks and discrete) as well as fundamental methods for distribution and transport planning, inventory planning and management,
- is able to model practical problems mathematically and estimate their complexity as well as choose and adapt appropriate solution methods.

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

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

**Remarks**
The planned lectures and courses for the next three years are announced online.
Module: Methodical Foundations of OR [IW3OR6]

Coordination: O. Stein
Degree programme: Informationswirtschaft (B.Sc.)
Subject: OR (Specialization)

ECTS Credits 9
Cycle Every term
Duration 1

Courses in module

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

Conditions
At least one of the lectures Nonlinear Optimization I [2550111] and Global Optimization I [2550134] has to be examined. The lecture Stochastische Entscheidungsmodelle I [2550679] cannot be examined.

Learning Outcomes
The student

- names and describes basic notions for optimization methods, in particular from nonlinear and from global optimization,
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems and chooses the appropriate solution methods to solve also challenging optimization problems independently and, if necessary, with the aid of a computer,
- validates, illustrates and interprets the obtained solutions.

Content
The modul focuses on theoretical foundations as well as solution algorithms for optimization problems with continuous decision variables. The lectures on nonlinear programming deal with local solution concepts, whereas the lectures on global optimization treat approaches for global solutions.

Remarks
The planned lectures and courses for the next three years are announced online (http://www.ior.kit.edu). For the lectures of Prof. Stein a grade of 30 % of the exercise course has to be fulfilled. The description of the particular lectures is more detailed.
Module: Stochastic Methods and Simulation [IW3OR7]

**Coordination:** K. Waldmann
**Degree programme:** Informationswirtschaft (B.Sc.)
**Subject:** OR (Specialization)

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### Courses in module

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<td>2550679</td>
<td>Markov Decision Models I (p. 255)</td>
<td>2/1/2</td>
<td>W</td>
<td>5</td>
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<tr>
<td>2550682</td>
<td>Markov Decision Models II (p. 256)</td>
<td>2/1/2</td>
<td>S</td>
<td>4,5</td>
<td>K. Waldmann</td>
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<td>2550662</td>
<td>Simulation I (p. 240)</td>
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<td>2550665</td>
<td>Simulation II (p. 241)</td>
<td>2/1/2</td>
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<tr>
<td>2550111</td>
<td>Nonlinear Optimization I (p. 177)</td>
<td>2/1</td>
<td>S</td>
<td>4,5</td>
<td>O. Stein</td>
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<tr>
<td>2550488</td>
<td>Tactical and Operational Supply Chain</td>
<td>2/1</td>
<td>S</td>
<td>4,5</td>
<td>S. Nickel</td>
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<td></td>
<td>Management (p. 257)</td>
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### Learning Control / Examinations

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

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

### Conditions

Successful completion of the modules in semester 1-4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

The course Simulation I [2550662] has to be attended.

The course Markov Decision Models [2550679] cannot be examined.

### Learning Outcomes

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

### Content

**Topics overview:**
- Markov Decision Models II: Queuing Systems, Stochastic Decision Processes
- Simulation I: Generation of random numbers, Monte Carlo integration, Discrete event simulation, Discrete and continuous random variables, Statistical analysis of simulated data.
- Simulation II: Variance reduction techniques, Simulation of stochastic processes, Case studies.

### Remarks

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

Module: Semantic Knowledge Management [IW3INAIFB2]

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

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<tr>
<td>25860sem</td>
<td>Special Topics of Knowledge Management (p. 249)</td>
<td>2/1</td>
<td>W/S</td>
<td>5</td>
<td>R. Studer</td>
</tr>
<tr>
<td>2511210</td>
<td>Business Process Modelling (p. 173)</td>
<td>2/1</td>
<td>W</td>
<td>5</td>
<td>A. Oberweis</td>
</tr>
<tr>
<td>25070p</td>
<td>Advanced Lab Applied Informatics (p. 189)</td>
<td>2</td>
<td>W/S</td>
<td>4</td>
<td>A. Oberweis, H. Schmeck, D. Seese, R. Studer, S. Tai</td>
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<tr>
<td>25070s</td>
<td>Seminar in Applied Informatics (p. 211)</td>
<td>2</td>
<td>W/S</td>
<td>3</td>
<td>A. Oberweis, H. Schmeck, D. Seese, R. Studer, S. Tai</td>
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<tr>
<td>2511310</td>
<td>Semantic Web Technologies (p. 210)</td>
<td>2/1</td>
<td>S</td>
<td>5</td>
<td>R. Studer, A. Harth</td>
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Learning Control / Examinations
The assessment mix of each course of this module is defined for each course separately. The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.

Conditions
Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.
Lecture Semantic Web Technologies I [2511304] is mandatory.

Learning Outcomes
Students

- know the motives for the application of knowledge management in organizations
- know the basic design dimensions of holistic knowledge management (organization, human, information technology, corporate culture)
- know the main group of IT systems for knowledge management and are able to describe the relevant application scenarios and basic operating modes of these systems
- know how to use the different IT systems for knowledge management in practice
- know the basic standards for the modeling of information and processes and are able to describe their formal structures
- know how to apply the different modeling languages
- know criteria to evaluate the success of knowledge management systems and are able to apply them to assess defined knowledge management scenarios

Content
In modern companies the availability and usability of knowledge is an essential factor of success for central managerial tasks and duties such as the improvement of business processes, product innovation and the amelioration of customer satisfaction. This module illustrates the typical problems of knowledge management in organizations and presents IT methods to approach these questions. The relevant groups of knowledge management systems are analyzed and expanded in the subject areas knowledge representation/semantic modeling and document management/groupware systems.
## Module: Semantic Web and Applications [IW3INAIFB3]

**Coordination:** R. Studer  
**Degree programme:** Informationswirtschaft (B.Sc.)  
**Subject:** Informatics (Specialization)

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

**Conditions**  
Successful completion of the modules in semester 1–4 except for up to two modules. The module *Internship* [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

**Learning Outcomes**

**Content**
Module: Information Services in Networks [IW3INAIFB4]

**Coordination:** H. Schmeck

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

**Subject:** Informatics (Specialization)

### ECTS Credits: 9

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### Learning Control / Examinations

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

### Conditions

None.

### Learning Outcomes

#### Content
### Module: Algorithms and Applications [IW3INAIFB5]

**Coordination:** H. Schmeck  
**Degree programme:** Informationswirtschaft (B.Sc.)  
**Subject:** Informatics (Specialization)

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#### Learning Control / Examinations

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

#### Conditions

None.

#### Learning Outcomes

Content
Module: Business Processes and Information Systems [IW3INAIFB8]

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

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### Courses in module

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

**Conditions**  
At least one of the courses Workflowangement [2511204] or Modellierung von Geschäftsprozessen [2511210] has to be attended. Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

**Learning Outcomes**  
Students  
- design architecture models of enterprise information systems and compare alternative designs,  
- explain the concepts and principles of process modeling languages and methods, apply the methods in a concrete situation and evaluate the results,  
- choose an appropriate modeling language according to a given context for analysing, modeling and improving business processes.

**Content**  
Modeling the relevant aspects of a business process is the basis for efficient and effective support of this process in an enterprise information system. Detailed knowledge of languages, methods and software tools for supporting business process modeling is taught in this module. Additionally fundamentals of software quality management are considered in this module. Maturity models like CMMI or SPICE for evaluation and improvement of a software development process are introduced.
Module: Introduction to Data and Information Management [IW3INGDI]

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

ECTS Credits: 9  Cycle: Every term  Duration: 1

Courses in module

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<td>Data Privacy Protection in Interconnected Information Systems (p. 120)</td>
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<td>Mechanisms and Applications of Workflow Systems (p. 160)</td>
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<td>W</td>
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<td>J. Mülle, Silvia von Stackelberg</td>
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<td>(p. 100)</td>
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<td>Database Systems (p. 119)</td>
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Learning Control / Examinations
Conditions
None.

Learning Outcomes
The students
- see the necessity of specialised systems for information and data management and are able to define and deploy decision criteria for purchasing such software,
- are aware of the fundamental approaches in information and database systems and are able to judge their potential applications,
- understand database applications and develop simple database applications on their own,
- are able to communicate at a professional level about technical aspects of information and knowledge management

Content
This module aims at exposing students to modern information and database systems. Beyond fundamental theory and concepts, this module covers the deployment of such technology.
## Module: Foundations of Information Systems [IW3INGIS]

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

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### Learning Control / Examinations

**Conditions**  
Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.  
At least one of the lectures Data Warehousing and Mining, Deployment of Database Systems, Mechanisms and Applications of Workflow Systems has to be taken.

**Recommendations**  
It is recommended to take this module after completion of the module Communication and Database Systems [IW3INKD].

### Learning Outcomes

The students

- see the necessity of specialised systems for information management and are able to define and deploy decision criteria for purchasing such software,
- are aware of the fundamental approaches in information systems and are able to judge their potential applications,
- understand database applications and develop simple database applications on their own,
- are able to communicate at a professional level about technical aspects of information and knowledge management.

### Content

This module aims at exposing students to modern information systems. Beyond fundamental theory and concepts, this module covers the deployment of such technology.

### Remarks

The courses in this module are offered irregularly, however, the exam can be taken anytime.
Module: Communication and Database Systems [IW3INKD]

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

<table>
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Courses in module

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<td>24516</td>
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<td>K. Böhm</td>
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<tr>
<td>24519</td>
<td>Introduction in Computer Networks (p. 134)</td>
<td>2/1</td>
<td>S</td>
<td>4</td>
<td>M. Beigl, M. Zitterbart</td>
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</table>

Learning Control / Examinations

The assessment of the lecture Introduction in Computer Networks consists of a written exam according to section 4 subsection 2 no. 1 study and examination regulations.

The assessment of the lecture Database Systems consists of a written exam according to section 4 subsection 2 no. 1 study and examination regulations.

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

Conditions

Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

Recommendations

Knowledge of the lecture Software Engineering I is recommended.

Learning Outcomes

The students will

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

Content

Distributed information systems are worldwide information repositories which are accessible by everybody at any place of the world at any time. The physical distance is bridged by telecommunication systems, while database management technology manages and coordinates data for arbitrary periods of time. In order to understand globally running processes, one has to understand both data transmission techniques and database technology. Besides the telecommunication and database technologies on their own, an understanding of their cooperation is required, too.
Module: Information and Database Systems [IW3INIDS]

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

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<td>24111</td>
<td>Mechanisms and Applications of Work-flow Systems (p. 160)</td>
<td>3</td>
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<td>J. Mülle, Silvia von Stackelberg</td>
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<td>24317</td>
<td>(p. 100)</td>
<td>2</td>
<td>W</td>
<td>4</td>
<td>K. Böhm</td>
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<td>24605</td>
<td>Data Privacy Protection in Interconnected Information Systems (p. 120)</td>
<td>2</td>
<td>S</td>
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<td>K. Böhm, Buchmann</td>
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<td>PUB Consulting in Practice (p. 193)</td>
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<td>PMP Project Management in Practice (p. 200)</td>
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</table>

Learning Control / Examinations

Conditions
None.

Learning Outcomes

The students

- see the necessity of specialised systems for information management and are able to define and deploy decision criteria for purchasing such software,
- are aware of the fundamental approaches in information systems and are able to judge their potential applications,
- understand database applications and develop simple database applications on their own,
- are able to communicate at a professional level about technical aspects of information and knowledge management.

Content

This module aims at exposing students to modern information systems. Beyond fundamental theory and concepts, this module covers the deployment of such technology.
Module: Database Systems in Theory and Practice [IW3INDBSTP]

Coordination: K. Böhm, Clemens Heidinger
Degree programme: Informationswirtschaft (B.Sc.)
Subject: Informatics (Specialization)

ECTS Credits 9
Cycle Every term
Duration 2

Courses in module

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<td>2</td>
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Learning Control / Examinations
It will be announced at least 6 weeks in advance if the assessment consists of a written exam (usually 1h) according to sec. 4 subsec. 2 no. 1 study and examination regulations or of an oral exam (usually 20min) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The practical course has to be passed in order to successfully complete the module.

Conditions
None.

Learning Outcomes

Content
Module: Telematics [IW3INTM]

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

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<td>S</td>
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<tr>
<td>24128</td>
<td>Telematics (p. 258)</td>
<td>3</td>
<td>W</td>
<td>6</td>
<td>M. Zitterbart</td>
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Learning Control / Examinations

Conditions
Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

Recommendations
The lecture Telematics [24128] builds on the content of the lecture Introduction in Computer Networks [24519] and should therefore only be taken after successful completion of the lecture Introduction in Computer Networks [24519].

Learning Outcomes
The students will broaden their knowledge of computer networks initially learnt in the module Telematics [IW3INTM]. They learn about problems and solutions in the domains of wireless, multimedia, or secure communications and they will be able to analyse and evaluate specific solutions in those domains.

Content
Selected protocols, architectures, mechanisms, and algorithms in the chosen domains will be analysed in detail. The student hereby may choose among mobile and wireless communications, principles of the design of secure communication protocols, and protocols and techniques for multimedia communication.
Module: Telematics II [IW3INTM2]

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

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<td>Multimedia Communications (p. 174)</td>
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<td>Network Security: Architectures and Protocols (p. 176)</td>
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<td>IT-Security Management for Networked Systems (p. 159)</td>
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Learning Control / Examinations

Conditions
The module Telematics [IW3INTM] has to be taken.

Recommendations
The material covered in the courses of the module Telematics [IW3INTM] constitutes the basis for the lectures of this module and therefore should be known in advance.

Learning Outcomes
The students will broaden their knowledge of computer networks initially learnt in the module Telematics [IW3INTM]. They learn about problems and solutions in the domains of wireless, multimedia, or secure communications and they will be able to analyse and evaluate specific solutions in those domains.

Content
Selected protocols, architectures, mechanisms, and algorithms in the chosen domains will be analysed in detail. The student hereby may choose among mobile and wireless communications, principles of the design of secure communication protocols, and protocols and techniques for multimedia communication.
Module: Algorithm Design [IW3INALGOTK]

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

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

Courses in module

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<td>24079</td>
<td>Algorithms II (p. 92)</td>
<td>3/1 W</td>
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<td>D. Wagner, P. Sanders</td>
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<tr>
<td>24614</td>
<td>Algorithms for Planar Graphs (p. 89)</td>
<td>2/1 W/S</td>
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<td>D. Wagner</td>
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<td>30014</td>
<td>AlgoMO: Algorithmic Methods for Hard Optimization Problems (p. 93)</td>
<td>2/1</td>
<td>4</td>
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</table>

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

Conditions
- Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.
- Course Algorithmen II has to be passed.

Learning Outcomes
The student
- identifies algorithmic problems from different areas and can formulate these formally,
- judges the computational complexity of algorithmic problems and recognizes suitable algorithmic techniques for solving these problems,
- knows the crucial methodical approaches for the design and analysis of algorithms,
- designs algorithms for specific applications,
- comments on methodical aspects of algorithmics in a qualified and well-structured manner.

Content
This module conveys profound knowledge concerning theoretical and practical aspects of algorithmics. Its theoretical focus is on algorithms for graphs and common algorithmical methods, particularly, on algorithmic methods concerning randomized algorithms, parallel algorithms and algorithms for NP-hard problems. Practical aspects involve methods from the field of algorithm engineering.
Module: Algorithms II [IW3INALG2]

Coordination: D. Wagner, P. Sanders
Degree programme: Informationswirtschaft (B.Sc.)
Subject: Informatics (Specialization)

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Courses in module

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<td>24079</td>
<td>Algorithms II (p. 92)</td>
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</table>

Learning Control / Examinations

The assessment consists of a written exam (approx. 120 minutes) according to section 4 subsection 2 no. 1 study and examination regulations.
The grade of the module corresponds to the grade of the written exam.

Conditions
Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

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

Content
This module conveys knowledge of basic theoretical and practical aspects of algorithmics. It covers common methods for the design and analysis of basic algorithmic problems as well as the fundamentals of common algorithmic methods such as approximations algorithms, linear programming, randomized algorithms, parallel algorithms and parameterized algorithms.
Module: Security [IW3INSICH]

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

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

Courses in module

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Learning Control / Examinations
The assessment consists of a written exam (approx. 60 minutes) according to sec. 4 subsec. 2 no. 1 study and examination regulations.

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

Conditions
Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

Learning Outcomes
The student

• knows the theoretic background and the basic mechanisms of computer security and cryptography
• understands the mechanisms of computer security and can explain them,
• can read and understand the current scientific papers,
• can evaluate the safety procedures and can recognize hazards,
• can adapt mechanisms of computer security to new environment.

Content
• Theoretical and practical aspects of computer security
• Development of safety goals and classification of threats
• Presentation and comparison of different formal access control models
• Formal description of authentication systems, presentation and comparison of different authentication methods (passwords, biometrics, challenge-response protocols)
• Analysis of typical vulnerabilities in programs and web applications and development of appropriate protective protection methods / avoidance strategies
• Introduction to key management and Public Key Infrastructure
• Presentation and comparison of current safety certifications
• Block ciphers, hash functions, digital signature, public key encryption and digital signatures (RSA, ElGamal), and various methods of key exchange (e.g., Diffie-Hellman)
• Furthermore, an introduction to provable security is provided, which presents some of the key security concepts (e.g. IND-CCA).
• Presentation of combinations of cryptographic modules using currently used protocols such as Secure Shell (SSH) and Transport Layer Security (TLS).
Module: Software Engineering I [IW3INSWT1]

Coordination: W. Tichy, R. Reussner
Degree programme: Informationswirtschaft (B.Sc.)
Subject: Informatics (Specialization)

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Courses in module

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<td>W. Tichy, Korbinian Molitorisz</td>
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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. The grade of this module corresponds to the grade of the written exam. In addition the student needs to submit a certificate for the exercise (not graded) as an assessment according to section 4 subsection 2 no. 3 study and examination regulations.

Conditions
Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation. The successful completion of the module Foundations in Informatics [IW1INF1] is required.

Learning Outcomes
The students acquire basic knowledge about the principles, methods and tools of software engineering. They learn how to build and to maintain complex software systems in a systematic way.

Content
The content of the lecture is the entire lifecycle of software, spanning project planning, system analysis, cost estimation, design, implementation, validation, verification, and finally the maintaining of software. The covered topics include UML, design patterns, software tools, programming environments and configuration control/versioning systems.
Module: Software Engineering II [IW3INSWT2]

Coordination: R. Reussner, W. Tichy
Degree programme: Informationswirtschaft (B.Sc.)
Subject: Informatics (Specialization)

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

Courses in module

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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.

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

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.

Content
Requirements engineering, software development processes, software quality, software architectures, MDD, Enterprise Software Patterns software maintainability, software security, dependability, embedded software, middleware, statistic testing
Module: Advanced Object Orientation [IW4INFON]

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

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

Courses in module

| ID    | Course                                             | Hours per week | Term | CP | Responsible
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Learning Control / Examinations
The assessment consists of an oral exam (approx. 15 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The grade of the module corresponds to the grade of the oral exam.

Conditions
None.

Recommendations
Good knowledge of Java

Learning Outcomes
Participants in this course know the basics of different object oriented programming languages (e.g. Java, C#, Smalltalk, Scala). They know how inheritance and dynamic dispatch work, behave and are implemented, and how these are used in software engineering. They know innovative language constructs in objects oriented languages like generics, aspects and traits. The participants know the theoretic foundations of (e.g. type systems), software engineering tools for (e.g. refactoring) and techniques (e.g. points-to analysis) for analysing object oriented programs. They know current trends in research on object oriented programming.

Content
- Behaviour and semantics of dynamic dispatch
- Implementation of single and multiple inheritance
- Genericity, refactoring
- Traits and mixins, virtual classes
- Cardelli’s type system
- Palsberg-Schwartzbach type inference
- Analyses on the call graph, points-to analyses
- operational semantics, type safety
- bytecode JVM, bytecode verifier, dynamic compilation

Remarks
This is not a lecture on object-oriented software development! Rather, knowledge of object-oriented software engineering (e.g. Java, UML, Design Patterns) is required.
## Module: Computer Architecture [IW3INRS]

**Coordination:** W. Karl  
**Degree programme:** Informationswirtschaft (B.Sc.)  
**Subject:** Informatics (Specialization)

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### 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. The grade of the module corresponds to the grade of the written exam.

### Conditions
None.

### Learning Outcomes

**Content**
Module: Energy-conscious Systems [IW3INEBS]

Coordination: F. Bellosa, J. Henkel
Degree programme: Informationswirtschaft (B.Sc.)
Subject: Informatics (Specialization)

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Courses in module

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<tr>
<td>24127</td>
<td>Power Management (p. 187)</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>F. Bellosa</td>
</tr>
<tr>
<td>24181</td>
<td>Power Management Lab (p. 188)</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>F. Bellosa</td>
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<tr>
<td>24672</td>
<td>Low Power Design (p. 163)</td>
<td>2</td>
<td>S</td>
<td>3</td>
<td>J. Henkel</td>
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<tr>
<td></td>
<td>LPD Lab: Low power design (p. 192)</td>
<td>2</td>
<td>W/S</td>
<td>3</td>
<td>J. Henkel</td>
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</table>

Learning Control / Examinations

The assessment consists of an oral exam on the taken lectures and practical courses (approx. 30 minutes) according to section 4 subsection 2 no. 2 study and examination regulations.

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

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

Conditions

The following combinations can be taken:
- lecture Low Power Design and Power Management
- lecture Low Power Design and Lab: Low Power Design
- lecture Power Management and Power Management Lab

Learning Outcomes

The students are familiar with the design, implementation and evaluation of energy critical systems. The trade-off between low power and performance is common.

Content

Syllabus:
- Design of low-power systems
- Synthesis of low-power systems
- Energy estimation
- Operating system policies
Module: [IW3INMC]

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

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Courses in module

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<tr>
<td>240051</td>
<td>(p. 171)</td>
<td>2/1</td>
<td>W</td>
<td>5</td>
<td>M. Beigl</td>
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</table>

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content
## 5.7 General Modules

### Module: Seminar Module Economic Sciences [IW3SEMWIWI]

**Coordination:** Studiendekan (Fak. f. Wirtschaftswissenschaften)  
**Degree programme:** Informationswirtschaft (B.Sc.)  
**Subject:** Business Administration (Specialization), Economics (Specialization), OR (Specialization)

<table>
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<tr>
<td>2540524</td>
<td>Bachelor Seminar in Information Engineering and Management (p. 105)</td>
<td>2 W/S</td>
<td>3</td>
<td>A. Geyer-Schulz</td>
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<tr>
<td>SemIW</td>
<td>Seminar Information Engineering and Management (p. 223)</td>
<td>2 W/S</td>
<td>3</td>
<td>C. Weinhardt</td>
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<tr>
<td>SemIIP2</td>
<td>Seminar in Industrial Production (p. 222)</td>
<td>2 W/S</td>
<td>3</td>
<td>F. Schultmann, M. Fröhling</td>
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<tr>
<td>SemEW</td>
<td>Seminar Energy Economics (p. 217)</td>
<td>2 W/S</td>
<td>3</td>
<td>W. Fichtner, P. Jochem, D. Kelles, R. McKenna, V. Bertsch</td>
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<tr>
<td>2577915</td>
<td>Seminar: Management and Organization (p. 238)</td>
<td>2 W/S</td>
<td>3</td>
<td>H. Lindstädt</td>
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<tr>
<td>2579904</td>
<td>Seminar Management Accounting (p. 225)</td>
<td>2 W/S</td>
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<td>2579905</td>
<td>Special Topics in Management Accounting (p. 245)</td>
<td>2 W/S</td>
<td>3</td>
<td>M. Wouters, S. Morales, M. Kirchberger</td>
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<tr>
<td>2572197</td>
<td>Seminar in strategic and behavioral marketing (p. 234)</td>
<td>2 W</td>
<td>3</td>
<td>B. Neibecker</td>
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<tr>
<td>2530280</td>
<td>Seminar in Finance (p. 220)</td>
<td>2 W/S</td>
<td>3</td>
<td>M. Uhrig-Homburg, M. Ruckes</td>
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<tr>
<td>SemFBV1</td>
<td>Seminar Risk and Insurance Management (p. 228)</td>
<td>2 W/S</td>
<td>3</td>
<td>U. Werner</td>
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<tr>
<td>2530353</td>
<td>Seminar Financial Economics and Risk Management (p. 221)</td>
<td>2 W/S</td>
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<td>M. Ulrich</td>
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<tr>
<td>SemTuE1</td>
<td>Entrepreneurship Seminar (p. 218)</td>
<td>2 W/S</td>
<td>3</td>
<td>O. Terzidis</td>
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<tr>
<td>2585420/2586420</td>
<td>Topics of Sustainable Management of Housing and Real Estate (p. 101)</td>
<td>2 W/S</td>
<td>3</td>
<td>T. Lützkendorf, D. Lorenz</td>
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<tr>
<td>SemWIOR1</td>
<td>Seminar Stochastic Models (p. 222)</td>
<td>2 W/S</td>
<td>3</td>
<td>K. Waldmann</td>
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<tr>
<td>SemWIOR2</td>
<td>Seminar Economic Theory (p. 268)</td>
<td>2 W/S</td>
<td>3</td>
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<tr>
<td>SemWIOR3</td>
<td>Seminar in Experimental Economics (p. 236)</td>
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<td>n.n.</td>
<td>Seminar in Behavioral and Experimental Economics (p. 219)</td>
<td>2 W/S</td>
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<tr>
<td>2560141</td>
<td>Seminar on Morals and Social Behavior (p. 226)</td>
<td>2 W/S</td>
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<tr>
<td>2560140</td>
<td>Seminar on Topics in Political Economics (p. 227)</td>
<td>2 W/S</td>
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<td>n.n.</td>
<td>Selected Topics in Public Management and Governance (p. 104)</td>
<td>2 W</td>
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<td>B. Wigger, N. Edwards</td>
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<tr>
<td>2550131</td>
<td>Seminar in Continuous Optimization (p. 237)</td>
<td>2 W/S</td>
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<td>2550491</td>
<td>Seminar in Discrete Optimization (p. 235)</td>
<td>2 W/S</td>
<td>3</td>
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<tr>
<td>SemSTAT</td>
<td>Seminar Statistics (p. 231)</td>
<td>2</td>
<td>3</td>
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</table>
### Learning Control / Examinations

The assessment is done by a seminar with at least 3 CP. The assessment of the seminar (following §4(2), 3 ER) is described at the course description.

### Conditions

Successful completion of the modules in semester 1–4 except for up to two modules. The module *Internship* [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation.

### Learning Outcomes

#### Content

The module consists of a seminar, that is related to the research field of economic sciences. A complete list of available seminars is published in the internet.

#### Remarks

The mentioned seminars in this module handbook are place holders. For each semester, a complete list of seminars are published in the Vorlesungsverzeichnis or at the web pages of the participating institutes. Often, the seminar topics for a given semester are published at the end of the preceding semester. Some seminars require an early sign-in deadline at the end of the of the preceding semester.
Module: Seminar Module Informatics [IW3SEMINFO]

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

<table>
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<th>CP</th>
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<tr>
<td>24074s</td>
<td>Seminar in Telematics (p. 213)</td>
<td>2</td>
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<td>SemAlIFB1</td>
<td>Seminar in Enterprise Information Systems (p. 216)</td>
<td>2</td>
<td>W/S</td>
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<td>R. Studer, A. Oberweis, T. Wolf, R. Kneuper</td>
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<tr>
<td>xIDLS</td>
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<td>2</td>
<td>W/S</td>
<td>3</td>
<td>H. Schmeck, S. Tai, R. Studer, H. Hartenstein, W. Tichy</td>
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<td>SemAlIFB4</td>
<td>Seminar Knowledge Management (p. 233)</td>
<td>2</td>
<td>W</td>
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<td>SWSSem</td>
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<td>W/S</td>
<td>3</td>
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<tr>
<td>SemSich</td>
<td>Seminar in Security (p. 215)</td>
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<td>W/S</td>
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<td>prosemis</td>
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<td>24530</td>
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<td>MCprosem</td>
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<td>W/S</td>
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Learning Control / Examinations
The assessment is done by a seminar with at least 3 CP. The assessment of the seminar (following §4(2), 3 ER) is described at the course description.

Conditions
Successful completion of the modules in semester 1–4 except for up to two modules. The module Internship [IW1EXPRAK] and the law modules [IW1JURA1,2,3] are not relevant in this calculation. see german version

Learning Outcomes
The student
- deals with a well-defined problem in the Informatics domain in detail,
- analyses and discusses the given problems as part of the courses and in the final seminar papers,
- discusses, presents, and defends technical arguments within the given task specifications,
- organises the drafting of the final seminar paper mostly independently.

The competences gained as part of this seminar module serve as a preparation for the Bachelor thesis. Guided by the respective examiner, the student exercises independent scientific work in drafting and presenting the final seminar paper.

Content
The module consists of a seminar, that is related to the research field of informatics. A complete list of available seminars is published in the internet.

Remarks
The mentioned seminars in this module handbook are place holders. For each semester, a complete list of seminars are published in the Vorlesungsverzeichnis or at the web pages of the participating institutes. Often, the seminar topics for a given semester are published at the end of the preceding semester. Some seminars require an early sign-in deadline at the end of the of the preceding semester.
Module: Seminar Module Law [IW3SEMJURA]

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

ECTS Credits: 3
Cycle: Every term
Duration: 1

Courses in module

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<th>CP</th>
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<td>W/S</td>
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<td>T. Dreier</td>
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Learning Control / Examinations
The assessment is done by a seminar with at least 3 CP.
The assessment of the seminar (following §4(2), 3 ER) is described at the course description.

Conditions
From the law modules in the core programme, Introduction to Civil Law [IW1INJURA1], Commercial Law [IW1INJURA2], and Constitutional and Administrative Law [IW1INJURA2], 2 out of 3 have to be completed successfully.

Learning Outcomes

Content
The module consists of a seminar, that is related to the research field of law. A complete list of available seminars is published in the internet.

Remarks
The mentioned seminars in this module handbook are place holders. For each semester, a complete list of seminars are published in the Vorlesungsverzeichnis or at the web pages of the participating institutes. Often, the seminar topics for a given semester are published at the end of the preceding semester. Some seminars require an early sign-in deadline at the end of the of the preceding semester.
Module: Internship [IW1EXPRAK]

Coordination: Studiendekan (Fak. f. Wirtschaftswissenschaften), Studiendekan/in Studiengang Informationswirtschaft
Degree programme: Informationswirtschaft (B.Sc.)

Subject:

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</table>

Learning Control / Examinations
The assessment is in the form of a certificate of employment about at least 6 weeks, a written report (typewritten, not handwrit-ten) and a short presentation.

Conditions
The internship is regulated in §12 of the examination regulation.
Examiners are all lecturers of the degree programme.
The choice of the examiner has to be prior to the start of the internship (cf. content description).

Recommendations
It is recommended that the internship is taken between the 4th and the 5th term of the Bachelor programme Information Engineering and Management.

Learning Outcomes
This module serves to impart interdisciplinary key qualifications:

The student

• carries out professional tasks in the context of Information Engineering and Management to learn about the requirements on the engineer,
• describes in a short report the executed activities precisely and coherent, and judges about them critically,
• presents effectively is experiences gained during the internship using appropriate media support and gets involved professionally in the subsequent discussion, and
• trains via concrete and constructive criticism his/her competence for problem solving.

The presentation primarily serves for the communication between student, company, and examiner with the goal of initiating further cooperation in the context of the Bachelor thesis and/or a project

Content
It is the responsibility of the students to apply for an internship in a suitable company or public organization at which the internship can be fulfilled.
The process for the internships has the following (sequential) steps:

1. Choice of the examiner and of the company or organization by the student.
   During the internship each student is attended by an examiner of the degree programme and by an advisor of the company. In case a student does not succeed in finding an examiner for the internship, he can request the assignment of an examiner from the examination board of the Bachelor programme in Information Engineering and Management. When enrolling for the internship, the student fills the form for the internship and he hands the form over to the examiner and the students’ secretary. If required, the students’ secretary certifies the compulsory character of the internship as part of the Bachelor programme in Information Engineering and Management.

2. Internship
   The student passes the internship in the chosen company or organization.

3. Preparation of a short report and presentation:
   At the end of the internship, the employment is proven by a certificate of employment. The examiner receives a report (maximal 2 A4 pages) and the student gives feedback on the internship with a short presentation (approx. 15 minutes) followed by a short discussion (approx. 5 minutes).

4. Presentation and proof of performance.
   The short presentation may by given in the form of a talk with the examiner, in a colloquium or in a seminar. The form is fixed at the registration of the internship with the examiner. The certificate of employment of the company and the short report must be delivered at the examiner before the presentation. Based on these, a certificate of performance if produced and transferred to the office of study (“Studienbüro”).

Remarks
The form for the internship is available at the examination offices of the two faculties participating in the programme.
Module: Bachelor Thesis [IW3THEESIS]

Coordination: Studiendekan (Fak. f. Wirtschaftswissenschaften), Studiendekan/in Studiengang Informationswirtschaft, Der Vorsitzende des Prüfungsausschusses
Degree programme: Informationswirtschaft (B.Sc.)
Subject: 

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</table>

Learning Control / Examinations
The Bachelor thesis is examined by an examiner following the 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
The regulations for the Bachelor thesis can be found in §11 of the examination regulation.

Learning Outcomes
The student

- investigates a problem in information engineering and management autonomously and scientifically,
- searches for scientific literature for his problem,
- chooses and applies suitable scientific methods or develops and improves such methods,
- critically compare and evaluate his findings with the state of the art,
- communicates his results clearly and in a scientific form in his bachelor thesis.

Content
The Bachelor thesis is a written report which shows that the student can autonomously investigate a scientific problem in Information Engineering and Management. The work load for the Bachelor thesis should be 360h. The recommended project time is 6 months, the maximal project time is 9 months. The Bachelor thesis may also be written in English.

Remarks
None.
6  Courses

6.1  All Courses

Course: Advanced Topics in Economic Theory [2520527]

| Coordinators: | M. Hillebrand, K. Mitusch |
| Part of the modules: | Economic Theory (p. 54)[IW3VWL12] |

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**Learning Control / Examinations**
The assessment consists of a written exam (60 min) (following § 4(2), 1 of the examination regulation) at the beginning of the recess period or at the beginning of the following semester.

**Conditions**
None.

**Recommendations**
This course is designed for advanced Master students with a strong interest in economic theory and mathematical models. Bachelor students who would like to participate are free to do so, but should be aware that the level is much more advanced than in other courses of their curriculum.

**Learning Outcomes**
The students

- will know fundamental questions and methods of General Equilibrium Theory
- will know fundamental questions and methods of information economics respectively contract theory
- will be able to apply advanced methods of formal economic modeling

**Content**
The course deals with basic elements of modern economic theory. It is divided into two parts. The first part introduces the microeconomic foundations of general equilibrium à la Debreu ("The Theory of Value", 1959) and Hildenbrand/Kirman ("Equilibrium Analysis", 1988). The second part deals with asymmetric information and introduces the basic techniques of contract theory.

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

**Literature**
The course is based on the excellent textbook “Microeconomic Theory” (Chapters 1-5, 10, 13-20) by A.Mas-Colell, M.D.Winston, and J.R.Green.
Course: Algorithms for Planar Graphs [24614]

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

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

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 to work on current reasearch 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:

Remarks
The course is lectured irregular.
Course: Algorithms I [24500]

**Coordinators:** P. Sanders

**Part of the modules:** Algorithms I (p. 16) ([W2INF2])

<table>
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<tr>
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<td>Summer term</td>
<td>de</td>
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**Learning Control / Examinations**
The assessment is explained in the module description.

**Conditions**
None.

**Learning Outcomes**
The student is supposed to

- know and understand basic, frequently used algorithms, their conception, analysis of their efficiency, implementation, documentation and application
- be able to use their comprehension to work on new algorithmic problems
- apply the knowledge acquired in the module Grundlagen der Informatik (B.Sc. Information Engineering and Management) to non-trivial algorithms
- apply the knowledge acquired in the module “Grundbegriffe der Informatik” (Bachelor Informatics) or in “Grundlagen der Informatik” (B.Sc. Information Engineering and Management) and the mathematical methodologies learned in the mathematics lectures to solve problems, the focus being on mathematical efficiency analysis

**Content**
The module provides basic algorithms and data structures. The following topics are covered in particular:

- basic terms of algorithm engineering
- asymptotic algorithm analysis (worst case, average case, probabilistic, amortised)
- data structures like arrays, heaps, queues and linked lists
- hash tables
- sorting: comparison based algorithms (e.g. mergesort, quicksort), lower border, radix sort
- sorted sequences, search trees and selection
- graphs (representation, traversing: breadth search, deep search, shortest path, spanning trees)
- generic optimisation algorithms (greedy, dynamic programming, systematic search, local search)
- geometric algorithms

**Media**
slides, blackboard

**Literature**

*Algorithmen - Eine Einführung*
T. H. Cormen, C. E. Leiserson, R. L. Rivest, und C. Stein
Oldenbourg, 2007

*Elective literature:*

*Algorithms and Data Structures – The Basic Toolbox*
K. Mehlhorn und P. Sanders
Springer 2008

*Algorithmen und Datenstrukturen*
T. Ottmann und P. Widmayer
Spektrum Akademischer Verlag, 2002

*Algorithmen in Java. Teil 1-4: Grundlagen, Datenstrukturen, Sortieren, Suchen*
R. Sedgewick
Pearson Studium 2003

*Algorithm Design*
J. Kleinberg and É. Tardos
Addison Wesley, 2005
Vöcking et al.
Taschenbuch der Algorithmen
Springer, 2008
Course: Algorithms II [24079]

Coordinators: D. Wagner, P. Sanders
Part of the modules: Algorithms II (p. 74) [IW3INALG2], Algorithm Design (p. 73) [IW3INALGOTK]

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<td>3/1</td>
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Learning Control / Examinations
The assessment consists of a written exam (approx. 120 minutes) according to section 4 subsection 2 no. 1 study and examination regulations.

Conditions
See module description.

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

Content
This course conveys knowledge of basic theoretical and practical aspects of algorithmics. It covers common methods for the design and analysis of basic algorithmic problems as well as the fundamentals of common algorithmic methods such as approximations algorithms, linear programming, randomized algorithms, parallel algorithms and parameterized algorithms.
Course: Algorithmic Methods for Hard Optimization Problems [AlgoMO]

Coordinators: H. Meyerhenke, D. Wagner
Part of the modules: Algorithm Design (p. 73)[IW3INALGOTK]

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Learning Control / Examinations

Conditions
None.

Recommendations
Knowledge of the lecture Algorithmen II [24079] is recommended.

Learning Outcomes
The goal of this course is to familiarize the students with hard problems and possible approaches to solve them. Online problems may also be part of the course.

Content
There are many practical problems that cannot be solved optimally - some not at all and some not in a reasonable amount of time. An example is the “bin packing problem” where a collection of objects must be packed using a possibly small number of bins. Moreover, problems sometimes arise where knowledge about the future (or even about the present) is incomplete, but a decision is required nevertheless (“online problems”). Regarding bin packing, for example, there must be a point in time when you close the bins and send them away. Even if there are some more objects arriving later.
Course: Algorithms for Internet Applications [2511102]

Coordinators: H. Schmeck

Part of the modules: Algorithms and Applications (p. 64)[IW3INAIFB5], Information Services in Networks (p. 63)[IW3INAIFB4]

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Learning Control / Examinations
The assessment consists of a written exam (60 min) (according to Section 4(2), 1 of the examination regulation) and an additional written examination (called “bonus exam”, 45 min) (according Section 4(2), 3 of the examination regulation).

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

Conditions
credits for all the Informatics modules of years 1 and 2 (except for at most one module).

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

In particular, the student will

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

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

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

Literature


Elective literature:
- Further references will be given in the course.
Course: Big Data Analytics [24114]

**Coordinators:** K. Böhm, E. Müller

**Part of the modules:** Introduction to Data and Information Management (p. 66)[IW3INGDI], Foundations of Information Systems (p. 67)[IW3INGIS]

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

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

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

**Learning Outcomes**

**Content**

**Media**
Slides.

**Literature**

- Data Mining: Concepts and Techniques (3rd edition):
  Jiawei Han, Micheline Kamber, Jian Pei, Morgan Kaufmann Publishers 2011
- Introduction to Data Mining:
  Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Addison-Wesley 2006
- Knowledge Discovery in Databases:
  Martin Ester, Jörg Sander, Springer 2000
Course: Analytical CRM [2540522]

Coordinators: A. Geyer-Schulz
Part of the modules: Specialization in Customer Relationship Management (p. 40)[IW3BWLISM5], CRM and Service Management (p. 38)[IW3BWLISM4]

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

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<tr>
<th>Grade</th>
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<tr>
<td>1.0</td>
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<tr>
<td>1.3</td>
<td>90</td>
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<td>1.7</td>
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Conditions
None.

Recommendations
We expect knowledge about data models and the UML modelling language concerning information systems.

Learning Outcomes
The Student
- understands the principal scientific methods from statistics and informatics used in analytical CRM and their application to enterprise decision problems and independently applies these methods to standard cases,
- understands the components for creating and managing a data warehouse from operative system sources including the processes and steps involved and applies these methods to a simple example, and
- uses his knowledge to conduct a standard CRM analysis on enterprise data for a business decision problem and deduces and justifies a recommendation for appropriate action.

Content
The course Analytical CRM deals with methods and techniques for analysis concerning the management and improvement of customer relationships. Knowledge about customers is aggregated and used for enterprise decision problems like product line planning, customer loyalty, etc. A necessary precondition for these analyses is the transformation of data stemming from operative systems into a common data warehouse that assembles all necessary information. This requires transformation of data models and processes for creating and managing a data warehouse, like ETL processes, data quality and monitoring. The generation of customer oriented and flexible reports for different business purposes is covered. The course finally treats several different statistical analysis methods like clustering, regression etc. that are necessary for generating important indicators (like customer lifetime value, customer segmentation). As external data source, customer surveys are introduced.

Media
slides

Literature

**Remarks**
The lecture ultimately takes place in summer term of 2014. Afterwards the lecture is hold in alternation with "2540520 - Operative CRM". The current schedule can be seen on the chair's website (http://www.em.uni-karlsruhe.de/studies/).
## Course: Applied Informatics I - Modelling [2511030]

### Coordinators:
A. Oberweis, R. Studer, S. Agarwal

### Part of the modules:
Applied Informatics (p. 19)[IW1INF5]

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### Learning Control / Examinations

#### Conditions
None.

### Learning Outcomes

**Students**

- explain the strengths and weaknesses of various modeling approaches for Information Systems and choose an appropriate method for a given problem,
- create UML models, ER models and Petri nets for given problems,
- model given problems in Description Logics and apply description logic rules,
- describe the main ontology concepts and languages and explain SPARQL queries,
- create and evaluate a relational database schema and express queries in relational algebra.

### Content

In the context of complex information systems, modelling is of central importance, e.g. – in the context of systems to be developed – for a better understanding of their functionality or in the context of existing systems for supporting maintenance and further development.

Modelling, in particular modelling of information systems, forms the core part of this lecture. The lecture is organized in two parts. The first part mainly covers the modelling of static aspects, the second part covers the modelling of dynamic aspects of information systems.

The lecture sets out with a definition of modelling and the advantages of modelling. After that, advanced aspects of UML, the Entity Relationship model (ER model) and description logics as a means of modelling static aspects will be explained. This will be complemented by the relational data model and the systematic design of databases based on ER models. For modelling dynamic aspects, different types of petri-nets as well as as event driven process chains together with their respective analysis techniques will be introduced.

### Media

- Slides.

### Literature


### Elective literature:

Course: Applied Informatics II - IT Systems for e-Commerce [2511032]

Coordinators: N.N.
Part of the modules: Applied Informatics (p. 19) [IW1INF5]

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Learning Control / Examinations
The assessment consists of a written exam (120 min) according to Section 4(2), 1 of the examination regulation. The successful completion of the compulsory exercises is prerequisite for the admission to the written exam. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
Knowledge of content of the modules Foundations in Informatics [IW1INF1] and Algorithms I [IW2INF2] is expected.

Recommendations
Knowledge of content of the module [WI1INFO].

Learning Outcomes
The student learns about concepts and technologies for designing big, distributed application architectures. Students apply industry-relevant technology to solve application-oriented problems in lab classes.

Content
The course Applied Informatics II [2511032] covers various facets of electronic commerce which have to be supported by adequate and efficient distributed information systems. Key topics are middleware technologies and distributed application architectures. Document description and exchange (incl. XML), Java EE, Web technologies, and Web services are additional topics.

Media
Slides, internet resources.

Literature
Tba in the lecture.
**Course: [24317]**

**Coordinators:** K. Böhm

**Part of the modules:** Information and Database Systems (p. 69)[IW3INIDS], Database Systems in Theory and Practice (p. 70)[IW3INDBSTP], Foundations of Information Systems (p. 67)[IW3INGIS], Introduction to Data and Information Management (p. 66)[IW3INGDI]

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**Learning Control / Examinations**

The assessment will be an assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations and consists of multiple parts. The performance is assessed on the basis of projects, experiments, presentations and reports.

The course will be assessed with “passed” or “failed” (according to sec. 9 subsec. 3 study and examination regulations). For passing the practical course, all partial exercises must have been passed successfully. If the course is dropped after the first session, it will be marked with “failed”.

**Conditions**

None.

**Learning Outcomes**

**Content**
Course: Topics of Sustainable Management of Housing and Real Estate [2585420/2586420]

Coordinators: T. Lützkendorf, D. Lorenz
Part of the modules: Seminar Module Economic Sciences (p. 82) [IW3SEM WIWI]

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

Conditions
None.

Learning Outcomes

- Students autonomously compile a paper treating of a marked-off subject within the area of real estate economics respectively sustainable construction, and present their results within the seminar.
- Therefore they master the principles of scientific writing, especially research, reasoning and citation, as well as handling information suspiciously.
- Through own and observed experiences they develop the ability to hold scientific presentations, including technical, formal, rhetorical and didactical aspects.

Content
The seminar deals with changing up-to-date topics concerning Real Estate Economics or Sustainable Construction. Current topics and schedules are announced at the beginning of term.

Media
A reader dealing with the basics of scientific writing is provided (in german language).
Course: Asset Management [2530219]

Coordinators: A. Sauer
Part of the modules: Topics in Finance I (p. 46)

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Learning Control / Examinations
The assessment consists of a written exam (60 minutes) (following §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.

Recommendations
Proficiency of the topics covered in the course “Investments” is required.

Learning Outcomes
Students are able to name the terms and definitions of professional asset management. They are able to structure, formally describe and analyze problems of professional asset management. Students are in a position to apply the instruments and methods of asset management.

Content
The course familiarizes students with the instruments, methods and terms of professional asset management. It conveys the knowledge of applying the relevant methods to students via practical exercises.

Media
Slides.

Literature
Course: Auction & Mechanism Design [2560550]

Coordinators: N. Szech
Part of the modules: Applied Microeconomics (p. 55) [IW3VWL13], Economic Theory (p. 54) [IW3VWL12]

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Learning Control / Examinations
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Students can earn a bonus to the final grade by successfully participating in the exercises.

Conditions
None.

Recommendations
Basic knowledge of microeconomics and statistics are recommended. A background in game theory is helpful, but not absolutely necessary.

Learning Outcomes
The students
- can analyze strategic behavior in auctions;
- can compare auction formats with regard to efficiency and revenue;
- are familiar with the basic theory of (Bayesian) mechanism design;
- master the revenue equivalence theorem for standard auctions;
- can apply mechanism design to one object auctions and bilateral trade.

Content
The course starts with the basic theory of equilibrium behavior and revenue management in one object standard auctions. The revenue equivalence theorem for standard auctions is introduced. Thereafter, the course focuses on mechanism design and its applications to one object auctions and bilateral trade.

Literature

Remarks
The lecture will be held in English.
Course: Selected Topics in Public Management and Governance [n.n.]

**Coordinators:** B. Wigger, N. Edwards

**Part of the modules:** Seminar Module Economic Sciences (p. 82)[IW3SEMWIWI]

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**Learning Control / Examinations**
Non exam assessment (following §4(2), 3 of the examination regulation).

**Conditions**
None.

**Recommendations**
Prior knowledge of public management and public governance, as evidenced by participation in courses such as Introduction to Public Management and Case Studies in Public Management, is strongly recommended.

**Learning Outcomes**
The student will demonstrate an advanced understanding of key topics dealt with in the seminar.

**Content**
Selected topics in public management and governance.

**Media**
Academic journal articles

**Literature**
Will be announced on Ilias.
Course: Bachelor Seminar in Information Engineering and Management [2540524]

**Coordinators:** A. Geyer-Schulz

**Part of the modules:** Seminar Module Economic Sciences (p. 82)[IW3SEMWIWI]

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

The final mark is given, if the written seminar thesis was handed in as well as the presentation was held.

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 module description.

**Recommendations**
At least one of the following lectures should be successfully completed:

- **Customer Relationship Management** [2540508]
- **Analytic CRM** [2540522]
- **Operative CRM** [2540520]

**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 (and later on, the bachelors/masters thesis) with the text setting system LaTeX and include format requirements as used by scientific publishers.
- to do a presentation in an adequate scientific manner.
- to write down the results of his investigations in the form of scientific publications.

**Content**
This seminar serves as an introduction into the process of scientific work. Students write a review for a selected scientific article. A profound literature search is required to judge the article. The review is written with LaTeX by using formating styles similar to those of scientific publishers.

The seminar treats questions of Customer Relationship Management.

**Literature**
A CRM-specific article is assigned to every student participating in this seminar. The chosen articles are published in the beginning of every term.

**Elective literature:**

Course: Lab Protocol Engineering [BPPE]

Coordinators: M. Zitterbart
Part of the modules: Telematics II (p. 72)[IW3INTM2]

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Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content
## Course: Design and Construction of Buildings [26404w]

**Coordinators:** T. Lützkendorf  
**Part of the modules:** Design, Construction and Sustainability Assessment of Buildings (p. 48)[IW3BWLOOW1]

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### Learning Control / Examinations
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place two times only in the semester in which the lecture is takes place (winter semester). Re-examinations are offered at every ordinary examination date.

### Conditions
None.

### Recommendations
A combination with the module *Real Estate Management* [IW3BWLUO1] and with engineering science modules in the area of building physics and structural design is recommended.

### Learning Outcomes
The student

- has an in-depth knowledge of aspects of energy-saving, resource-saving and health-oriented design, construction and operation of buildings (design for environment)
- has a critical understanding of the essential requirements, concepts and technical solutions for green buildings
- is able to integrate aspects of energy-saving, resource-saving and health-conscious construction into a holistic environmental design approach and to assess the advantages and disadvantages of different individual solutions.

### Content
Taking low-energy buildings as an example the course is an introduction to cheap, energy-efficient, resource-saving and health-supporting design, construction and operation of buildings. Questions of the implementation of the principles of a sustainable development within the building sector are discussed on the levels of the whole building, its components, building equipment as well as the materials. Besides technical interrelationships basics dimensioning and various approaches to ecological and economical assessment play a role during the lectures, as well as the different roles of people involved into the building process. Topics are the integration of economical and ecological aspects into the design process, strategies of energy supply, low-energy and passive buildings, active and passive use of solar energy, selection and assessment of construction details, selection and assessment of insulation materials, greened roofs plus health and comfort.

### Media
For a better clearness videos and simulation tools will be presented during the lectures.

### Literature
**Elective literature:**
See german version.
Course: Sustainability Assessment of Buildings [2585404/2586404]

Coordinators: T. Lützkendorf
Part of the modules: Design, Construction and Sustainability Assessment of Buildings (p. 48)[IW3BWLOOW1]

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Learning Control / Examinations
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place two times only in the semester in which the lecture is takes place (summer semester). Re-examinations are offered at every ordinary examination date.

Conditions
None.

Recommendations
A combination with the module Real Estate Management [IW3BWLOOW2] and with engineering science modules from the areas building physics and structural design is recommended.

Learning Outcomes
The student

• has an in-depth knowledge of the classification of environmental design and construction of buildings within the overall context of sustainability
• has a critical understanding of the main theories and methods of assessing the environmental performance of buildings
• is able to use methods and tools to evaluate the environmental performance in design and decision processes or to interpret existing results

Content
The course identifies problems concerning the economical and environmental assessment of buildings along their lifecycle and discusses suitable procedures and tools supporting the decision making process. For example, the course addresses topics like operating costs, heat cost allocation, comparisons of heating costs, applied economical assessment methods, life cycle assessment as well as related design and assessment tools (e.g. element catalogues, databases, emblems, tools) and assessment procedures (e.g. carbon footprint, MIPS, KEA), which are currently available.

Literature
Elective literature:
See german version.
Course: Business Administration: Finance and Accounting [2600026]

Coordinators: M. Ruckes, M. Uhrig-Homburg
Part of the modules: Business Administration (p. 23) [WI1BWL2], Foundations in Business Administration (p. 20) [WI1BWL3]

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<td>Winter term</td>
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Learning Control / Examinations
Conditions
None.

Learning Outcomes
The goal of this course and the tutorials of this course is to equip students with the fundamentals and basics in the fields of investment and finance, financial and management accounting.

Content
• Investment and Finance:
  – Valuation of Bonds and Stocks
  – Capital Budgeting
  – Portfolio Theory
• Financial Accounting
• Management Accounting

Literature
Extensive bibliographic information will be given in the materials to the lecture.

Remarks
In the winter term 2012/13 this lecture was modified. Its former title was Business Administration and Management Science C. Key qualifications can be shown in an active participation through presentations of solutions and discussions in the tutorials which accompany the course. Each part of the course is taught by instructors specialised in the field of that part.
Course: Business Administration: Production Economics and Marketing [2600024]

Coordinators: M. Ruckes, W. Fichtner, M. Klarmann, Th. Lützkendorf, F. Schultmann
Part of the modules: Business Administration (p. 23)[IW1BWL2], Business Administration (p. 22)[IW1BWL4]

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Learning Control / Examinations
The assessment consists of a written exam (90 minutes) according to Section 4(2), 1 of the examination regulation.

Conditions
None.

Learning Outcomes
The target of this course and the tutorials of this course are the basic points of marketing and production economics. After this basic course students have to be familiar with these three topics in Business Administration and Management Science.

Content
The course is made up of the following topics:

Marketing
- Foundations of marketing
- Strategic marketing
- Consumer behaviour
- Product
- Price
- Promotion
- Sales
- Marketing Metrics

Production economics
In the part of production economics the student will learn basics in the field of production theory, procurement and resource acquisitions, production and operations management and industrial engineering. Aspects of electrical engineering industry, technological foresights, construction industry and real estate markets will be treated.

Literature
Further literature references are announced in the materials to the lecture.

Remarks
In the winter semester 2012/13 the title has changed. The former title was Business Administration and Management Science B.
Key qualifications can be shown in an active participation through presentations of solutions and discussions in the tutorials which accompany the course.
Each part of the course is taught by instructors specialised in the field of that part.
Course: Civil Law for Beginners [24012]

Coordinators: T. Dreier, O. Knöfel
Part of the modules: Introduction to Civil Law (p. 27)/IW1JURA1

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

Conditions
None.

Learning Outcomes
To begin with, the course provides students with a general introduction into law. It shall enable them to understand legal problems and solutions both with regard to lawmaking and to individual cases. Students shall grasp the differences between civil law, public law and criminal law. In particular, students shall learn the fundamental notions and constructions of Civil law as laid down in the German Civil Code (Bürgerliches Gesetzbuch, BGB), such as subjects and objects of law, legally binding declarations, the formation of contracts, standard terms and conditions, consumer protection, performance of contractual promises etc. Students shall be trained to understand legal problems and legal solutions. They shall be able to recognise the legal problems of a given factual situation and develop solutions to simple legal problems.

Content
The course starts with a general introduction into law. What is law, why are legal rules valid, and what is the role of law in conjunction with social behaviour, technological and market developments? What is the relationship between law and justice? Moreover, the distinction between civil law, public law and criminal law will be highlighted. The basics of jurisdiction, international conflicts and alternative dispute settlement will be discussed. The main focus of the course is on the fundamental notions of civil law as defined and regulated in the German Civil Code (Bürgerliches Gesetzbuch, BGB), such as subjects and objects of law, legally binding declarations, agency, the formation of contracts, standard terms and conditions, consumer protection, performance of contractual promises. The course ends with an outlook to the law of contracts and property law.

Media
Transparencies/Slides

Literature
Tba at the beginning of the course,

Elective literature:
Tba at the beginning of the course,
Course: Advanced Civil Law [24504]

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

Conditions
The course Civil law for beginners [24012] is required.

Learning Outcomes
Following what the students have learned in the course Civil law for beginners about the basic notions of law and, in particular, the general part of the German Civil Code (Bürgerliches Gesetzbuch, BGB), in this course the students shall acquire knowledge of contract and of property law. They will learn about the statutory regulation of place, time and modalities of the performance of contractual duties, as well as the statutory rules governing defaults of performing contractual promises (impossibility of performance; non-performance; delayed performance, defective performance). In addition the students will be presented with the different types of contracts and with both liability for fault and strict liability. As far as property law is concerned, the students shall understand the different types of transfer of ownership and of securities the German Civil Code provides for.

Content
Following what the students have learned in the course Civil law for beginners about the basic notions of law and, in particular, the general part of the German Civil Code (Bürgerliches Gesetzbuch, BGB), in this course the students shall acquire knowledge of contract and of property law. On the one hand, this includes the statutory rules on place, time and modalities of performance, and the statutory rules governing defaults of performing contractual promises (impossibility of performance; non-performance; delayed performance, defective performance). On the other hand, the statutory types of contracts will be discussed (in particular, sale, lease, contract for work and contract for services, lending and borrowing) as well as new types of combined contracts (e.g., leasing, factoring, computer contracts). Moreover, legal liability will be discussed both with regard to liability for fault and with regard to strict liability. As regards property law, possession and ownership will be discussed as well as the different forms of transfer of ownership and the most important of the security rights.

Media
Transparencies/Slides

Literature
Tba at the beginning of the course.

Elective literature:
tba at the beginning of the course
Course: Exchanges [2530296]

Coordinators: J. Franke
Part of the modules: Topics in Finance I (p. 46)[IW3BWLFBV5], eFinance (p. 37)[IW3BWLISM3]

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Learning Control / Examinations

Conditions
None.

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

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

Literature
Elective literature:
Educational material will be offered within the lecture.
Course: Computational Economics [2590458]

Coordinators: P. Shukla, S. Caton

Part of the modules: Algorithms and Applications (p. 64)[IW3INAIFB5]

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Learning Control / Examinations
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulation). By successful completion of the exercises (according to §4(2), 3 of the examination regulation) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4). The bonus only applies to the first and second exam of the semester in which it was obtained.

Conditions
None.

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

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

Media
- PowerPoint

Literature

Remarks
This course is offered in cooperation with the Institute of Applied Informatics and Formal Description Models (AIFB).
Summer Term 2011: The course has been added to the Module Algorithms and Applications [IW3INAIFB5] and is thus also eligible for 3rd year B.Sc. students majoring in Information Engineering and Management.
Course: Customer Relationship Management [2540508]

Coordinators: A. Geyer-Schulz
Part of the modules: CRM and Service Management (p. 38)[IW3BWLIISM4]

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

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<tr>
<th>Grade</th>
<th>Minimum points</th>
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<tr>
<td>1.0</td>
<td>95</td>
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<td>90</td>
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<td>1.7</td>
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<td>2.7</td>
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Conditions
None.

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

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

Media
Slides, Audio, Reader

Literature

Elective literature:
Course: Data and Storage Management [24074]

**Coordinators:** B. Neumair

**Part of the modules:** Information Services in Networks (p. 63)[IW3INAIFB4]

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

**Conditions**
None.

**Learning Outcomes**

**Content**

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Information Engineering and Management (B.Sc.)
Module Handbook, Date: 21.08.2014
Course: Data Mining [2520375]

Coordinators: G. Nakhaeizadeh
Part of the modules: Statistical Applications of Financial Risk Management (p. 56)

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<td>Winter / Summer Term</td>
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Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Part one: Data Mining
Why Data Mining?

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

Part two: Examples of application of Data Mining

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

Literature


- Jiawei Han, Micheline Kamber, Data Mining : Concepts and Techniques, 2nd edition, Morgan Kaufmann, ISBN 1558609016, 2006.
- David J. Hand, Heikki Mannila and Padhraic Smyth, Principles of Data Mining, MIT Press, Fall 2000
Course: Deployment of Database Systems [2400020]

Coordinators: K. Böhm
Part of the modules: Introduction to Data and Information Management (p. 66)[IW3INGDI], Foundations of Information Systems (p. 67)[IW3INGIS], Database Systems in Theory and Practice (p. 70)[IW3INDBSTP]

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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
None.

Recommendations
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 philosophies and data models, together with respective query languages. For instance, we address both so-called NoSQL database concepts as well as semistructured databases (i.e., XML databases, with XQuery as one query language) and graph databases. 'Depth' is reached by the study of several non-trivial applications, such as management of XML or e-commerce data using relational database technology. Since all these applications are generic problems themselves, the study of such applications is interesting in itself already.

Media
Slides.

Literature

Elective literature:
Course: Database Systems [24516]

Coordinators: K. Böhm
Part of the modules: Introduction to Data and Information Management (p. 66)[IW3INGDI], Communication and Database Systems (p. 68)[IW3INKD]

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Learning Control / Examinations

Conditions
None.

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

Learning Outcomes

Content

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:

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

Coordinators: K. Böhm, Buchmann

Part of the modules: Introduction to Data and Information Management (p. 66) [IW3INGDI], Foundations of Information Systems (p. 67) [IW3INGIS], Information and Database Systems (p. 69) [IW3INIDS]

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**Learning Control / Examinations**

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

**Conditions**

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

**Learning Outcomes**

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

**Content**

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

**Media**

lecture slides

**Literature**

Will be announced in the lecture.
Course: Data Protection Law [24018]

Coordinators: G. Sydow
Part of the modules: Intellectual Property and Data Protection (p. 32) [IW3JURA]

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Learning Control / Examinations
The assessment consists of a written exam (approx. 60 min.) according to § 4(2), 1 SPO.

Conditions
None.

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

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

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

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

Literature
Will be announced in the course.

Elective literature:
Will be announced in the course.

Remarks
In cooperation with the House of Competence, Students should be rhetorical trained asking and answering questions (short-answer-and-question-technique). Therefor most likely a coach will attend several lessons.
Course: Derivatives [2530550]

Coordinators: M. Uhrig-Homburg
Part of the modules: Topics in Finance I (p. 46)[IW3BWLFBV5], eFinance (p. 37)[IW3BWLISM3]

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Learning Control / Examinations
Conditions
None.

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

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

Media
Slides, Exercises/Exercise sheets

Literature

Elective literature:
Course: Services Marketing and B2B Marketing [2572158]

**Coordinators:** M. Klarmann

**Part of the modules:** Foundations of Marketing (p. 50)[IW3BWLMAR]

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**Learning Control / Examinations**
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

**Conditions**
None.

**Learning Outcomes**
See German version.

**Content**
The aim of this course is to prepare students for two certain marketing perspectives. The service marketing is concentrated on the particularities coming up when a company sells services instead of products. Subjects in this section are for example:

- Measuring service quality
- Pricing services
- Management of service staff

The second part of the course contains a business-to-business marketing perspective. Topics are below others:

- Management of buying centers
- Competitive Bidding
- B2B-Branding

**Remarks**
For further information please contact Marketing & Sales Research Group (marketing.ism.kit.edu).
Course: Economics and Behavior [2560137/2560138]

Coordinators: N. Szech
Part of the modules: Applied Microeconomics (p. 55)[IW3VWL13], Economic Theory (p. 54)[IW3VWL12]

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Learning Control / Examinations
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).
The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.
The grade will be determined in a final written exam. Students can earn a bonus to the final grade by successfully participating in the exercises.

Conditions
None.

Recommendations
Basic knowledge of microeconomics and statistics are recommended. A background in game theory is helpful, but not absolutely necessary.

Learning Outcomes
The students
- gain insight into fundamental topics in behavioral economics;
- get to know different research methods in the field of behavioral economics;
- learn to critically evaluate experimental designs;
- get introduced to current research papers in behavioral economics;
- become acquainted with the technical terminology in English.

Content
The course covers topics from behavioral economics with regard to contents and methods. In addition, the students gain insight into the design of economic experiments. Furthermore, the students will become acquainted with reading and critically evaluating current research papers in the field of behavioral economics.

Literature

Remarks
The lecture will be held in English.
Course: Efficient Algorithms [2511100]

Coordinators: H. Schmeck
Part of the modules: Algorithms and Applications (p. 64)[IW3INAIFB5]

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<tr>
<td>5</td>
<td>2/1</td>
<td>Summer term</td>
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**Learning Control / Examinations**
The assessment consists of assignments or of a bonus exam (wrt §4 (2), 3 SPO), and a written exam (60 min.) in the week after the end of the lecturing period (§4 (2), 1 SPO).

If the mark obtained in the written exam is in between 1.3 and 4.0, a successful completion of the assignments or the bonus exam will improve the mark by one level (i.e. by 0.3 or 0.4).

Deviations from this type of assessment are announced at the beginning of this course.

**Conditions**
credits for the Informatics modules of years 1 and 2.

**Learning Outcomes**
The student will learn how to use methods and concepts of efficient algorithms and how to demonstrate adequate innovative capabilities with respect to the used methods.

This course emphasizes the teaching of advanced concepts for the design and application of algorithms, data structures, and computer infrastructures in relation to their applicability in the real world. Based on a fundamental understanding of the covered concepts and methods, students should know how to select appropriate concepts and methods for problem settings in their professional life, and, if necessary, to extend and apply them in an adequate form. The students should be enabled to find adequate arguments for justifying their chosen problem solutions.

**Content**
In a problem oriented way the course presents systematic approaches to the design and analysis of efficient algorithms using standard tasks of information processing as generic examples. Special emphasis is put on the influence of data structures and computer architectures on the performance and cost of algorithms. In particular, the course emphasizes the design and analysis of algorithms on parallel computers and in hardware, which is increasingly important considering the growing presence of multicore architectures.

**Media**
- powerpoint slides with annotations using a tablet pc
- access to applets and Internet resources
- lecture recording (camtasia)

**Literature**
Borodin, Munro: The Computational Complexity of Algebraic and Numeric Problems (Elsevier 1975)
Cormen, Leiserson, Rivest: Introduction to Algorithms (MIT Press)
Sedgewick: Algorithms (Addison-Wesley) (many different versions available)

**Elective literature:**
will be announced in class
Course: eFinance: Information Engineering and Management for Securities Trading [2540454]

Coordinators: C. Weinhardt
Part of the modules: eBusiness and Service Management (p. 33)[IW3BWLISM1], eFinance (p. 37)[IW3BWLISM3], Topics in Finance I (p. 46)[IW3BWLFBV5]

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

Learning Control / Examinations
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulation) and by submitting written essays as part of the exercise (according to §4(2), 3 of the examination regulation). 70% of the final grade is based on the written exam and 30% is based on assignments from the exercises. The points obtained in the exercises only apply to the first and second exam of the semester in which they were obtained.

Conditions
None.

Learning Outcomes
The students
- are able to understand the theoretical and practical aspects of securities trading,
- are able to handle the relevant electronic tools for the evaluation of financial data,
- are able to identify the incentives of the traders for participation in different market platforms,
- are able to analyse capital marketplaces concerning their efficiency, weaknesses and technical configuration,
- are able to apply theoretical methods of econometrics,
- are able to understand, criticize and present articles with a finance-scientific background,
- learn to elaborate solutions in a team.

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

Media
- Powerpoint presentations
- recorded lecture available on the internet

Literature

Elective literature:
Course: Introduction to Operations Research I [2550040]

**Coordinators:** S. Nickel, O. Stein, K. Waldmann

**Part of the modules:** Introduction to Operations Research (p. 25)[IW1OR]

**ECTS Credits**

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**Learning Control / Examinations**
See module description.

**Conditions**
See module information.

**Learning Outcomes**
The student

- names and describes basic notions of the essential topics in Operations Research (Linear programming, graphs and networks, integer and combinatorial optimization, nonlinear programming, dynamic programming and stochastic models),
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems and chooses the appropriate solution methods to solve optimization problems independently,
- validates, illustrates and interprets the obtained solutions.

**Content**
Examples for typical OR problems.
Linear Programming: Basic notions, simplex method, duality, special versions of the simplex method (dual simplex method, three phase method), sensitivity analysis, parametric optimization, multicriteria optimization.
Graphs and Networks: Basic notions of graph theory, shortest paths in networks, project scheduling, maximal flows in networks.

**Media**
Blackboard, slides, beamer presentations, lecture notes, OR software.

**Literature**
Course: Introduction to Operations Research II [2530043]

Coordinators: S. Nickel, O. Stein, K. Waldmann
Part of the modules: Introduction to Operations Research (p. 25)[IW1OR]

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Learning Control / Examinations
See module description.

Conditions
See corresponding module information. Especially the course Introduction to Operations Research I [2550040] is assumed.

Learning Outcomes
The student
- names and describes basic notions of the essential topics in Operations Research (Linear programming, graphs and networks, integer and combinatorial optimization, nonlinear programming, dynamic programming and stochastic models),
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems and chooses the appropriate solution methods to solve optimization problems independently,
- validates, illustrates and interprets the obtained solutions.

Content
Integer and Combinatorial Programming: Basic notions, cutting plane methods, branch and bound methods, branch and cut methods, heuristics.
Nonlinear Programming: Basic notions, optimality conditions, solution methods for convex and nonconvex optimization problems.
Dynamic and stochastic models and methods: dynamical programming, Bellman method, lot sizing models, dyanical and stochastic inventory models, queuing theory.

Media
Blackboard, slides, beamer presentations, lecture notes, OR software

Literature
Course: Introduction to Energy Economics [2581010]

Coordinators: W. Fichtner

Part of the modules: Energy Economics (p. 44)[IW3BWLIIP2]

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

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

Conditions
None.

Learning Outcomes
The student is able to

- characterize and judge the different energy carriers and their peculiarities,
- understand contexts related to energy economics.

Content
1. Introduction: terms, units, conversions
2. The energy carrier gas (reserves, resources, technologies)
3. The energy carrier oil (reserves, resources, technologies)
4. The energy carrier hard coal (reserves, resources, technologies)
5. The energy carrier lignite (reserves, resources, technologies)
6. The energy carrier uranium (reserves, resources, technologies)
7. The final carrier source electricity
8. The final carrier source heat
9. Other final energy carriers (cooling energy, hydrogen, compressed air)

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

Literature
Complementary literature:
Feess, Eberhard. Umweltökonomie und Umweltpolitik. ISBN 3-8006-2187-8
# Course: Introduction to Public Finance [2560131]

**Coordinators:** B. Wigger  

**Part of the modules:** Introduction to Public Finance and Public Management (p. 53) [IW3VWL11]  

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## Learning Control / Examinations  
See module description.

### Conditions  
None.

### Recommendations  
None.

## Learning Outcomes  
Students are able to:

- critically assess the economic role of the state in a market economy  
- explain and discuss key concepts in public finance, including: public goods; economic externalities; and market failure  
- explain and critically discuss competing theoretical approaches to public finance, including welfare economics and public choice theory  
- explain the theory of bureaucracy according to Weber and critically assess its strengths and weaknesses  
- evaluate the incentives inherent in the bureaucratic model, as well as the more recent introduction of market-oriented incentives associated with public-sector reform  
- analyze the strategic implications of public decision making

## Content  
The course *Introduction to Public Finance* provides an overview of the fundamental issues in public economics. The first part of the course deals with normative theories about the economic role of the state in a market economy. Welfare economics theory is offered as a base model, with which alternative normative theories are compared and contrasted. Within this theoretical framework, arguments concerning efficiency and equity are developed as justification for varying degrees of economic intervention by the state. The second part of the course deals with the positivist theory of public economics. Processes of public decision making are examined and the conditions that lead to market failures resulting from collective action problems are discussed. The third part of the course examines a variety of public spending programs, including social security systems, the public education system, and programs aimed at reducing poverty. The fifth part of the course addresses the key theoretical and political issues associated with fiscal federalism.

## Media  
Lecture slides.

## Literature  

## Remarks  
See German version.
Course: Introduction to Information Engineering and Management [2540490]

Coordinators: C. Weinhardt, A. Geyer-Schulz
Part of the modules: Foundations in Business Administration (p. 21)[IW1BWL1], Foundations in Business Administration (p. 20)[IW1BWL3]

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

Learning Control / Examinations
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulation) and by submitting written essays in conjunction with the exercise (according to §4(2), 3 of the examination regulation). The final grade is based on the written exam and on the assignments from the exercises. The exact allocation will be announced during the first lecture. The points obtained in the exercises only apply to the first and second exam of the semester in which they were obtained.

Conditions
None.

Learning Outcomes
The student

• is able to handle interdisciplinary case studies of information management and engineering and to consider the impact of juridical framework of information technology on the design of business processes,
• knows the basic principles of informations as source for economic decision support,
• can develop and design venture creation and independently develop and create a business plan with external help,
• knows the fundamentals of strategic and operative marketing and logistic systems,
• can model and analyze dynamic systems,
• can apply with external help causal loop diagrams and methods from System Dynamics to a well defined business problem, describe system behavior and analyze the consequences of decisions on the system behavior,
• learns to work team-oriented and independently in small groups, learns English terminology in the context of information management and he is able to read and comprehend international literature to solve the tutorial assignments.

Content
The last years have seen the rise of information companies whose company purpose is the generation and distribution of informations. In these companies, as well as companies of the old economy, the role of information, communication, and their cost is increasing. Some of the problems related with this trend are presented and treated in-depth in the course Introduction to Information Engineering and Management.

The goal of this course is to present the foundation of information engineering and management and the necessary linking of the different disciplines in today’s information society. The course is completely motivated by authentic, real-world examples. With the help of these examples, the following topics as well as the interdependencies between business administration, economics, information technology, and law, are treated:

• The foundation of a company: Choosing the legal form and financing
• Information for economic decision support.
• Organizing information flows, valuation of information
• Network Economies
• Service Engineering
• Electronic markets
• Logistics/SCM
• Web/Internet-Marketing
• Production and Procurement

Media

• PowerPoint
• Full Text Documents

Literature


Elective literature:
Course: Introduction to Game Theory [2520525]

**Coordinators:** C. Puppe, P. Reiss

**Part of the modules:** Applied Microeconomics (p. 55)[IW3VWL13], Economic Theory (p. 54)[IW3VWL12]

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**Learning Control / Examinations**
The assessment consists of a written exam (60 minutes) according to Section 4(2),1 of the examination regulation. The exam takes place in the recess period and can be resited at every ordinary examination date.

**Conditions**
None.

**Recommendations**
Basic knowledge of mathematics and statistics is assumed.

**Learning Outcomes**
This course offers an introduction to the theoretical analysis of strategic interaction situations. At the end of the course, students shall be able to analyze situations of strategic interaction systematically and to use game theory to predict outcomes and give advice in applied economics settings.

**Content**
The course focuses on non-cooperative game theory. It discusses models, solution concepts, and applications for simultaneous games as well as sequential games. Various solution concepts, e.g., Nash equilibrium and subgame-perfect equilibrium, are introduced along with more advanced concepts. A short introduction to cooperative game theory is given if there is sufficient time.

**Media**
Slides, problem sets.

**Literature**
- Additional Literature:

**Remarks**
This course was formerly named “Game Theory I”.

Information Engineering and Management (B.Sc.)
Module Handbook, Date: 21.08.2014
Course: Introduction in Computer Networks [24519]

**Coordinators:** M. Beigl, M. Zitterbart

**Part of the modules:** Information and Database Systems (p. 69)[IW3INIDS], Communication and Database Systems (p. 68)[IW3INKD], Telematics (p. 71)[IW3INM]

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**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. Hence, we present all layers starting with the physical medium layer up to the application layer.

**Media**
Slides.

**Literature**

**Elective literature:**

**Remarks**
This lecture replaces the communication part of the lecture Kommunikation und Datenhaltung.
Course: Introduction to Public Management [2560132]

Coordinators: B. Wigger, N. Edwards
Part of the modules: Management of public- and private-sector organizations (p. 52)[IW3BWLIWW1], Introduction to Public Finance and Public Management (p. 53)[IW3VWL11]

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<td>2</td>
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Learning Control / Examinations
Module Management of public- and private-sector organizations:
Student achievement of learning goals is assessed by means of a written exam (90 min.), in accordance with §4(2), 1 SPO of the exam regulations. The grade for the exam constitutes the final grade for the course.
A re-sit exam (written exam) will be offered during the first week of the following winter semester, for which participation is obligatory for all students who failed the exam on their first attempt. Only students who took the first exam will be allowed to participate in the re-sit exam. Only in exceptional circumstances may the re-sit exam be taken as an oral exam rather than as a written exam.

Module Introduction to Public Finance and Public Management:
See module description

Conditions
Both the lecture „Introduction to Public Management“ and the course „Case Studies in Public Management“ must be taken at the same time.
Since this course is a compulsory element of the entire module, a passing grade is required in order to receive credit for completion.

Recommendations
A good proficiency in the English language (written and spoken).

Learning Outcomes
Course objective: The aim of the course is to provide students with a comprehensive understanding of management in public sector organizations and management of the provision of public services, also by private organizations.

Learning goals
Successful completion of the course will enable students to*:
1. Discuss management issues unique to the public sector;
2. Explain the main managerial functions involved in the management of public organizations and the provision of public services;
3. Explain and discuss the nature of “public services”;
4. Evaluate normative arguments (both political and economic) for and against public versus private provision of certain goods and services;
5. Critically discuss the role of politicians in and the impact of politics on organizational management in the public sector;
6. Explain the opportunities and limitations associated with the application of private sector management practices in public sector organizations;
7. Explain and discuss the managerial challenges in private and public sector organizations, respectively, posed by the following organizational characteristics: ownership, funding, control and purpose.
*Further learning goals related to specific topics covered in the lecture can be found in the textbook (see “Required reading”).

Content
Strategic management; Marketing; Financial management; Contracting for public service provision; Use of information and communication technologies; Human resource management; Performance, quality and process management; Auditing and controlling

Literature
Course: Energy Policy [2581959]

Coordinators: M. Wietschel
Part of the modules: Energy Economics (p. 44)[IW3BWLIIP2]

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Learning Control / Examinations
Conditions
None.

Learning Outcomes
See German version.

Content
The course deals with material and energy policy of policy makers and includes the effects of such policies on the economy as well as the involvement of industrial and other stakeholders in the policy design. At the beginning the neoclassical environment policy is discussed. Afterwards the Sustainable Development concept is presented and strategies how to translate the concept in policy decision follows. In the next part of the course an overview about the different environmental instruments classes, evaluation criteria for these instruments and examples of environmental instruments like taxes or certificates will be discussed. The final part deals with implementation strategies of material and energy policy.

Literature
Will be announced in the lecture.
Course: Enterprise Architecture Management [2511600]

Coordinators:  T. Wolf
Part of the modules:  Business Processes and Information Systems (p. 65)

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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 understand the connection between enterprise strategy, business processes and business objects and IT architecture; they know methods to depict these connections and how they can be developed based on each other.

Content
The following topics will be covered: components of enterprise architecture, enterprise strategy including methods to develop strategies, business process (re)engineering, methods to implement changes within enterprises (management of change)

Media
Slides, access to internet resources.

Literature
- Doppler, K., Lauterburg, Ch.: Change Management. Campus Verlag 1997
Course: Enterprise Risk Management [2530326]

<table>
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<tr>
<th>Coordinators:</th>
<th>U. Werner</th>
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<tr>
<td>Part of the modules:</td>
<td>Risk and Insurance Management (p. 47) [IW3BWLFBV3]</td>
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ECTS Credits: 4.5  Hours per week: 3/0  Term: Winter term  Instruction language: de

Learning Control / Examinations
The assessment consists of oral presentations (incl. papers) within the lecture (according to Section 4 (2), 3 of the examination regulation) and a final oral exam (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the assessment of the oral presentations incl. term papers (50 percent) and the assessment of the oral exam (50 percent).

Conditions
None.

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

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

Literature

Elective literature:
Additional literature is recommended during the course.
Course: eServices [2595466]

Coordinators: C. Weinhardt, H. Fromm
Part of the modules: eBusiness and Service Management (p. 33)[IW3BWLISM1], Specialization in Customer Relationship Management (p. 40)[IW3BWLISM5]

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Learning Control / Examinations
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulation). By successful completion of the exercises (according to §4(2), 3 of the examination regulation) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4). The bonus only applies to the first and second exam of the semester in which it was obtained.

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

Literature
• Meffert, H./Bruhn, M. (2006), Dienstleistungsmarketing, 5. Auflage,
• Teboul, (2007), Services is Front Stage.

Remarks
The credits have been changed from 5 to 4.5.
The lecture is not offered in the M.Sc. modules anymore, starting with the summer term 2012.
Course: Case Studies in Public Management [2560133]

**Coordinators:** B. Wigger, N. Edwards

**Part of the modules:** Management of public- and private-sector organizations (p. 52), Introduction to Public Finance and Public Management (p. 53)

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**Learning Control / Examinations**

**Module Management of public- and private-sector organizations:**
Successful completion of the course is determined by an alternative form of assessment rather than by an exam, in accordance with §4(2), 3 of the examination regulations.

The overall grade for the course is calculated as the weighted average of the grades for the individual assignments, rounded to the first decimal place.

Restrictions for the Re-sit Exam: Students, who do not pass the course on their first attempt, are obliged to re-take the entire course. The final possibility to earn a passing grade for the course will encompass the (individual, written and oral) preparation and presentation of a case study.

**Module Introduction to Public Finance and Public Management:**
See module description

**Conditions**
Both the lecture „Introduction to Public Management“ and the course „Case Studies in Public Management“ must be taken at the same time.
Since this course is a compulsory element of the entire module, a passing grade is required in order to receive credit for completion.

**Recommendations**
A good proficiency in the English language (written and spoken).

**Learning Outcomes**

**Course objective:** The aim of the course is to facilitate the application of knowledge acquired in the accompanying lecture, as well as through students’ own independent research, in formulating solutions to contemporary problems in public management and in the provision of public services.

**Learning goals:**
Successful completion of the course will enable students to:

1. Apply relevant theory from different disciplines in formulating solutions to case studies;
2. Demonstrate the ability to manage own (and group) learning needs, learning processes, and learning goals;
3. Effectively communicate results of work in both oral and written forms;
4. Contribute to group learning by actively participating in class and by actively engaging with peers outside of class.

**Content**

**Media**
PBL tasks (i.e. case studies) will be made available via ILIAS, as will the following:

- All relevant assessment forms
- Recommended reading

**Literature**
Course: Financial Management [2530216]

**Coordinators:** M. Ruckes

**Part of the modules:** Essentials of Finance (p. 45)[IW3BWLFBV1]

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**Learning Control / Examinations**
The assessment consists of a written exam (60 min.) according to Section 4 (2), 1 of the examination regulation. The exam takes place at every semester. Re-examinations are offered at every ordinary examination date.

**Conditions**
None.

**Recommendations**
Knowledge of the content of the course Business Administration: Finance and Accounting [25026/25027] is recommended.

**Learning Outcomes**
Students get an comprehensive insight into financing, capital investments of firms and the essentials of valuation.

**Content**
Analytical methods and theories in the field “Capital investments and financing” with the main focus on:

- Capital Structure
- Dividend policy
- Essentials of valuation
- Investment decisions
- Short term/long term finance
- Working Capital Management
- Corporate Governance

**Literature**

**Elective literature:**
- Berk, De Marzo (2007): Corporate Finance, Pearson Addison Wesley
Course: Financial Intermediation [2530232]

**Coordinators:** M. Ruckes  
**Part of the modules:** Topics in Finance I (p. 46) [IW3BWLFBV5]

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**Learning Control / Examinations**

**Conditions**
None.

**Learning Outcomes**
Students are introduced to the theoretical fundamentals of financial intermediation.

**Content**
- Arguments for the existence of financial intermediaries
- Bank loan analysis, relationship lending
- Competition in the banking sector
- Stability of the financial system
- The macroeconomic role of financial intermediation

**Literature**
**Elective literature:**
Course: Advanced object orientation [24665]

Coordinators: G. Snelting
Part of the modules: Advanced Object Orientation (p. 78)[IW4INFON]

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

Conditions
This is not a lecture on object-oriented software development! Rather, knowledge of object-oriented software engineering (e.g. Java, UML, Design Patterns) is required.

Recommendations
Good knowledge of Java

Learning Outcomes
Participants in this course know the basics of different object oriented programming languages (e.g. Java, C#, Smalltalk, Scala). They know how inheritance and dynamic dispatch work, behave and are implemented, and how these are used in software engineering. They know innovative language constructs in objects oriented languages like generics, aspects and traits. The participants know the theoretic foundations of (e.g. type systems), software engineering tools for (e.g. refactoring) and techniques (e.g. points-to analysis) for analysing object oriented programs. They know current trends in research on object oriented programming

Content

• Behaviour and semantics of dynamic dispatch
• Implementation of single and multiple inheritance
• Genericity, refactoring
• Traits and mixins, virtual classes
• Cardelli’s type system
• Palsberg-Schwartzbach type inference
• Analyses on the call graph, points-to analyses
• operational semantics, type safety
• bytecode, JVM, bytecode verifier, dynamic compilation
Course: Business Strategies of Banks [2530299]

Coordinators: W. Müller
Part of the modules: Topics in Finance I (p. 46)

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Learning Control / Examinations

Conditions
None.

Learning Outcomes
Students are told the basics of commercial banking.

Content
The management of a bank is in charge of the determination and implementation of business policy - taking into account all relevant endogenous and exogenous factors - that assures the bank's success in the long run. In this context, there exists a large body of banking models and theories which are helpful in describing the success and risk of a bank. This course is meant to be the bridging of banking theory and practical implementation. In the course of the lectures students will learn to take on the bank management's perspective.

The first chapter deals with the development of the banking sector. Making use of appropriate assumptions, a banking policy is developed in the second chapter. The design of bank services (ch. 3) and the adequate marketing plan (ch. 4) are then built on this framework. The operational business of banks must be guided by appropriate risk and earnings management (ch. 5 and 6), which are part of the overall (global) bank management (ch. 7). Chapter eight, at last, deals with the requirements and demands of bank supervision as they have significant impact on a bank's corporate policy.

Literature
Elective literature:

- A script is disseminated chapterwise within the lecture.
- Hartmann-Wendels, Thomas; Pfingsten, Andreas; Weber, Martin; 2000, Bankbetriebslehre, 2. Auflage, Springer
Course: Industrial Property and Copyright Law [24070]

**Coordinators:** T. Dreier

**Part of the modules:** Intellectual Property and Data Protection (p. 32)[IW3JURA]

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**Learning Control / Examinations**

**Conditions**

None.

**Learning Outcomes**

It is the aim of this course to give students an overview of the law of intellectual property. The course focuses on patent law, trademark law, copyright law and also presents other laws of industrial property, including the additional legal protection by unfair competition law. Students shall understand the differences between registration and non-registration rights. Key concepts such as territoriality, conditions for protection, exclusive rights, limitations and exceptions, infringement and sanctions will be discussed. In addition, the focus will be on licensing of IP rights. The course covers national, european and international IP law.

**Content**

The course gives an introduction to the legal protection of intellectual property. The different rationals for granting legal protection to immaterial goods will be explained, as well as the difference between registration and non-registration rights, and the system of international IP protection on the basis of the principle of territoriality will be explained. Following, the different IP rights will be discussed with regard to their respective conditions and scope of protection. An overview of licensing and of the sanctions in case of infringement of IP rights will be given.

**Media**

Slides.

**Literature**

Ilzhöfer, Volker Patent-, Marken- und Urheberrecht Verlag Vahlen, 7th current edition

**Elective literature:**

Additional literature tba
Course: Global Optimization I [2550134]

Coordinators: O. Stein

Part of the modules: Applications of Operations Research (p. 57)[IW3OR5], Methodical Foundations of OR (p. 59)[IW3OR6]

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Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The examination is held in the semester of the lecture and in the following semester. Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite. The examination can also be combined with the examination of Global Optimization II [2550136]. In this case, the duration of the written examination takes 120 minutes.

Conditions
None.

Learning Outcomes
The student

- knows and understands the fundamentals of deterministic global optimization in the convex case,
- is able to choose, design and apply modern techniques of deterministic global optimization in the convex case in practice.

Content
In many optimization problems from economics, engineering and natural sciences, numerical solution methods are only able to efficiently identify local optimizers, while it is much harder to find globally optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

Part I of the lecture treats methods for global optimization of convex functions under convex constraints. It is structured as follows:

- Introduction, examples, and terminology
- Existence results
- Optimality in convex optimization
- Duality, bounds, and constraint qualifications
- Numerical methods

Nonconvex optimization problems are treated in part II of the lecture.

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Media
Lecture notes.

Literature
Elective literature:

- W. Alt Numerische Verfahren der konvexen, nichtglatten Optimierung Teubner 2004
- C.A. Floudas Deterministic Global Optimization Kluwer 2000
- R. Horst, H. Tuy Global Optimization Springer 1996

Remarks
Part I and II of the lecture are held consecutively in the same semester.
Course: Global Optimization II [2550136]

Coordinators:
O. Stein

Part of the modules:
Methodical Foundations of OR (p. 59)

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

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The examination is held in the semester of the lecture and in the following semester. Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration to the written examination is subject to fulfilling the prerequisite. The examination can also be combined with the examination of Global Optimization I [2550134]. In this case, the duration of the written examination takes 120 minutes.

Conditions
None.

Learning Outcomes
The student

- knows and understands the fundamentals of deterministic global optimization in the nonconvex case,
- is able to choose, design and apply modern techniques of deterministic global optimization in the nonconvex case in practice.

Content
In many optimization problems from economics, engineering and natural sciences, numerical solution methods are only able to efficiently identify local optimizers, while it is much harder to find globally optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The global solution of convex optimization problems is subject of part I of the lecture. Part II of the lecture treats methods for global optimization of nonconvex functions under nonconvex constraints. It is structured as follows:

- Introduction and examples
- Convex relaxation
- Interval arithmetic
- Convex relaxation via αBB method
- Branch and bound methods
- Lipschitz optimization

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Media
Lecture notes.

Literature
Elective literature:

- W. Alt Numerische Verfahren der konvexen, nichtglatten Optimierung Teubner 2004
- C.A. Floudas Deterministic Global Optimization Kluwer 2000
- R. Horst, H. Tuy Global Optimization Springer 1996

Remarks
Part I and II of the lecture are held consecutively in the same semester.
Course: Basic Notions of Computer Science [24001]

<table>
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<tr>
<th>Coordinators:</th>
<th>T. Worsch</th>
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<td>Part of the modules:</td>
<td>Foundations in Informatics (p. 15)[INF1]</td>
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**Learning Control / Examinations**
The assessment of the module consists of a grade certificate for the exercise according to sec. 4 subsec. 2 no. 3 study and examination regulations and of a written exam (2 hours) according to sec. 4 subsec. 2 no. 1 study and examination regulations. The grade of the module corresponds to the grade of the written exam.

**Conditions**
None.

**Learning Outcomes**

- Students know the most important techniques for definitions and are able to read and understand such definitions.
- Students know the difference between syntax and semantics.
- Students know the most important notions from discrete mathematics and computer science and are able to use them for the description of problems and in proofs.

**Content**

- informal notion of algorithm, basics of correctness proofs
- computational complexity measures, hard problems
- big O notation, master theorem
- alphabets, words, formal languages
- finite acceptors, contextfree grammars
- inductive/recursive definitions, proofs by induction, closure
- relations and functions
- graphs

**Media**
lecture notes, slides (pdf).

**Literature**
Elective literature:

- Goos: Vorlesungen über Informatik, Band 1, Springer, 2005
- Abeck: Kursbuch Informatik I, Universitätsverlag Karlsruhe, 2005
Course: Fundamentals of Production Management [2581950]

**Coordinators:** F. Schultmann  
**Part of the modules:** Industrial Production I (p. 43) [IW3BWL1P1]

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**Learning Control / Examinations**  
The assessment consists of a written exam (90 minutes) (following §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**
- Students should describe the tasks of strategic corporate planning.
- Students should be able to use general approaches in order to solve these problems.

**Content**  
This lecture focuses on strategic production management with respect to various economic aspects. Interdisciplinary approaches of systems theory will be used to describe the challenges of industrial production. This course will emphasize the importance of R&D as the central step in strategic corporate planning to ensure future long-term success.

In the field of site selection and planning for firms and factories, attention will be drawn upon individual aspects of existing and greenfield sites as well as existing distribution and supply centres. Students will obtain knowledge in solving internal and external transport and storage problems with respect to supply chain management and disposal logistics.

**Media**
Media will be provided on learning platform.

**Literature**
will be announced in the course
Course: Commercial and Corporate Law [24011]

Coordinators: Z. (ZAR), O. Knöfel

Part of the modules: Commercial Law (p. 28)[IW1JURA2]

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

Conditions
None.

Learning Outcomes
Based on the lectures on civil law, the students are provided with an overview of the specifics of commercial transactions, commercial agency and the law of merchants. Moreover, the forms of organization available in German company law are outlined.

Content
The lecture begins with an introduction into the different terms of merchants of the German Commercial Code. Subsequently, the rules governing trade names, commercial registries and commercial agency are dealt with. This is followed by a presentation of the general rules of commercial transactions and of the specific commercial transactions. In company law, first of all, the basics of partnerships are explained. Thereafter, the focus will be on corporate law which is most important in practice.

Media
Slides.

Literature
Klunzinger, Eugen

- Grundzüge des Handelsrechts, Verlag Vahlen, latest edition
- Grundzüge des Gesellschaftsrechts, Verlag Vahlen, latest edition

Elective literature:
Will be announced in the lecture.
Course: Industrial Organization [2560238]

Coordinators: P. Reiss
Part of the modules: Applied Microeconomics (p. 55)[IW3VWL13], Economic Theory (p. 54)[IW3VWL12]

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Learning Control / Examinations
The assessment consists of a written exam (60 minutes) (following §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.

Recommendations
Completion of the module Economics [WW1VWL] is assumed.

Learning Outcomes
The student
- gains knowledge of the basic problems relating to imperfect competition and its policy implications,
- gains knowledge of the game-theoretic modeling used in the field of Industrial Organization,
- understands the scope and implications of strategic behavior of firms in various market settings.

Content
This course introduces the theory of industrial organization using game theoretical models. The course is divided into two parts: The first part reviews standard market forms (monopoly, oligopoly, perfect competition). The second part discusses more advanced topics including price discrimination, strategic product differentiation, cartel formation, market entry, and research and development.

Media
Slides, problem sets.

Literature
Compulsory Textbook:

Additional Literature:
Course: Informatics Seminar [SemInfo]

Coordinators: M. Zitterbart
Part of the modules: Seminar Module Informatics (p. 84)[IW3SEMINFO]

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Learning Control / Examinations

Conditions
None.

Learning Outcomes
The student
- deals with a well-defined problem in the Informatics domain in detail,
- analyses and discusses the given problems as part of the courses and in the final seminar papers,
- discusses, presents, and defends technical arguments within the given task specifications,
- organises the drafting of the final seminar paper mostly independently.

The competences gained as part of this seminar module serve as a preparation for the Bachelor thesis. Guided by the respective examiner, the student exercises independent scientific work in drafting and presenting the final seminar paper.

Content
The module consists of a seminar, that is related to the research field of informatics. A complete list of available seminars is published in the internet.

Remarks
The mentioned seminars in this module handbook are place holders. For each semester, a complete list of seminars are published in the Vorlesungsverzeichnis or at the web pages of the participating institutes. Often, the seminar topics for a given semester are published at the end of the preceding semester. Some seminars require an early sign-in deadline at the end of the of the preceding semester.
Course: Integrated Network and Systems Management [INS]

**Coordinators:** B. Neumair
**Part of the modules:** Information Services in Networks (p. 63)[IW3INAIFB4]

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**Learning Control / Examinations**

**Conditions**
None.

**Learning Outcomes**

**Content**
Course: Intelligent Systems in Finance [2511402]

**Coordinators:** D. Seese

**Part of the modules:** eFinance (p. 37)[IW3BWLSM3]

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**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 genetic algorithms, neural networks, support vector machines, fuzzy-logic, expert systems and intelligent hybrid systems. The presented applications focus on the finance area.

**Media**
Slides.

**Literature**
see lecture

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

The course “Intelligent Systems in Finance” will not be offered any more from summer term 2015 on. The examination will be offered latest until summer term 2015 (repeaters only).
Course: International Marketing [2572155]

Coordinators: M. Klarmann
Part of the modules: Foundations of Marketing (p. 50) [IW3BWLMAR]

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**Learning Control / Examinations**
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

**Conditions**
None.

**Learning Outcomes**
Students
- know the characteristics of international marketing
- are familiar with the Hofstede's cultural dimensions theory
- understand basic concepts of cultural learning (the concept of acculturation, the psychic distance paradox)
- know different concepts that explain international buying behavior (e.g. country-of-origin effects)
- comprehend different concepts for market entries in an international context ("waterfall"-strategy, "sprinkler"-strategy, method of analogy, chain ratio method)
- understand what needs to be considered regarding international market research (dealing with ethical dilemmas, challenges regarding primary and secondary data sources, testing measurement equivalence, linguistic equivalence, differences in the response styles of questionnaires)
- know the particularities of international product policy (standardization vs. differentiation, challenge of branding, fight against product plagiarism, brand counterfeiting and product piracy, protection of intellectual property)
- are familiar with the particularities in the international price policy (BigMac Index, how to deal with price demand functions to achieve profit maximization, arbitrage, price corridor, standardization vs. differentiation of prices, how to deal with currency risks, inflation, exchange rates and different willingness to pay)
- know the characteristics of the international communication policy (different laws, problems regarding international standardized campaigns)
- know particularities of the international sales policy (international channels, differences of contract negotiations)
- are able to organize international marketing departments and subsidiaries
- know the problems of marketing in emerging markets

**Content**
Doing marketing abroad creates a number of significant new challenges for firms. This class is intended to prepare you for meeting these challenges. In the first session, we will discuss the peculiarities of international marketing. The next five sessions will then be dedicated to methods that can be used to address them. For instance, we will look at the following issues:

- Internationalization strategies
- Market entry strategies
- Standardization vs. individualization (e.g. regarding products, prices, and communication)
- Measurement equivalence in international market research

In the final session, we will apply this knowledge to the case of Wal Mart. In particular, Wal Mart, despite being the largest retailing company worldwide, failed to successfully enter the German Market. We will discuss Wal Mart's failure using the methods taught in the weeks before.

**Remarks**
For further information please contact Marketing & Sales Research Group (marketing.ism.kit.edu).
Course: International Finance [2530570]

Coordinators: M. Uhrig-Homburg, Dr. Walter
Part of the modules: Topics in Finance I (p. 46)[IW3BWLFBV5], eFinance (p. 37)[IW3BWLISM3]

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

Learning Control / Examinations
Conditions
None.

Learning Outcomes
The objective of this course is to become familiar with the basics of investment decisions on international markets and to manage foreign exchange risks.

Content
The main aspects of this course are the chances and the risks which are associated with international transactions. We carry out our analysis from two distinct perspectives: First the point of view of an international investor second that, of an international corporation. Several alternatives to the management of foreign exchange risks are shown. Due to the importance of foreign exchange risks, the first part of the course deals with currency markets. Furthermore current exchange rate theories are discussed.

Literature
Elective literature:
Course: Cost and Management Accounting [2530210]

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**Learning Control / Examinations**
The assessment consists of a written exam (60 min) taking place in the recess period (according to §4 (2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Conditions**
None.

**Learning Outcomes**
This course aims at providing students with the understanding of the purposes of alternative costing systems as well as the use of relevant information for decision making. The course will also examine techniques for the purpose of cost management and accounting for control.

**Content**
- Design of Cost Systems
- Cost Classifications, Cost Behavior, and Principles of Cost Allocation
- Activity-based Costing
- Product Costing
- Production Decisions
- Cost-based Pricing
- Cost Management
- Decisions under Risk
- Cost Accounting for Control

**Literature**

**Elective literature:**

**Remarks**
This lecture will not be provided any more, the corresponding exams, however, will be provided each semester.
Course: Investments [2530575]

Coordinators: M. Uhrig-Homburg
Part of the modules: Essentials of Finance (p. 45)[IW3BWLBV1]

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Learning Control / Examinations
The assessment consists of a written exam (75 min) according to Section 4(2), 1 of the examination regulation. The examination takes place in every semester. Re-examinations are offered at every ordinary examination date. By submitting the exercises (according to Section 4(2), 3 of the examination regulation) up to 4 bonus points can be acquired.

Conditions
None.

Recommendations
Knowledge of Business Administration: Finance and Accounting [2600026] is recommended.

Learning Outcomes
The objective of this course is to become familiar with the basics of investment decisions on stock and bond markets. Basic economic concepts and models are discussed and applied on introductory level. Interlinkages between markets, different decision makings concepts and models are demonstrated.

Content
The lecture deals with investment decisions under uncertainty, where the main emphasis is on investment decisions on stock markets. After a discussion of the basic questions of corporate valuation, the lecture focuses on portfolio theory. After that, risk and return in equilibrium are derived using the Capital Asset Pricing Model and the Arbitrage Pricing Theory. The lecture concludes with investments on bond markets.

Literature
Elective literature:
Course: IT-Security Management for Networked Systems [24149]

Coordinators: H. Hartenstein
Part of the modules: Telematics II (p. 72)[W3INTM2]

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Learning Control / Examinations

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 objective of this lecture is to teach the basics of IT security management for networked systems. In this lecture, both methodological and technical approaches are shown. Furthermore, insights into current research are provided during the course.

Content
The course of this module teaches how to manage modern highly distributed IT systems and services. As a foundation, key concepts and models commonly used in the areas of IT Security Management, Network Management, Identity Management, and IT Service Management are introduced and discussed. Based on these concepts, selected technical architectures, protocols, and tools found within the mentioned areas of interest are evaluated. Among others, IT security workflows are illustrated by means of the “BSI Grundschutz”. It is explained how highly distributed computer networks can be monitored and controlled, and the management of public IP networks is evaluated. The course also focuses on Identity and Access Management as well as Firewalls, Intrusion Detection, and Prevention. Furthermore, concrete examples taken from the daily operation of the Steinbuch Centre for Computing (SCC), for instance in the context of the glass fiber backbone KITnet, are discussed to underline presented conclusions. By presenting current research activities in the areas of Peer-to-Peer networks (e.g. BitTorrent) and social networks (e.g. Facebook) management approaches are put into a global context.

Media
Slides

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

Coordinators: J. Mülle, Silvia von Stackelberg

Part of the modules: Information and Database Systems (p. 69)[IW3INIDS], Foundations of Information Systems (p. 67)[IW3INGIS], Introduction to Data and Information Management (p. 66)[IW3INGDI]

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

Conditions
None.

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

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

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

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

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

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

Further, the course presents application-driven procedures for changing and adapting workflows to new 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

Elective literature
Will be announced in the lecture.
Course: Logistics and Supply Chain Management [2581996]

Coordinators: M. Wiens

Part of the modules: Industrial Production I (p. 43)[IW3BLIIIP1]

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**Learning Control / Examinations**
The assessment consists of an oral (30 minutes) or a written (60 minutes) exam (following §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.

**Recommendations**
None.

**Learning Outcomes**
This course covers central tasks and challenges of modern logistics management from a systemic perspective. Basic industrial planning tasks are discussed and exemplary solution approaches for these tasks are presented. Due to its increasing relevance in practice, the course devotes special attention to the management of supply chain risks.

**Content**
- Introduction: Basic Terms and Concepts
- Logistics Systems and Supply Chain Management
- Supply Chain Risk Management
- Extensions and Applications

**Media**
Medie will be provided on learning platform.

**Literature**
will be announced in the course

**Remarks**
See German version.
Course: Logistics - organisation, design and control of logistic systems [2118078]

**Coordinators:** K. Furmans

**Part of the modules:** Supply Chain Management (p. 35)[IW3BWLISM2]

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**Learning Control / Examinations**
The assessment consists of a written exam according to Section 4 (2), 1 of the examination regulation. The grade of the exam may be improved by passing case studies.

**Conditions**
None.

**Recommendations**
Required are lectures on “Linear Algebra” and “Stochastic”.

**Learning Outcomes**
Students are able to:

- Describe logistical tasks,
- Design logistical systems suitable to the respective task,
- Dimension stochastic stock models,
- Determine essential influencing parameters on the bullwhip effect and
- Use optimizing solution methods.

**Content**
- Multistage logistic process chains
- Transport chain in logistic networks
- Distribution processes
- Distribution centers
- Logistics of production systems
- Dependencies between production and road traffic
- Information flow
- Cooperative strategies (like kanban, just-in-time, supply chain management)

**Media**
presentations, black board

**Literature**
None.

**Remarks**
None.
Course: Low Power Design [24672]

Coordinators: J. Henkel
Part of the modules: Energy-conscious Systems (p. 80)[IW3INEBS]

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

Conditions
None.

Recommendations
Module "Entwurf und Architekturen für Eingebettete Systeme"
Basic knowledge to the module "Optimierung und Synthese Eingebetteter Systeme" is helpful but not mandatory. The lecture is suited for both computer science and electrical engineering students.

Learning Outcomes
Students learn to consider energy-saving measures at all levels of the design of embedded systems while at the same time maintaining the computing power. Upon completion of the course the student should be able to identify and rectify problematic energy consumption in embedded systems.

Content
This course provides an overview of design methods, synthesis methods, estimation techniques, software techniques, operating system strategies, etc. with the aim to minimize power consumption of embedded systems while maintaining the required performance at the same time. Both research-related as well as established (i.e. implemented in current products) techniques at different abstraction levels (from the circuit to the system) are covered in the lecture.

Media
Slides
Course: Management of Business Networks [2590452]

Coordinators: C. Weinhardt
Part of the modules: Supply Chain Management (p. 35)[IW3BWLISM2], eBusiness and Service Management (p. 33)[IW3BWLISM1]

Learning Control / Examinations
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulation) and by submitting written essays as part of the exercise (according to §4(2), 3 of the examination regulation). 65% of the final grade is based on the written exam and 35% is based on assignments from the exercises. Successful completion of the exercises is a prerequisite for admission to the written exam. The points obtained in the exercises only apply to the first and second exam of the semester in which they were obtained.

Conditions
None.

Learning Outcomes
The student

• identifies the coordination problems in a business network,
• explains the theory of strategic and operative management,
• analyses case studies in logistics considering the organization theory and network analysis,
• argues and constructs new solutions for the case studies by means of electronic tools.

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
• E-learning platform ILIAS
• Recorded lecture available on the internet, if circumstances allow

Literature

Course: Management of Business Networks (Introduction) [2540496]

Coordinators: C. Weinhardt
Part of the modules: Supply Chain Management (p. 35)[IW3BWLISM2]

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Learning Control / Examinations
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulation).

Conditions
None.

Learning Outcomes
The student
- identifies the coordination problems in a business network,
- explains the theory of strategic and operative management,
- analyses case studies in logistics considering the organization theory and network analysis,
- argues and constructs new solutions for the case studies by means of electronic tools.

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
- E-learning platform ILIAS
- Recorded lecture available on the internet, if circumstances allow

Literature

Remarks
This version of the MBN course does not include the case study in the second part of the lecture, so that it is worth less credits.
Course: Brand Management [2572177]

**Coordinators:** B. Neibecker

**Part of the modules:** Foundations of Marketing (p. 50) [IW3BWLMAR]

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**Learning Control / Examinations**

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The examination is offered every semester. Re-examinations are offered at every ordinary examination date.

**Conditions**

None.

**Learning Outcomes**

Students have learned the following outcomes and competences:

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

**Content**

The students should learn the essential scientific and practical principles of Marketing, especially branding. Branding consists of any name, design, style, words or symbols, singly or in any combination that distinguish one product from another in the eyes of the consumer. Brand positioning, brand loyalty and brand equity are discussed as important elements of a management concept. The focus of the course is not limited to short-term ROI, but also long-term benefits of communication strategies facing company’s responsibilities to all of its stakeholders, e.g. consumers, investors and public. The strategies and techniques in branding are broaden by several case studies. English as an international technical language in marketing is practiced with course readings and scientific papers. Content:

The course brand management starts with the development of the corporate objectives as the heart of the brand planning process followed by definitions of brand. Setting up on the psychological and social bases of consumer behavior, aspects of an integrated marketing communication are discussed. The students should acquire the particular value of branding strategies. The concept of brand personality is considered in two perspectives, from a practical point of view and the challenging position of the theoretical construct. Methods for the measurement of a consumer-based brand equity are compared with the financial valuation of the brand. The information provided by this equity measurements are related to the equity drivers in brand management. The marketers perspective will be accomplish with the analysis of several case studies. Within the limits of a knowledge based system for advertising evaluation many of the issues accomplished in the course are summarized. At the same time it is discussed as a tool to use marketing knowledge systematically.

**Media**

Slides, Powerpoint presentations, Website with Online Course Readings

**Literature**

Course: Managing the Marketing Mix [2571152/2571153]

**Coordinators:** M. Klarmann

**Part of the modules:** Foundations of Marketing (p. 50) [IW3BWLMAR]

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**Learning Control / Examinations**

**Conditions**
This course is compulsory within or the module “Foundations of Marketing” and must be examined.

**Learning Outcomes**
See German version.

**Content**
The content of this course concentrates on the four elements of the marketing mix. Therefore the four main chapters are:

- Product management
- Pricing
- Promotion
- Sales management

**Remarks**
For further information please contact Marketing & Sales Research Group (marketing.ism.kit.edu).
Course: Mathematics I for Information Engineering and Management [01360]

Coordinators: A. Rieder, C. Wieners
Part of the modules: Mathematics I (p. 30) [IW1MATH1]

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**Learning Control / Examinations**

The assessment consists of

1. a graded certificate of exercise following §4(2), 3 of the examination regulation from the exercises to mathematics I and
2. a written examination of 60 minutes on the lectures mathematics I following §4(2), 1 of the examination regulations.

The grade of the module is computed as a weighted sum, where the grade of the written examination has a weight of 80% and the certificates a weight of 20%.

**Conditions**
None.

**Learning Outcomes**

The aim of the course “Mathematics I” is to impart a comprehension of basic methods in linear algebra.

**Content**

The two lectures „Mathematics I and II for the subject area Information Systems“, edoate basic mathematical knowlegde which is requiered to understand modern computer science and economical sciences. Part I is concerned with linear algebra including the basic algebraic structures, vector spaces and linear mappings. These structures are important for example in computer science.

**Media**
blackboard, data projector and transparencies if necessary

**Literature**

**Elective literature:**

- Offer for interested and top students
  - Ammann / Escher: Analysis I–III, Birkhäuser
- Tutorials / simpler literature alternatives
  - Henze / Last: Mathematik für Wirtschaftsingenieure I–II, Teubner
  - Ansorge / Oberle: Mathematik für Ingenieure I–III, Wiley
Course: Mathematics II for Information Engineering and Management [01877]

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**Coordinators:** A. Rieder, C. Wieners  
**Part of the modules:** Mathematics II (p. 31) [IW1MATH2]

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

1. a graded certificate of exercise following §4(2), 3 of the examination regulation from the exercises to mathematics II and
2. a written examination of 60 minutes on the lectures mathematics II following §4(2), 1 of the examination regulations.

The grade of the module is computed as a weighted sum, where the grade of the written examination has a weight of 80% and the certificate a weight of 20%.

**Conditions**  
Mathematics I
None.

**Learning Outcomes**  
The aim of the course “Mathematics I” is to impart a comprehension of basic methods in analysis.

**Content**  
The lectures in mathematics give an overview in basic mathematical knowledge which is required to understand modern computer science and economical sciences. Part II consists of analysis including an introduction into the calculus of functions of one or several variables.

**Media**  
blackboard, data projector and transparencies if necessary

**Literature**  
Elective literature:

- Offer for interested and top students
  
  Ammann / Escher: Analysis I–III, Birkhäuser  
  Tutorials / simpler literature alternatives

  Henze / Last: Mathematik für Wirtschaftsingenieure I–II, Teubner  
  Ansorge / Oberle: Mathematik für Ingenieure I–III, Wiley
Course: [240051]

Coordinator: M. Beigl
Part of the modules: (p. 81)[IW3INMC]

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Learning Control / Examinations

Conditions
None.

Learning Outcomes
Content
Course: Mobile Communication [24643]

Coordinators: O. Waldhorst, M. Zitterbart
Part of the modules: Telematics II (p. 72) [IW3INTM2]

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

**Conditions**
None.

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

**Learning Outcomes**
The students are introduced to the fundamental terms used in mobile communications. They are equipped with a portfolio of basic methods for implementing mobile communication systems. Furthermore, they learn how prominent mobile communication systems with practical relevance are structured and operated. In this context, the students will develop an understanding of typical problems in mobile communication systems and learn how to chose and apply methods from the portfolio to solve them.

**Content**
The course starts with a discussion of typical problems related to wireless transmissions, e.g., signal propagation and fading, reflections and interference. Subsequently, it develops a portfolio of methods for modulation of digital data, multiplexing, coordination of concurrent medium access, and mobility management. To illustrate where and how these methods are applied in practice, typical mobile communication systems are introduced. These include wireless local area networks using IEEE 802.11, wireless personal area networks using Bluetooth, as well as wireless telecommunication systems using GSM, UMTS with HSPA and LTE. Discussions of network-layer mechanisms (e.g., mobile ad-hoc networks and MobileIP) and transport layer protocols close the course.

**Media**
Slides.

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

**Elective literature:**
H. Kaaranen, A. Ahtiainen, et. al., UMTS Networks – Architecture, Mobility and Services, Wiley Verlag, 2001.
What You Should Know About the ZigBee Alliance http://www.zigbee.org.
H. Holma, WCDMA For UMTS, HSPA Evolution and LTE, 2007
Course: Business Process Modelling [2511210]

Coordinators: A. Oberweis
Part of the modules: Business Processes and Information Systems (p. 65)[IW3INAIFB8], Semantic Knowledge Management (p. 61)[IW3INAIFB2]

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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
- describe goals of business process modeling and apply different modeling languages,
- choose the appropriate modeling language according to a given context,
- use suitable tools for modeling business processes,
- apply methods for analysing and assessing process models to evaluate specific quality characteristics of the process model.

Content
The proper modeling of relevant aspects of business processes is essential for an efficient and effective design and implementation of processes. This lecture presents different classes of modeling languages and discusses the respective advantages and disadvantages of using actual application scenarios. For that simulative and analytical methods for process analysis are introduced. In the accompanying exercise the use of process modeling tools is practiced.

Media
Slides, access to internet resources.

Literature
Further Literature will be given in the lecture.
Course: Multimedia Communications [24132]

Coordinators: R. Bless, M. Zitterbart
Part of the modules: Telematics II (p. 72) [IW3INTM2]

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

Conditions
None.

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

Learning Outcomes
Objective of the lecture is to present techniques, 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, Advanced TV and Video on Demand.

Media
Slides. Protocol traces.

Literature
Weiterführend:
Course: Nature-inspired Optimisation Methods [2511106]

Coordinators: P. Shukla
Part of the modules: Algorithms and Applications (p. 64)

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

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

Literature

Weiterführende Literatur:
Course: Network Security: Architectures and Protocols [24601]

Coordinators: M. Schöller
Part of the modules: Telematics II (p. 72)[IW3INTM2]

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

Conditions
None.

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

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

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

Media
Slides.

Literature

Elective literature:
• Carlisle Adams and Steve Lloyd. Understanding PKI. Addison Wesley, 2003
Course: Nonlinear Optimization I [2550111]

Coordinators:
O. Stein

Part of the modules:
Stochastic Methods and Simulation (p. 60)[IW3OR7], Methodical Foundations of OR (p. 59)[IW3OR6]

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

Learning Control / Examinations
The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in the semester of the lecture and in the following semester. Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite. The examination can also be combined with the examination of Nonlinear Optimization II [2550113]. In this case, the duration of the written examination takes 120 minutes.

Conditions
None.

Learning Outcomes
The student

• knows and understands fundamentals of unconstrained nonlinear optimization,
• is able to choose, design and apply modern techniques of unconstrained nonlinear optimization in practice.

Content
The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, we derive optimality conditions that form the basis for numerical solution methods. The lecture is structured as follows:

• Introduction, examples, and terminology
• Existence results for optimal points
• First and second order optimality conditions for unconstrained problems
• Optimality conditions for unconstrained convex problems
• Numerical methods for unconstrained problems (line search, steepest descent method, variable metric methods, Newton method, Quasi Newton methods, CG method, trust region method)

Constrained problems are the contents of part II of the lecture.
The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Media
Lecture notes.

Literature
Elective literature:

• W. Alt, Nichtlineare Optimierung, Vieweg, 2002
• M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993

Remarks
Part I and II of the lecture are held consecutively in the same semester.
## Course: Nonlinear Optimization II [2550113]

### Coordinators:
O. Stein

### Part of the modules:
Methodical Foundations of OR (p. 59)[IW3OR6]

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<tr>
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<td>2/1</td>
<td>Summer term</td>
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</table>

### Learning Control / Examinations
The assessment consists of a written exam (120 minutes) according to §4{2}, 1 of the examination regulation. The exam takes place in the semester of the lecture and in the following semester. Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite. The exam can also be combined with the examination of Nonlinear Optimization I [2550111]. In this case, the duration of the written exam takes 120 minutes.

### Conditions
None.

### Learning Outcomes
The student
- knows and understands fundamentals of constrained nonlinear optimization,
- is able to choose, design and apply modern techniques of constrained nonlinear optimization in practice.

### Content
The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, we derive optimality conditions that form the basis for numerical solution methods. Part I of the lecture treats unconstrained optimization problems. Part II of the lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions for constrained problems
- Optimality conditions for constrained convex problems
- Numerical methods for constrained problems (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

### Media
Lecture notes.

### Literature
Elective literature:
- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993

### Remarks
Part I and II of the lecture are held consecutively in the same semester.
Course: Public Revenues [2560120]

Coordinators:  B. Wigger, Assistenten
Part of the modules:  Applied Microeconomics (p. 55) [IW3VWL13]

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Learning Control / Examinations
The assessment consists of an 1h written exam following Art. 4, para. 2, clause 1 of the examination regulation. The grade for this course equals the grade of the written exam.

Conditions
Basic knowledge of Public Finance is required.

Learning Outcomes
See German version.

Content
The Public Revenues lecture is concerned with the theory and policy of taxation and public dept. In the first chapter, fundamental concepts of taxation theory are introduced, whereas the second chapter deals with key elements of the German taxation system. The allocative and distributive effects of different taxation types are examined in chapter three and four. Chapter five integrates both allocative and distributive components in order to derive a theory of optimal taxation. The core of the sixth chapter is represented by international aspects of taxation. The debt part begins with a description of the extent and structure of public dept in chapter seven. In the following chapter, macroeconomic theories of national dept are evolved, while chapter nine is concerned with its long term consequences when employed as a regular instrument of budgeting. Finally, the tenth chapter deals with constitutional limits to public debt-incurring.

Literature
Elective literature:

Course: Public Law I - Basic Principles [24016]

Coordinators: G. Sydow

Part of the modules: Constitutional and Administrative Law (p. 29) [IW1JURA3]

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<td>3</td>
<td>2/0</td>
<td>Winter term</td>
<td>de</td>
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</tbody>
</table>

Learning Control / Examinations
The assessment consists of a written exam concerning the courses Public Law I [24016] and Public Law II [24520] (according to Section 4(2), 1 of the examination regulation).

Conditions
None.

Recommendations
Parallel to the lectures, tutorials are offered in which legal thinking and argumentation are practised. Their attendance is strongly recommended.

During the semester, test exams to each lecture are offered with extensive coaching. During the lecture-free time, a Q-and-A-lecture is offered. Details on the homepage of the ZAR (www.kit.edu/zar).

Learning Outcomes
The lecture covers the core principles of public law. Students shall become acquainted with the basics of constitutional law, the fundamental rights which route governmental actions and the entire legal system, as well as possibilities of actions and instruments (especially law, administrative act, public-private contract) of the public authority. Furthermore, the distinction between public and private law will be clarified. Moreover, possibilities of legal protection regarding administrative behavior will be addressed. Students shall learn to classify problems in public law and to solve (simple) administrative and constitutional cases.

Content
The course covers core material of constitutional and administrative law. It begins with the differentiation between public and private law. In the constitutional law part, the course will concentrate on the rule of law and individual rights, especially those protecting communication and entrepreneurship. The administrative law part will explain the different legal instruments of the administration how to act (rule, order, contract, etc.) and their propositions. Also, court proceedings to sue the administrative will be discussed. Students will learn the technique how to solve (simple) administrative and constitutional cases.

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

Literature
tba in scriptum

Elective literature:
tba in scriptum
Course: Public Law II - Public Economic Law [24520]

Coordinators: G. Sydow

Part of the modules: Constitutional and Administrative Law (p. 29)[IW1JURA3]

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<td>2/0</td>
<td>Summer term</td>
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Learning Control / Examinations
The assessment consists of a written exam (60min) according to Section 4(2), 1 of the examination regulation.

Conditions
None.

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

Learning Outcomes
Public economic law is of significant importance to supervise the German economy. In order to understand the functionality of mandatory interventions into market mechanisms in a thoroughly normed legal system, appropriate legal knowledge is required. This knowledge is to be provided in the lecture. In doing so, substantive law ought to be dealt with in a deepened way, while responsible authorities and institutions as well as possibilities of legal protection in the area of public commercial law will be taught at a glance. The lecture’s primary aim is to exercise handling the corresponding legal norms. It proceeds the lecture public law I.

Content
In a first step legal basics of the economic system (such as financial system and freedom of property and profession) will be presented. In this context, interaction between the Basic Constitutional Law and presettings of European Community law will be elaborated on as well. Thereafter, regulatory instruments of the administrative law will be analysed extensively. As particular matters, we will deal with industrial code, further trade law (handicrafts code; law of gastronomy), basic principles of telecommunication law, state aid law and public procurement law. A last part is devoted to the institutional design of the economy’s regulation.

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

Literature
Will be announced in the lecture.
Elective literature:
tba in lecture slides
Course: Operative CRM [2540520]

Coordinators: A. Geyer-Schulz
Part of the modules: CRM and Service Management (p. 38)[IW3BWLISM4], Specialization in Customer Relationship Management (p. 40)[IW3BWLISM5]

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

<table>
<thead>
<tr>
<th>Grade</th>
<th>Minimum points</th>
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<tbody>
<tr>
<td>1.0</td>
<td>95</td>
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<tr>
<td>1.3</td>
<td>90</td>
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<tr>
<td>1.7</td>
<td>85</td>
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<tr>
<td>2.0</td>
<td>80</td>
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<tr>
<td>2.3</td>
<td>75</td>
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<tr>
<td>2.7</td>
<td>70</td>
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<tr>
<td>3.0</td>
<td>65</td>
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<tr>
<td>3.3</td>
<td>60</td>
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<td>3.7</td>
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<tr>
<td>4.0</td>
<td>50</td>
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<tr>
<td>5.0</td>
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</table>

Conditions
None.

Recommendations
The attendance of courses Customer Relationship Management [2540508] and Analytical CRM [2540522] is advised.

Learning Outcomes
The Student

• understands the theory of methods for process and data analyses and applies them for the design and implementation of operative CRM-processes in the complex context of companies,
• takes privacy problems into account,
• evaluates existing operative CRM-processes in companies and gives recommendation for their improvement. This requires the knowledge of example processes and the ability to transform them according to the given setting.
• uses literature for the solution of case studies, communicates with professionals and summarizes his recommendations and drafts in precise and coherent texts.

Content
The Student should be able to understand and implement methods and applications within the operative CRM. This includes, but is not limited to the analysis of business processes, as a basis for improvements in CRM, and applications like call centers.

Literature

Elective literature:
Chris Todman. Designing a Data Warehouse : Supporting Customer Relationship Management.

Remarks
As of winter term 2014/15 this lecture is hold in alternation with “2540522 - Analytical CRM”. The current schedule can be seen on the chair's website (http://www.em.uni-karlsruhe.de/studies/).
Course: Organic Computing [2511104]

Coordinators: H. Schmeck, S. Mostaghim
Part of the modules: Algorithms and Applications (p. 64)[IW3INAIFB5]

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<th>ECTS Credits</th>
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<tr>
<td>5</td>
<td>2/1</td>
<td>Summer term</td>
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Learning Control / Examinations
The assessment of this course consists of a written examination (60 min) (following §4(2), 1 SPO) and of submitting written exercises that recapitulate the content of the course. The exercises include theoretical questions as well as practical programming. For providing a successful solution to all exercises, a bonus will be granted, improving the grade of a passed exam by one grade-step (0.3 or 0.4, respectively, following §4(2), 3 SPO). The course will be offered every second semester (summer term) and exams may be repeated at every ordinary exam date.

Conditions
None.

Learning Outcomes
The student acquires the ability to master methods and concepts of Organic Computing and to demonstrate innovation skills regarding the used methods.

Therefore the course aims at the teaching of fundamentals and methods of Organic Computing within the context of its applicability in practice. On the basis of a fundamental understanding of the taught concepts and methods the students should be able to choose the adequate methods and concepts, if necessary further develop them according to the situation and use them properly when facing related problems in their later job. The students should be capable of finding arguments for the chosen solutions and express them to others.

Content
The mission of Organic Computing is to tame complexity in technical systems by providing appropriate degrees of freedom for self-organized behaviour adapting to changing requirements of the execution environment, in particular with respect to human needs. According to this vision an organic computer system should be aware of its own capabilities, the requirements of the environment, and it should be equipped with a number of “self-x” properties allowing for the anticipated adaptiveness and for a reduction in the complexity of system management. These self-x properties are self-organisation, self-configuration, self-optimization, self-healing, self-protection and self-explanation. In spite of these self-x properties, an organic system should be open to external control actions which might be necessary to prevent undesired behaviour.

Media
powerpoint slides with annotations using a tablet pc access to applets and Internet resources lecture recording (camtasia).

Literature

Elective literature:

Information Engineering and Management (B.Sc.)
Module Handbook, Date: 21.08.2014


Further references will be announced in class.
Course: Managing Organizations [2577902]

Coordinators: H. Lindstädt
Part of the modules: Management of public- and private-sector organizations (p. 52)[IW3BWLIWW1], Strategy and Organization (p. 42)[IW3BWLUO1]

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<td>4</td>
<td>2/0</td>
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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
Concretely, after passing this course the students should be able to assess effects and implications of the following aspects:

- Strength and weaknesses of existing organisational structures and rules
- Alternatives of organisational structure in practice with assessment and interpretation regarding their effectiveness and efficiency
- Management of organisational changes

Media
Slides.

Literature

The relevant excerpts and additional sources are made known during the course.
Course: Power Management [24127]

Coordinators: F. Bellosa
Part of the modules: Energy-conscious Systems (p. 80)[IW3INEBS]

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<td>2</td>
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Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
The students are familiar with mechanisms and policies to manage the use of energy. The impact of operation modes of the underlying hardware is known. The principles and limits of energy accounting are common.

Content
Syllabus:

- CPU Power Management
- Thermal Management
- Memory Power Management
- I/O Power Management
- Battery Power Management
- Cluster Power Management

Media
lecture slides in English
Course: Power Management Lab [24181]

Coordinators: F. Bellosa

Part of the modules: Energy-conscious Systems (p. 80) [IW3INEBS]

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

Conditions
This course can only be taken in cooperation with the course “Power Management” [24127].

Learning Outcomes
The students apply the knowledge from the parallel lectures to implementations on real hardware and system software. The student is familiar with system programming and can extend and evaluate existing operating systems. The student learns to instrument and measure energy critical systems.

Content
Topics:
- Thermal management
- Frequency scaling
- Shutdown strategies
- Energy efficient file systems

Media
presentations, operating systems sources
Course: Advanced Lab Applied Informatics [25070p]

Coordinators: A. Oberweis, H. Schmeck, D. Seese, R. Studer, S. Tai
Part of the modules: Semantic Knowledge Management (p. 61)[IW3INAIFB2]

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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: Computing Lab Information Systems [PraBI]

**Coordinators:** A. Oberweis, D. Seese, R. Studer  
**Part of the modules:** Business Processes and Information Systems (p. 65)

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**Learning Control / Examinations**  
The assessment of this course are practical work, presentations and a written 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 to present the results and the development process,
- give presentations in a scientific context in front of an auditorium to present the results.

**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 Internet Services [xIDlp]

**Coordinators:** H. Schmeck, S. Tai, W. Tichy, R. Studer, H. Hartenstein

**Part of the modules:** Information Services in Networks (p. 63)[IW3INAIFB4]

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**Learning Control / Examinations**
The success control is realized by demanding practical work, presentations and a document describing the work according to § 4(2),3 SPO Informationswirtschaft. The written document, the presentations and the practical work will be weighted in equal parts towards the total grade.

**Conditions**
the advanced lab may offered by any of the lecturers participating in this module

**Learning Outcomes**
Students will

- carry out a literature study based on a given topic, and then identify, find, evaluate and analyze the relevant literature.
- produce their seminar work (and later the bachelor- / masters thesis) without much initial delay for familiarizing with the topic, while obeying format requirements, like the ones provided by publishers in the publication of documents.
- devise presentations as part of a scientific context. For that techniques will be presented which allow the preparation and presentation of the content to be presented in a manner that is adequate for the audience.
- present the results of the research in written form in a manner that is generally used in scientific publications.

**Content**
The seminar deals with specific topics that were partly mentioned in the respective lecture, and deepens them. A previous visit to the respective lecture is helpful, but not a prerequisite for attendance.
Course: Lab: Low power design [LPD]

Coordinators: J. Henkel
Part of the modules: Energy-conscious Systems (p. 80) [IW3INEBS]

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<td>2</td>
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Learning Control / Examinations
Conditions
None.

Learning Outcomes
Content
Course: Consulting in Practice [PUB]

Coordinators: K. Böhm, Stefan M. Lang

Part of the modules: Introduction to Data and Information Management (p. 66) [IW3INGDI], Foundations of Information Systems (p. 67) [IW3INGIS], Information and Database Systems (p. 69) [IW3INIDS]

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<td>2</td>
<td>Winter / Summer Term</td>
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Learning Control / Examinations
The assessment will be an assessment according to sec. 4 subsec. 2 no 3. study and examination regulations and consists of several parts. These include talks, market studies, projects, case studies and reports.

The course will be assessed with “passed” or “failed”. For passing the practical course, all partial exercises must have been passed successfully.

Conditions
None.

Learning Outcomes
At the end of the course, the participants

- have gained knowledge and understanding for the activities of the consulting process in general,
- have gained function-specific knowledge and understanding of IT consulting,
- have an overview about consulting companies,
- know concrete consulting examples,
- have experienced how effective teams work and
- have got an insight into the professional field “consulting”.

Content
The market for consulting services grows annually by 20% and is therefore one of the leading growth sectors and professional fields in the future. This trend is in particular driven by the IT industry. Here, widely used standard software moves the focus of the future professional field from software development to consulting. In this context, consulting services have usually a broad definition, reaching from pure IT-focused consulting (e.g., deployment of SAP) to strategic consulting (strategy, organisation etc). In contrast to common rumors, a qualification in business studies is not a must. This opens up a diversified and exciting field with exceptional development perspectives for computer science students. The course deals thematically with the two fields consulting in general and function-specific consulting (with IT consulting as an example).

The structure of the course is oriented along the phases of a consulting project:

- Diagnosis: The consultant as an analytic problem solver.
- Strategic adjustment/redesign of the core processes: Optimisation/redesign of essential business functionality to solve the diagnosed problems in cooperation with the client.
- Implementation: Installation of the solutions in the client’s organisation for assuring the implementation.

Emphasised topics in the course are:

- Elementary problem solving: Problem definition, structuring of problems and focusing through the usage of tools (e.g., logic and hypothesis trees), creative techniques, solution systems etc.
- Obtaining information effectively: Access of information sources, interview techniques etc.
- Effective communication of findings/recommendations: Analysis/planning of communication (media, audience, formats), communication styles (e.g., top-down vs. bottom-up), special topics (e.g., arrangement of complex information) etc.
- Efficient teamwork: Tools for optimising efficient work, collaboration with clients, intellectual and process leadership in the team etc.

Media
Slides, case studies.

Remarks
Seats are limited, so please register with Prof. Böhm’s office.
This course is offered every three semesters.
Course: Selling IT-Solutions Professionally [PLV]

Course: Selling IT-Solutions Professionally [PLV]

Coordinators: K. Böhm, Hellriegel

Part of the modules: Introduction to Data and Information Management (p. 66)[IW3INGDI], Foundations of Information Systems (p. 67)[IW3INGIS], Information and Database Systems (p. 69)[IW3INIDS]

ECTS Credits

Hours per week

Term

Instruction language

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Learning Control / Examinations

The assessment will be an assessment according to sec. 4 subsec. 2 no 3. study and examination regulations and consists of several parts. These include group work and role playing, written summaries and the presentation thereof and occasionally playing roles such as account manager, sales manager and project manager.

The course will be assessed with “passed” or “failed”. For passing the practical course, all partial exercises must have been passed successfully.

Conditions

None.

Learning Outcomes

At the end of the course, the participants:

1. Have gained knowledge and understanding for the sales process.
2. Have obtained knowledge and understanding for typical roles and tasks.
3. Have gained an insight into practical and application-oriented aspects through an extensive case study and role plays.

Content

One of the key qualifications in IT sales (activities related to the customer) is the understanding of sales mechanisms as well as having the corresponding basic skills. This applies not only to the marketing staff, but also to consultants of customers, project managers and developers. After a short overview of the different types of businesses and the resulting requirements regarding marketing and sales in general, the course focuses in particular on the process of selling IT-solutions professionally.

The topics are structured as follows:

1. Understanding the market: which information regarding the markets of clients and suppliers needs to be obtained and where can such information be found.
2. Knowing the customer: what should a provider know about the customer and its staff? This goes up to the question with which characters one has to deal with.
3. Planning the sales process: sales builds on phases, milestones and formally describable intermediate results.
4. Building a sales team: solutions are developed and sold with a team consisting of “players” having different expertise. How does one play this game?
5. Positioning the solution: obviously, it is necessary to develop a solution which is competitive, both technically and commercially.
6. To contract: what is important at the very last steps: how to convince the customers.

Based on a real-world case study, the students have the opportunity to reflect and practice the learned theory by means of teamwork and role plays. This aims at establishing a first connection to reality. The topics of the course are enriched with many examples from practice.

Media

Presentation, case studies and group work material.

Literature

Elective literature:
Reiner Czichos: Creaktives Account-Management.

Remarks

Seats are limited, so please register with Prof. Böhm’s office.

This course is offered every three semesters, with the next time being in the winter term 2010/2011.
Course: Principles of Insurance Management [2550055]

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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
- U. Werner. Einführung in die Versicherungsbetriebslehre. Skript zur Vorlesung.

Elective literature:
Will be announced during the lecture.
Course: Exercises in Civil Law [24017]

Coordinators: T. Dreier
Part of the modules: Commercial Law (p. 28)[IW1JURA2]

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

Conditions
None.

Learning Outcomes
It is the aim of this course to enable students to solve legal cases by way of the appropriate legal technique (so-called Subsumtion). At the same time, the legal knowledge which students have acquired in the courses “Civil Law for Beginners”, “Advanced Civil Law” and “Commercial and Corporation Law” will be repeated and deepened. This shall enable students to solve practical legal problems in a methodologically correct way.

Content
In 5 sessions the substantive law which students have been taught in the courses “Civil Law for Beginners”, “Advanced Civil Law” and “Commercial and Corporation Law” will be repeated and the method for solving legal cases deepend. Moreover, 5 sessions are reserved to written exam problems which cover the totality of what students have learned so far. Additional sessions are reserved for the subsequent in-class discussion of the exam problems.

Media
Slides

Literature
Tba in the course.
Course: Problem solving, communication and leadership [2577910]

Coordinators: H. Lindstädt
Part of the modules: Strategy and Organization (p. 42)[IW3BWLUO1]

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**Learning Control / Examinations**
The assessment consists of a written exam (30 minutes) (following §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.

**Recommendations**
None.

**Learning Outcomes**
The course deals with various aspects of problem solving and communication processes and is divided into two parts. The first part of the course addresses the fundamental steps in the problem-solving process; namely, problem identification, problem structuring, problem analysis and communication of solution. Ideas for structuring problem solving processes will be discussed and the prerequisites for and principles of structured communication based on charts and presentations will be explained. The second part of the course addresses important concepts in leadership, including the context-specificity of influence, the choice of leader and the characteristics of employees. The course content reflects current issues in management and communication practice and is oriented toward the practical application of theoretical insights to these issues. In this respect, the course aims to develop interdisciplinary skills.

**Content**
Concretely, after passing this course the students should be able to assess effects and implications of the following aspects:

- Structuring problem solving processes
- Principles of focused communication based on charts and presentations
- Leadership in the context of situation and personality

**Media**
Slides.

**Literature**
The relevant excerpts and additional sources are made known during the course.
Course: Production Economics and Sustainability [2581960]

**Coordinators:** M. Fröhling

**Part of the modules:** Industrial Production I (p. 43)[IW3BWLIIP1]

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**Learning Control / Examinations**
The assessment consists of an oral (30 minutes) or a written (60 minutes) exam (following §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**
Students shall be aware of issues concerning industrial production and sustainability and shall apply strategies to resolve these issues.

**Content**
The analysis and management of material flows on the company level and above will be the focus of this lecture. Herein, the discussion will be about cost-effective and environmentally acceptable steps to avoid, abate and recycle emissions and waste as well as ways of efficient resources handling. As methods material flow analysis (MFA), life cycle assessment (LCA) and OR methods, e.g. for decision support, are introduced.

Topics:
- regulations related to materials and substances
- raw materials, reserves and their availabilities/lifetimes
- material and substance flow analysis (MFA/SFA)
- material related ecoprofiles, e.g. Carbon Footprint
- LCA
- resource efficiency
- emission abatement
- waste management and closed-loop recycling
- raw material oriented production systems
- environmental management (EMAS, ISO 14001, Ecoprofit), eco-controlling

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

**Literature**
will be announced in the course
Course: Programming [24004]

Coordinators: R. Reussner
Part of the modules: Foundations in Informatics (p. 15)[IW1INF1]

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Learning Control / Examinations
Two assessments are required for the successful completion of this module.

- A certificate for the exercise (not graded, assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations) has to be obtained. If this assessment is failed, it can be repeated once. **This certificate is a compulsory prerequisite for the second part**, namely the
- successful completion of the two final exercises (assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations), to be submitted separately. If this assessment is failed, it can be repeated once in which case both final exercises have to be handed in again.

The grade of the module consists of the grade of the two final exercises.

Conditions
None.

Recommendations
Previous knowledge in java programming is recommended but not mandatory.

Learning Outcomes
Students should learn

- basic structures of the programming language Java and how to apply them; in particular control and simple data structures, object orientation and implementation of basic algorithms
- basics of programming methodology and the ability to autonomously write executable small to medium sized Java programs

Content
- objects and classes
- types, values and variables
- methods
- control structures
- recursion
- references, lists
- inheritance
- input and output
- exceptions
- programming methodology
- implementation of basic algorithms in Java (such as sorting algorithms)

Media
beamer, slides, blackboard, practice sheets

Literature

Elective literature:
B. Eckels: Thinking in Java. Prentice Hall 2006
J. Bloch: Effective Java, Addison-Wesley 2008
Course: Project Management in Practice [PMP]

Coordinators: K. Böhm, W. Schnober

Part of the modules: Introduction to Data and Information Management (p. 66) [IW3INGDI], Foundations of Information Systems (p. 67) [IW3INGIS], Information and Database Systems (p. 69) [IW3INIDS]

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Learning Control / Examinations
The assessment is an assessment according to sec. 4 subsec. 2 no 3. study and examination regulations and consists of several parts. These include presentations, project work, papers and seminar theses. The course will be assessed with “passed” or “failed” (according to sec. 7 subsec. 3 study and examination regulations). For passing the practical course, all partial exercises must have been passed successfully.

Conditions
None.

Learning Outcomes
At the end of the course, the participants:

- Know the principles of project management and are able to make use of them in real-world case studies.
- Have profound knowledge about project phases, principles of project planning, fundamental elements such as project charter & scope definitions, descriptions of project goals, activity planning, milestones, project-structure plans, agenda and cost planning and risk management. Further, they know principle elements of project implementation, crisis management, escalation and, last but not least, project-termination activities.
- Understand and are able to adopt the fundamentals of planning as well as the subjective factors which are relevant in a project. This includes topics such as communication, group processes, teambuilding, leadership, creative solution methods and risk-assessment methods.

The following key skills are taught:

- Project planning
- Project control
- Communication
- Leadership behavior
- Crisis management
- Identification of and solutions of difficult situations
- Team building
- Motivation (of oneself and of others)

Content

- General project conditions
- Project goals / creative methods for identifying project goals and priorities
- Project planning
- Activity planning
- Cost/time/resource planning
- Phase models
- Risk management
- Project control / success control / monitoring
- Crisis management
- Project termination / lessons learned

Media
Slides, SW-screenshots, misc. presentation techniques

Remarks
The course materials are partly in English. Places are limited, so please register with Prof. Böhm’s office. This course is offered every three semesters, with the next time being in the winter term 2010/2011.
Course: Undergraduate Seminar Information Systems [prosemis]

**Coordinators:** K. Böhm

**Part of the modules:** Seminar Module Informatics (p. 84)[IW3SEMINFO]

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**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 of the seminar will be the grade for the seminar thesis which can be increased or decreased by up to two grade points ("Notenstufen") according to the performance in the oral presentation. For further details please see the German version.

**Conditions**
None.

**Recommendations**
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 every summer semester one undergraduate seminar covering selected topics from the area of information systems (every undergraduate seminar at the “Lehrstuhl für Systeme der Informationsverwaltung” counts as “Undergraduate Seminar Information Systems”). For example, the topics can be in the following areas 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: [MCprosem]

Coordinators: M. Beigl, P. Jakimovski

Part of the modules: Seminar Module Informatics (p. 84)[IW3SEMINFO]

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Learning Control / Examinations

Conditions
None.

Learning Outcomes
Content
Course: Seminar: Cellular automata and discrete complex systems [24530]

Coordinators: R. Vollmar, T. Worsch
Part of the modules: Seminar Module Informatics (p. 84) [IW3SEMINFO]

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Learning Control / Examinations
The assessment consists of a written seminar thesis and a presentation thereof according to sec. 4 subsec. 2 no. 3 study and examination regulations. The grade is the average of the weighted single grades (generally 50% seminar thesis, 50% presentation).

Conditions
None.

Learning Outcomes
- Students get an introduction to doing scientific work in a specific area.
- The work for the proseminar also is a preparation for the bachelor thesis.
- Besides the scientific work key qualifications are acquired in an integrative way.

Content
Selected topics concerning cellular automata and discrete complex systems include CA as a parallel model, reversible CA, simulation of real phenomena by CA, infinite tilings, asynchronous logic, etc.

Literature
scientific papers
Course: Real Estate Management I [26400w]

Coordinators: T. Lützkendorf
Part of the modules: Real Estate Management (p. 49) [IW3BWLOOW2]

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Learning Control / Examinations
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place two times only in the semester in which the lecture is takes place (winter semester). Re-examinations are offered at every ordinary examination date.

Conditions
None.

Recommendations
A combination with the module Design Construction and Assessment of Green Buildings I [IW3BWLOOW1] is recommended. Furthermore it is recommended to choose courses of the following fields
- Finance and Banking
- Insurance
- Civil Engineering and Architecture (building physics, structural design, facility management)

Learning Outcomes
The student
- has a basic understanding of the specific characteristics of real estate and real estate markets
- is able to transfer and apply in-depth knowledge in the field of business administration to construction and real estate
- is able to analyze, evaluate or to meet decisions in the life cycle of real estate

Content
The course Real Estate Management I deals with questions concerning the economy of a single building throughout its lifecycle. Among other topics this includes project development, location and market studies, German federal building codes as well as finance and assessment of economic efficiency.

The tutorial recesses the contents of the course by means of practical examples and, in addition to that, goes into the possible use of software tools.

Media
Presentation slides and supplementary material is provided partly as printout, partly online for download.

Literature
Elective literature:

Remarks
The course is replenished by excursions and guest lectures by practitioners out of the real estate business.
Course: Real Estate Management II [2585400/2586400]

Coordinators: T. Lützkendorf

Part of the modules: Real Estate Management (p. 49)[IW3BWLOOW2]

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Learning Control / Examinations
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place two times only in the semester in which the lecture is takes place (summer semester). Reexaminations are offered at every ordinary examination date.

Conditions
None.

Recommendations
A combination with the module Design Construction and Assessment of Green Buildings I [IW3BWLOOW1] is recommended. Furthermore it is recommended to choose courses of the following fields

- Finance and Banking
- Insurance
- Civil Engineering and Architecture (building physics, structural design, facility management)

Learning Outcomes
The student

- has an in-depth knowledge on the economic classification and significance of the real estate industry
- has a critical understanding of essential theories, methods and instruments of the real estate industry
- is able to analyze and evaluate activity areas and functions in real estate companies as well as to prepare or to take decisions

Content
The course Real Estate Management II gives special attention to topics in connection to the management of large real estate portfolios. This especially includes property valuation, market and object rating, maintenance and modernization, as well as real estate portfolio and risk management. The tutorial provides examples in order to practice the application of theoretical knowledge to practical problems.

Media
Presentation slides and supplementary material is provided partly as printout, partly online for download.

Literature
Elective literature:
See german version.

Remarks
The course is replenished by excursions and guest lectures by practitioners out of the real estate business.
Course: Computer Organization [24502]


Part of the modules: Computer Engineering (p. 18)[IW2INF4]

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

Conditions
None.

Learning Outcomes
The students are to be enabled to

- gain fundamental knowledge of computer organization, i.e. the architecture and the operation principle of computer systems,
- understand the relationship between hardware concepts and their effects on the software, in order to build efficient programs,
- comprehend the fundamental principles of the design process and being able to apply them, based on the understanding of the interdependencies of technology, computer concepts and applications,
- build up a computer from basic components.

Content
This course deals with the fundamentals of computer organisation: the instruction set architecture in conjunction with the discussion RISC – CISC; pipelining, pipeline constraints and methods for the resolution of pipeline conflicts; memory organization, cache memory; I/O system and interface modules; interrupt handling; bus systems; support of operating system functions: virtual memory management and protection mechanisms.

Media
slides, practice sheets

Literature
Elective literature:

- D. Patterson, J. Hennessy: Rechnerorganisation und -entwurf; Deutsche Auflage. Herausgegeben von Arndt Bode, Wolfgang Karl und Theo Ungerer, Spektrum Verlag, 2006
- Th. Flick, H. Liebig: Mikroprozessortechnik; Springer-Lehrbuch, 5. Auflage 1998
Course: Computer Architecture [24570]

Coordinators: J. Henkel, W. Karl
Part of the modules: Computer Architecture (p. 79)[IW3INRS]

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Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Media
slides, work sheets

Literature

Elective literature:

Course: Financial Accounting and Cost Accounting [2600002]

| Coordinators: | T. Lüdecke |
| Part of the modules: | Business Administration (p. 22)[IW1BWL4], Foundations in Business Administration (p. 21)[IW1BWL1] |

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

Conditions
None.

Recommendations
It is recommended to have some skills about financial accounting on an introductory level.

Learning Outcomes
The student should learn advanced topics in accounting.

Content
1. Introduction to accounting standards (IFRS, HGB)
2. Annual report and financial statements
3. Selected topics in financial accounting
4. Operational efficiency analysis
5. Financial Statement Analysis
6. Value-based management
7. Taxes
8. Creative accounting and compliance
9. Budgeting and benchmarking
10. Reporting

Media
slides

Remarks
The content of this lecture was changed in the winter semester 2013/14 and is different from the content of its predecessors. Foundations of accounting is taught in Business Administration: Finance and Accounting since the winter semester 2012/13.
Course: Renewable Energy – Resources, Technology and Economics [2581012]

Coordinators: R. McKenna

Part of the modules: Energy Economics (p. 44)

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Learning Control / Examinations

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

Conditions

None.

Learning Outcomes

The student:

- understands the motivation and the global context of renewable energy resources.
- gains detailed knowledge about the different renewable resources and technologies as well as their potentials.
- understands the systemic context and interactions resulting from the increased share of renewable power generation.
- understands the important economic aspects of renewable energies, including electricity generation costs, political promotion and marketing of renewable electricity.
- is able to characterize and where required calculate these technologies.

Content

1. General introduction: Motivation, Global situation
2. Basics of renewable energies: Energy balance of the earth, potential definition
3. Hydro
4. Wind
5. Solar
6. Biomass
7. Geothermal
8. Other renewable energies
9. Promotion of renewable energies
10. Interactions in systemic context
11. Excursion to the “Energieberg” in Mühlburg

Media

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

Literature

Elective literature:

Course: Semantic Web Technologies [2511310]

Coordinators: R. Studer, A. Harth
Part of the modules: Semantic Web and Applications (p. 62), Information Services in Networks (p. 63), Semantic Knowledge Management (p. 61)

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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 are required.

Recommendations
None.

Learning Outcomes
The student
- understands the motivation and foundational ideas behind Semantic Web and Linked Data technologies, and is able to analyse and realise systems
- demonstrates basic competency in the areas of data and system integration on the web
- masters advanced knowledge representation scenarios involving ontologies

Content
"Semantic Web" denotes an extension of the World Wide Web with meta data and applications to make the meaning (semantics) of data on the web usable in intelligent systems, e.g. in e-commerce and internet portals. Central concepts are the representation and processing of knowledge in form of ontologies and the access via Linked Data. This lecture provides the foundations of knowledge representation and processing for the corresponding technologies and presents example applications. The following topics are covered:
- Resource Description Framework (RDF) and RDF Schema (RDFS)
- Web Architecture and Linked Data
- Web Ontology Language (OWL)
- Rule languages
- Applications

Media
Lecture notes.

Literature
See German version.

Remarks
The lecture supersedes the existing SWT-1 and SWT-2 lectures beginning from SS 2014. The exams SWT-1 and SWT-2 will be offered latest until winter term 2014/15.
Course: Seminar in Applied Informatics [25070s]

**Coordinators:** A. Oberweis, H. Schmeck, D. Seese, R. Studer, S. Tai

**Part of the modules:** Semantic Knowledge Management (p. 61)[IW3/INAFB2], Semantic Web and Applications (p. 62)[IW3/INAFB3]

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**Learning Control / Examinations**
The assessment is done according to §4(2), 3 of the examination regulation in form of an evaluation of the seminar presentation and a written seminar report. The weighting of the individual marks (presentation and report) is announced at the beginning of the seminar.

**Conditions**
None.

**Learning Outcomes**
Students

- do literature search based on a given topic, identify relevant literature and evaluate this literature,
- give presentations in a scientific context in front of an auditorium to present the results of the research,
- present results of the research in a seminar thesis as a scientific publication using format requirements such as those recommended by well-known publishers.

**Content**
The seminar intensifies and extends specific topics which are discussed within corresponding lectures. The actual topics are changing each semester. Knowledge of these lecture topics is an advantage but not a precondition.

**Media**
Slides, Access to internet resources

**Literature**
Literature will be given individually.

**Remarks**
The title of this course is a generic one. Specific titles and the topics of offered seminars will be announced before the start of a semester in the internet at http://www.aifb.uni-karlsruhe.de/Lehre
Course: Seminar in Cryptography [SemiKryp3]

Coordinators: J. Müller-Quade
Part of the modules: Seminar Module Informatics (p. 84)[IW3SEMINFO]

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Learning Control / Examinations

Conditions
None.

Learning Outcomes
The student

- deals with a restricted problem in the field of cryptography,
- analyzes and discusses the problems associated to a distinct discipline in the final seminar paper,
- discusses, presents and defends subject-specific arguments within a given task,
- organizes the preparation of the final papers largely independent.

Content
The seminar deals with current topics in the research field of cryptography. These are e.g.

- provable security
- side channel attacks;
- new Public-Key systems;
- quantum cryptography
Course: Seminar in Telematics [24074s]

Coordinators: M. Zitterbart, H. Hartenstein
Part of the modules: Seminar Module Informatics (p. 84)[IW3SEMINFO]

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

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 in Law [rechtsem]

Coordinators: T. Dreier
Part of the modules: Seminar Module Law (p. 85)[IW3SEMJURA]

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Learning Control / Examinations

Conditions
None.

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

Learning Outcomes
It is the goal of the seminar to enable students to independent scientific research regarding legal issues in the area of information management and engineering. The seminar covers legal issues of information law and commercial law, from internet law, the law of intellectual property, competition law and data protection law to contract law. The subjects to be discussed comprise issues of national, European and international law. Written papers shall also discuss the information technology issues and economic questions related to the legal problem at issue.

Content
The seminar covers legal issues of information law, from internet law, the law of intellectual property, competition law and data protection law to contract law. The subjects to be discussed comprise issues of national, European and international law. Each seminar focuses on a different set of issues. Written papers shall also discuss the information technology issues and economic questions related to the legal problem at issue. The current topics will be announced before start of term.
Students can participate in all seminars offered by the ZAR/IIR (however, students can participate in seminars of the master study cours, seminars in cooperation with the University of Freiburg and other specially marked seminars if special permission has been granted).

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

Literature
Tba in the lecture.
**Course: Seminar in Security [SemSich]**

**Coordinators:** J. Müller-Quade  
**Part of the modules:** Seminar Module Informatics (p. 84)[IW3SEMINFO]

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**Learning Control / Examinations**

**Conditions**
None.

**Learning Outcomes**
The student
- deals with a restricted problem in the field of computer security,
- analyzes and discusses the problems associated to a distinct discipline in the final seminar paper,
- discusses, presents and defends subject-specific arguments within a given task,
- organizes the preparation of the final papers largely independent.

**Content**
The seminar deals with current topics in the research field of computer security. These are e.g.
- Side channel attacks;
- Network security;
- Communication protocols;
Course: Seminar in Enterprise Information Systems [SemAIFB1]

Part of the modules: Seminar Module Informatics (p. 84) [IW3SEMINFO]

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Learning Control / Examinations
The assessment of this course is according to §4(2), 3 SPO in form of an examination of the written seminar thesis and a presentation.
The final mark is based on the examination of the written seminar thesis but can be upgraded or downgraded according to the quality of the presentation.
The seminar is for bachelor as well as master students. The differentiation will be made by selection of different topics and different standards of evaluation.

Conditions
See corresponding module information.

Learning Outcomes
Students
- do literature search based on a given topic, identify relevant literature and evaluate this literature,
- give presentations in a scientific context in front of an auditorium to present the results of the research,
- present results of the research in a seminar thesis as a scientific publication using format requirements such as those recommended by well-known publishers.

Content
The seminar intensifies and extends specific topics which are discussed within corresponding lectures. Knowledge of these lecture topics is an advantage but not a precondition.
Specific titles and the topics of offered seminars will be announced before the start of a semester in the internet at http://www.aifb.uni-karlsruhe.de/Lehre

Literature
Literature will be given individually in the specific seminar.
Course: Seminar Energy Economics [SemEW]

**Coordinators:** W. Fichtner, P. Jochem, D. Keles, R. McKenna, V. Bertsch

**Part of the modules:** Seminar Module Economic Sciences (p. 82)[IW3SEMWIWI]

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**Learning Control / Examinations**
Non exam assessment (following §4(2), 3 of the examination regulation).

**Conditions**
None.

**Learning Outcomes**
Students shall gain insights into selected research in energy economics.
- Students search for, identify, review and evaluate relevant literature.
- Students prepare their seminar thesis (and later on bachelor/master thesis) with a minimum expense in becoming acquainted with their topic and general layout.
- Students produce an oral presentation in a scientific context by using the outlined techniques of scientific presentation.
- Students learn to present their written results in an adequate form for scientific publishing.

Students in M.Sc. studies will have to put special emphasis on a critical discussion and evaluation of their topic, since they will have to look into actual scientific results in the field of energy economics.

**Content**
Course: Entrepreneurship Seminar [SemTuE1]

**Coordinators:** O. Terzidis

**Part of the modules:** Seminar Module Economic Sciences (p. 82)[IW3SEMWIWI]

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**Learning Control / Examinations**
See German version.

**Conditions**
None.

**Learning Outcomes**
The scope is depending on the seminars summarised hereunder.

**Content**
**Course: Seminar in Behavioral and Experimental Economics [n.n.]**

**Coordinators:** P. Reiss

**Part of the modules:** Seminar Module Economic Sciences (p. 82)[IW3SEMWIWI]

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**Learning Control / Examinations**

Students write (according to Section 4 (2), 3 SPO) a seminar paper on an assigned topic (15-20 pages), present it in class and discuss results during seminar sessions. These three elements are graded individually. The seminar grade is the weighted average of these individual grades where the weighting is announced on the course syllabus.

**Conditions**

None.

**Recommendations**

Basic knowledge of mathematics, statistics, microeconomics, and game theory is assumed.

**Learning Outcomes**

The student
- works independently on a topic in Experimental Economics and/or Behavioral Economics,
- gains experience with writing a scientific paper and presenting it in class, and with the discussion of scientific findings.

**Content**

Seminar topics are announced online at http://io.econ.kit.edu (-> Studium und Forschung).

**Media**

Slides.

**Literature**

A selection of published papers is compulsory reading for the course.

**Remarks**

Language: german or english.
Course: Seminar in Finance [2530280]

Coordinators: M. Uhrig-Homburg, M. Ruckes
Part of the modules: Seminar Module Economic Sciences (p. 82) [IW3SEMWIWI]

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Learning Control / Examinations
Conditions
None.

Recommendations
Knowledge of the content of the module Essentials of Finance [IW3BWLFBV1] is assumed.

Learning Outcomes
The student gets in touch with scientific work. Through profound working on a specific scientific topic the student is meant to learn the foundations of scientific research and reasoning in particular in finance. Through the presentations in this seminar the student becomes familiar with the fundamental techniques for presentations and foundations of scientific reasoning. In addition, the student earns rhetorical skills.

Content
Within this seminar different topics of current concern are treated. These topics have their foundations in the contents of certain lectures. The topics of the seminar are published on the website of the involved finance chairs at the end of the foregoing semester.

Literature
Will be announced at the end of the foregoing semester.
**Course: Seminar Financial Economics and Risk Management [2530353]**

**Coordinators:** M. Ulrich  
**Part of the modules:** Seminar Module Economic Sciences (p. 82) [IWSEM WIWI]

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**Learning Control / Examinations**  
See German version.

**Conditions**  
None.

**Learning Outcomes**

**Content**
Course: Seminar in Industrial Production [SemIIP2]

**Coordinators:** F. Schultmann, M. Fröhling

**Part of the modules:** Seminar Module Economic Sciences (p. 82) [IW3SEM/WIWI]

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**Learning Control / Examinations**
Assessment acc. to §4 (2), No.3 ER by assessing the written seminar thesis (approx. 20 pages), the oral presentation and active participation in public discussions. The final grade will be formed by weighing the individual assessment grades.

**Conditions**
Students should have completed the modules „Industrial Production I“ [IW3BWLIIP1], „Industrial Production II“ [WW4BWLIIP2] or “Industrial Production III“ [WW3BWLIIP6].

**Learning Outcomes**
Students shall gain insights into selected research of the Institute of Industrial Production (IIP).

- Students search for, identify, review and evaluate relevant literature.
- Students prepare their seminar thesis (and later on bachelor/master thesis) with a minimum expense in becoming acquainted with their topic and general layout.
- Students produce an oral presentation in a scientific context by using the outlined techniques of scientific presentation.
- Students learn to present their written results in an adequate form for scientific publishing.

Students in M.Sc. studies will have to put special emphasis on a critical discussion and evaluation of their topic, since they will have to look into actual scientific results in the field of industrial production.

**Content**
This seminar covers actual topics of industrial production, logistics, environmental science, project management and similar fields. We recommend a successful attendance of previous IIP modules (not compulsory!).

Actual topics covered in this seminar will be published before the start of semester.
Course: Seminar Information Engineering and Management  [SemIW]

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<th>Coordinators:</th>
<th>C. Weinhardt</th>
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**Learning Control / Examinations**
The assessment consists of a seminar paper, a presentation of the results and the contribution to the discussion (according to §4(2), 3 of the examination regulation). The final grade is based on the evaluation of each component (seminar paper, oral presentation, and active participation).

**Conditions**
See corresponding module information.

**Learning Outcomes**
Students are able to

- do literature search based on a given topic: identify relevant literature, find, assess and evaluate this literature.
- write the seminar thesis (and later the Bachelor-/Masterthesis) with a minimal learning curve by using format requirements such as those recommended by well-known publishers.
- give presentations in a scientific context in front of an auditorium. These techniques are presented and learned during the seminar.
- present results of the research in written form generally found in scientific publications.

**Content**
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 an interdisciplinary examination.

**Media**
- PowerPoint
- E-learning 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: www.iism.kit.edu/im/lehre.
**Course: Seminar Internet Services [xIDLs]**

**Coordinators:** H. Schmeck, S. Tai, R. Studer, H. Hartenstein, W. Tichy

**Part of the modules:** Seminar Module Informatics (p. 84) [IW3SEMINFO]

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**Learning Control / Examinations**

The success monitoring is based on a presentation about a research topic from the current topic of the seminar followed by a discussion, and a written summary as well as active participation in discussions (in accordance with §4(2),3 of SPO Informationswirtschaft).

**Conditions**

A seminar can be chosen with one of the Professors participating in this module.

**Learning Outcomes**

Students will

- conduct a literature search based on a given topic and identify, find, evaluate and analyze the relevant literature
- Prepare their seminar paper (and later their Bachelor/Master thesis) with minimal familiarization effort while obeying format requirements like the ones provided by publishers when publishing documents
- Prepare presentations in a scientific context. Therefore techniques are introduced facilitating the preparation of content in a manner that is appropriate for the audience
- Present the results of their research in written form in a manner that is generally used in scientific publications

**Content**

The seminar deals with specific topics that were partly mentioned in the respective lecture and deepens students’ knowledge. Previously attending the lecture is recommended but not a prerequisite.
Course: Seminar Management Accounting [2579904]

Coordinators: M. Wouters
Part of the modules: Seminar Module Economic Sciences (p. 82)[IW3SEMWIWI]

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Learning Control / Examinations
The final grade of the course is the grade awarded to the paper.

Conditions
The LV “Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen” (2600026) must have been completed before starting this seminar.

Learning Outcomes
Students are familiar with topics in management accounting literature and practice that are most relevant to their studies and to their research projects.

Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. You are to a large extent free to select your own topic. The seminar course is concentrated in four meetings that are spread throughout the semester.

Meeting 1: Introductory lecture. You need to conduct a first literature search and at the end of the first week you should identify (provisionally) the topic for your paper.

Meeting 2 and 3: The purpose of the second week is to define the topics and research questions in much more detail. Different types of papers may be selected: literature review, research paper, descriptive case study, or teaching case. Students will present their ideas and all participants should ask questions, help each other focus, offer ideas, etc.

Meeting 4: In the third week we are going to present and discuss the final papers.

Literature
Will be announced in the course.

Remarks
Maximum of 24 students.
Course: Seminar on Morals and Social Behavior [2560141]

**Coordinators:** N. Szech

**Part of the modules:** Seminar Module Economic Sciences (p. 82)

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**Learning Control / Examinations**

Students write a seminar paper on an assigned topic (10 pages), present it in class and discuss results during seminar sessions. These three elements are graded individually. The seminar grade is the weighted average of these individual grades where the weighting is announced on the course syllabus.

**Conditions**
None.

**Recommendations**
None.

**Learning Outcomes**

The students
- look critically into current research topics in the field of morals and social behavior in relevant economic contexts.
- train their presentation skills.
- learn to get their ideas across in a focused and concise way, both in oral and written form.
- cultivate the economic discussion of research approaches.

**Content**

Seminar topics are announced online at http://polit.econ.kit.edu.

**Literature**

A selection of published papers and books.

**Remarks**

The seminar will be held in English.
Course: Seminar on Topics in Political Economics [2560140]

Coordinators: N. Szech
Part of the modules: Seminar Module Economic Sciences (p. 82)[iW3SEMWIWI]

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Learning Control / Examinations
Students write a seminar paper (about 10 pages), present it in class and discuss results during seminar sessions. These three elements are graded individually. The seminar grade is the weighted average of these individual grades where the weighting is announced on the course syllabus.

Conditions
None.

Recommendations
None.

Learning Outcomes
The students
- look critically into current research topics in Political Economics.
- train their presentation skills.
- learn to get their ideas across in a focused and concise way, both in oral and written form.
- cultivate the economic discussion of research approaches.

Content
Seminar topics are announced online athttp://polit.econ.kit.edu

Literature
A selection of published papers and books.

Remarks
The seminar will be held in English.
Course: Seminar Risk and Insurance Management [SemFBV1]

Coordinators: U. Werner
Part of the modules: Seminar Module Economic Sciences (p. 82) [IW3SEMWIWI]

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Learning Control / Examinations

Conditions
See corresponding module information.
The seminar is held within the courses of Risk and Insurance Management and Insurance Management ([IW3BWLFBV3], [WW3BWLFBV4] and [WW4BWLFBV6/7], respectively.
A course taken as a seminar cannot be chosen as a part of a course module (and vice versa).

Recommendations
The seminar fits well with the bachelor modules Risk and Insurance Management [IW3BWLFBV3] as well as with the master modules Insurance Management I [WW4BWLFBV6] and Insurance Management II [WW4BWLFBV7]. These modules, though, are not required to be taken.

Learning Outcomes
See German version.

Content
The seminar is offered within the following courses:
- Principles of Insurance Management
- Insurance Marketing
- Insurance Production
- Risk Communication
- Insurance Risk Management
- Enterprise Risk Management
- Modeling, Measuring and Management of Extreme Risks
- Current Issues in the Insurance Industry

For their contents refer to the information given for these courses.

Literature
Will be announced at the beginning of the lecture period.

Remarks
Some of the courses mentioned above are offered on demand. For further information, see: http://insurance.fbv.kit.edu.
To attend the course please register with the secretary of the chair: thomas.mueller3@kit.edu
Course: Seminar Software Systems [SWSSem]

**Coordinators:** R. Reussner

**Part of the modules:** Seminar Module Informatics (p. 84) [IW3SEMINFO]

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**Learning Control / Examinations**

**Conditions**
None.

**Learning Outcomes**
The students can

- conduct literature search for a given topic and can identify, locate, assess and evaluate the relevant literature.
- present the research results in a written form similar to scientific publications.
- write their papers with minimal effort, taking formatting and length requirements, as they are set by all publishers of scientific publications, into consideration.
- learn to cite related work in a scientific way and learn to create auditorium-appropriate presentations in the context of a scientific topic.
- achieve knowledge about techniques and tools for systematic software engineering, such as software design, software architectures, predictions of functional and extra-functional properties of software, documentation, testing, etc.

**Content**
This course treats cutting-edge research topics from the area of software systems, i.e. software engineering and performance engineering.
Course: Seminar Software Engineering [SWTSem]

Coordinators: W. Tichy, R. Reussner, G. Snelting

Part of the modules: Seminar Module Informatics (p. 84)[IW3SEMINFO]

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Learning Control / Examinations

Conditions
Basic knowledge of software engineering from lectures or practical experience is required.
Ability to create programs with low complexity and knowledge of an object-oriented programming language (e.g. Java, C#, or C++) are required.
Knowledge of the English terminology is required.

Learning Outcomes
The students will

• independently research literature for a given topic. This includes searching and identifying relevant literature as well as evaluating and interpreting its content.
• learn to optimize the time needed to cope with the relevant parts of the concrete topic.
• write a term paper that complies with formatting rules (as they will be enforced by all publishers for common publications).
• prepare a presentation for a scientific topic. We will discuss techniques that help to prepare and present the contents with respect to the targeted audience.

write down the results of their research similar to the form of a scientific publication.

Content
The seminar covers topics of recent research in the field of software engineering.
Course: Seminar Statistics [SemSTAT]

**Coordinators:** N.N.
**Part of the modules:** Seminar Module Economic Sciences (p. 82)[IWSEMWIWI]

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**Learning Control / Examinations**
Non exam assessment (following §4(2), 3 of the examination regulation).

**Conditions**
None.

**Learning Outcomes**
Content
Course: Seminar Stochastic Models [SemWIOR1]

<table>
<thead>
<tr>
<th>Coordinators:</th>
<th>K. Waldmann</th>
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<tr>
<td>Part of the modules:</td>
<td>Seminar Module Economic Sciences (p. 82)[IW3SEMWIWI]</td>
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**Learning Control / Examinations**
The assessment of this course is in form of an examination of the written seminar thesis and a presentation. The final mark is the result of both the paper and its presentation.

**Conditions**
None.

**Learning Outcomes**
See German version.

**Content**
The actual topic as well as the contemporary issues are available online.

**Media**
Power Point and related presentation techniques.

**Literature**
Will be presented with the actual topic.
Course: Seminar Knowledge Management [SemAIFB4]

Coordinators: R. Studer
Part of the modules: Seminar Module Informatics (p. 84) [IW3SEMINFO]

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Learning Control / Examinations
The success monitoring is done through a presentation about a research topic from the current topic of the seminar (45-60 minutes) followed by a discussion, a written summary of the main points (approx. 15 pages) and of active participation in discussions (in accordance with §4(2),3 SPO).

The total mark is composed of the graded and weighted success controls (50% lecture, 30% written paper, and 20% participation and discussion.

The seminar can be attended by both bachelor and master students. A differentiation is made by different topic assignment and evaluation standards for seminar paper and presentation.

Conditions
See module description.

Learning Outcomes
The students will learn to perform literature searches on current topics in computer science and holistic knowledge management as well as preparing and presenting the contents of scientific publications.

During the work on the seminar topics the master students will deepen their skills to autonomously comprehend current scientific knowledge and to convey it to others through oral presentations and written summaries.

Through active participation in the seminar, students acquire skills in critical appraisal of research topics and in oral and written presentation of independently developed research content.

Content
Each year, the seminar will cover topics from a different selected subfield of knowledge management, e.g.:

- Ontology-based knowledge management,
- Information Retrieval and Text Mining,
- Data Mining,
- Personal Knowledge Management,
- Case Based Reasoning (CBR),
- Collaboration and Social Computing,
- Business-process Oriented Knowledge Management.

Media
Slides.

Literature


Remarks
The number of students is limited. Students have to observe the designated registration process.
Course: Seminar in strategic and behavioral marketing [2572197]

**Coordinators:** B. Neibecker

**Part of the modules:** Seminar Module Economic Sciences (p. 82)[IW3SEMWIWI]

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**Learning Control / Examinations**
The student is evaluated based on the written work, a presentation of the results in front of an audience and his contribution to the discussion.

**Conditions**
None.

**Learning Outcomes**
At the seminar (with a "Referat" as its goal) the student should be able to do a literature review based on a predefined topic in the context of marketing research. The approach comprises the identification of relevant literature according to the topic and an analysis as well as an evaluation of the methods presented in the literature. The student learns to present his results in a paper and in front of an audience on an academic level.

**Content**
In the seminar the student should learn to apply the research methods to a predefined topic area. The topics are based on research questions in marketing. This problem analysis requires an interdisciplinary examination. As a special option, the implementation of methodological solutions for market research can be accomplished and discussed with respect to its application.

**Literature**
Will be allocated according the individual topics.

**Remarks**
Students from Bachelor and Master Course can visit the seminar. The research topic as well as the evaluation of the work and the presentation will have a different focus between Bachelor and Master Course.
Course: Seminar in Discrete Optimization [2550491]

**Coordinators:** S. Nickel
**Part of the modules:** Seminar Module Economic Sciences (p. 82)[IW3SEMWIWI]

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**Learning Control / Examinations**
The assessment consists of a written seminar thesis of 20-25 pages and a presentation of 35-40 minutes (according to §4(2), 3 of the examination regulation).
The final mark for the seminar consists of the seminar thesis, the seminar presentation, the handout, and if applicable further material such as programming code.
The seminar can be attended both by Bachelor and Master students. A differentiation will be achieved by different valuation standards for the seminar thesis and presentation.

**Conditions**
Successful completion of the module *Introduction to Operations Research* [IW1OR].

**Learning Outcomes**
The student
- illustrates and evaluates classic and current research questions in discrete optimization,
- applies optimization models and algorithms in discrete optimization, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management),
- successfully gets in touch with scientific working by an in-depth working on a special scientific topic which makes the student familiar with scientific literature research and argumentation methods,
- acquires good rhetorical and presentation skills.

As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic.

**Content**
The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Dates will be announced on the internet.

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

**Remarks**
The seminar is offered in each term.
Course: Seminar in Experimental Economics [SemWIOR3]

Coordinators: N. N.
Part of the modules: Seminar Module Economic Sciences (p. 82)[IW3SEMWIWI]

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Learning Control / Examinations
Term paper and presentation

Conditions
See corresponding module information.
A course in the field of Game Theory should be attended beforehand.

Learning Outcomes
The seminar wants to deepen the methods of scientific work. Students shall learn to discuss critical the latest research results in Experimental Economics.
Students learn the technical basics of presentation and to argument scientifically. Also rhetoric skills shall be amplified.

Content
The seminar’s topic will be announced before the beginning of each semester on the internet (http://www.wior.uni-karlsruhe.de/LS_Berninghaus/Studium/).

Media
Slides.

Literature
Will be announced at the end of the recess period.
Course: Seminar in Continuous Optimization [2550131]

**Coordinators:** O. Stein

**Part of the modules:** Seminar Module Economic Sciences (p. 82) [IW3SEMWIWI]

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**Learning Control / Examinations**

The assessment is composed of a 15-20 page paper as well as a 40-60 minute oral presentation according to §4(2), 3 of the examination regulation.

The total grade is composed of the equally weighted grades of the written and oral assessments.

The seminar is appropriate for bachelor as well as for master students. Their differentiation results from different assessment criteria for the seminar paper and the seminar presentation.

**Conditions**

See corresponding module information.

Attendance is compulsory.

Preferably at least one module offered by the institute should have been chosen before attending this seminar.

**Learning Outcomes**

The seminar aims at describing, evaluating, and discussing recent as well as classical topics in continuous optimization. The focus is on the treatment of optimization models and algorithms, also with respect to their practical application.

The student is introduced to the style of scientific work. By focussed treatment of a scientific topic the student learns the basics of scientific investigation and reasoning.

For further development of a scientific work style, master students are particularly expected to critically question the seminar topics.

With regard to the oral presentations the students become acquainted with presentation techniques and basics of scientific reasoning. Also rhetoric abilities may be improved.

**Content**

The current seminar topics are announced under http://kop.ior.kit.edu at the end of the preceding semester.

**Literature**

References and relevant sources are announced at the beginning of the seminar.
Course: Seminar: Management and Organization [2577915]

**Coordinators:** H. Lindstädt

**Part of the modules:** Seminar Module Economic Sciences (p. 82)[IW3SEMWIWI]

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**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: Security [24941]

**Coordinators:** D. Hofheinz  
**Part of the modules:** Security (p. 75) [IW3INSICH]

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

## Conditions
None.

## Learning Outcomes
The student

- knows the theoretic background and the basic mechanisms of computer security and cryptography
- understands the mechanisms of computer security and can explain them,
- can read and understand the current scientific papers,
- can evaluate the safety procedures and can recognize hazards,
- can adapt mechanisms of computer security to new environment.

## Content

- Theoretical and practical aspects of computer security
- Development of safety goals and classification of threats
- Presentation and comparison of different formal access control models
- Formal description of authentication systems, presentation and comparison of different authentication methods (passwords, biometrics, challenge-response protocols)
- Analysis of typical vulnerabilities in programs and web applications and development of appropriate protective protection methods / avoidance strategies
- Introduction to key management and Public Key Infrastructure
- Presentation and comparison of current safety certifications
- Block ciphers, hash functions, digital signature, public key encryption and digital signatures (RSA, ElGamal), and various methods of key exchange (e.g., Diffie-Hellman)
- Furthermore, an introduction to provable security is provided, which presents some of the key security concepts (e.g. IND-CCA).
- Presentation of combinations of cryptographic modules using currently used protocols such as Secure Shell (SSH) and Transport Layer Security (TLS).
Course: Simulation I [2550662]

Coordinators: K. Waldmann

Part of the modules: Stochastic Methods and Simulation (p. 60)[IW3OR7], Applications of Operations Research (p. 57)[IW3ORS]

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Learning Control / Examinations
The assessment consists of an 1h written exam according to Section 4(2), 1 of the examination regulation. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.6 (according to Section 4(2), 3 of the examination regulation).

Conditions
None.

Learning Outcomes
See German version.

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

Elective literature:

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.
Course: Simulation II [2550665]

Coordinators:  K. Waldmann
Part of the modules:  Stochastic Methods and Simulation (p. 60)[IW3OR7]

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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 0.6 (according to Section 4(2), 3 of the examination regulation).

Conditions
Foundations in the field of Simulation I[2550662] are desired.

Learning Outcomes
See German version.

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

Elective literature:

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.
Course: Software Laboratory: OR Models I [2550490]

Coordinators: S. Nickel
Part of the modules: Applications of Operations Research (p. 57) [IW3OR5]

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

Learning Control / Examinations
The assessment is a 120 minutes examination, including a written and a practical part (according to §4(2), 1 of the examination regulation).
The examination is held in the term of the software laboratory and the following term.

Conditions
Firm knowledge of the contents from the lecture Introduction to Operations Research I [2550040] of the module Operations Research [WI1OR].

Learning Outcomes
The student
- evaluates the possibilities of computer usage in practical applications of Operations Research,
- is capable of classifying and utilizing the general possibilities and fields of usage of modeling and implementation software for solving OR models in practice,
- models and solves problems arising in industry applications with the aid of computer-supported optimization methods.

Content
After an introduction to general concepts of modelling tools (implementation, data handling, result interpretation, ...), the software IBM ILOG CPLEX Optimization Studio and the corresponding modeling language OPL will be discussed which can be used to solve OR problems on a computer-aided basis.
Subsequently, a broad range of exercises will be discussed. The main goals of the exercises from literature and practical applications are to learn the process of modeling optimization problems as linear or mixed-integer programs, to efficiently utilize the presented tools for solving these optimization problems and to implement heuristic solution procedures for mixed-integer programs.

Remarks
Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course. The lecture is offered in every winter term. The planned lectures and courses for the next three years are announced online.
Course: Software Engineering I [24518]

**Coordinators:**
W. Tichy, Korbinian Molitorisz

**Part of the modules:**
Software Engineering I (p. 76)[IW3INSWT1]

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**Learning Control / Examinations**
The assessment consists of a 60 minute written exam according to sec. 4 subsec. 2 no. 1 study and examination regulations. In addition the student needs to obtain a certificate for the exercise (not graded) as an assessment according to section 4 subsection 2 no. 3 study and examination regulations.

**Conditions**
Successful completion of the module *Foundations in Informatics* [IW1INF1] is mandatory.

**Learning Outcomes**
The students acquire basic knowledge about the principles, methods and tools of software engineering. They learn how to build and to maintain complex software systems in a systematic way.

**Content**
The content of the lecture is the entire lifecycle of software, spanning project planning, system analysis, cost estimation, design, implementation, validation, verification, and finally the maintaining of software. The covered topics include UML, design patterns, software tools, programming environments and configuration control/versioning systems.

**Media**
slides (pdf), practice sheets

**Literature**

**Elective literature:**

- Objektorientierte Softwaretechnik : mit UML, Entwurfsmustern und Java / Bernd Brügge ; Allen H. Dutoit

- Lehrbuch der Software-Technik · Software Entwicklung / Helmut Balzert

- Software engineering / Ian Sommerville. - 7. ed.
  Boston ; Munich [u.a.] : Pearson, Addison-Wesley, 2004. - XXII, 759 S.
  (International computer science series), ISBN 0-321-21026-3

- Design Patterns: Elements of Reusable Object-Oriented Software / Gamma, Erich and Helm, Richard and Johnson, Ralph and Vlissides, John, Addison-Wesley 2002

- C# 3.0 design patterns : [Up-to-date for C#3.0] / Judith Bishop
  Beijing ; Köln [u.a.] : O'Reilly, 2008. - XXI, 290 S.
Course: Software Engineering II [24076]

**Coordinators:** R. Reussner, W. Tichy, A. Koziolek

**Part of the modules:** Software Engineering II (p. 77) [IW3INSWT2]

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**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.

**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: Special Topics in Management Accounting [2579905]

Coordinators: M. Wouters, S. Morales, M. Kirchberger

Part of the modules: Seminar Module Economic Sciences (p. 82)[IW3SEMWIWI]

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Learning Control / Examinations
The final grade of the course is the grade awarded to the paper.

Conditions
The LV “Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen” (2600026) must have been completed before starting this seminar.

Learning Outcomes
Students are familiar with topics in management accounting literature and practice that are most relevant to their studies and to their research projects.

Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in four meetings that are spread throughout the semester.

Meeting 1: Introductory lecture. You need to conduct a first literature search and at the end of the first week you should identify (provisionally) the topic for your paper.

Meeting 2 and 3: The purpose of the second week is to define the topics and research questions in much more detail. Different types of papers may be selected: literature review, research paper, descriptive case study, or teaching case. Students will present their ideas and all participants should ask questions, help each other focus, offer ideas, etc.

Meeting 4: In the third week we are going to present and discuss the final papers.

Literature
Will be announced in the course.

Remarks
Maximum of 24 students.
Course: Special Topics in Information Engineering & Management [2540498]

Coordinators: C. Weinhardt
Part of the modules: eBusiness and Service Management (p. 33)[IW3BWLISM1]

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Learning Control / Examinations
The assessment of this course is according to §4(2), 3 SPO in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class. Please take into account that, beside the written documentation, also a practical component (such as a survey or an implementation of an application) is part of the course. Please examine the course description for the particular tasks. The final mark is based on the graded and weighted attainments (such as the written documentation, presentation, practical work and an active participation in class)

Conditions
None.

Learning Outcomes
Students are able to

- do literature search based on a given topic: identify relevant literature, find, assess and evaluate this literature.
- do additional practical components in order to apply scientific methods (e.g., case studies, software implementations, surveys, or experiments).
- write the seminar thesis (and later the Bachelor-/Masterthesis) with a minimal learning curve by using format requirements such as those recommended by well-known publishers.
- give presentations in a scientific context in front of an auditorium. These techniques are presented and learned during the seminar.
- present results of the research in written form generally found in scientific publications.

Content
In this course the student should learn to apply the search methods to a predefined topic area. The topics are based on research questions in Information Engineering and Management across different industry sectors. This problem analysis requires an interdisciplinary examination. Experiments, case studies or software development can be part of the practical work that offers the students an opportunity to get a deeper insight into the field of Information Engineering and Management. The course also encompasses a documentation of the implemented work.

Media
- PowerPoint
- E-learning platform ILIAS
- Software tools for development, if needed

Literature
The basic literature will be made available to the student according to the respective topic.

Remarks
All the practical seminars offered at the chair of Prof. Dr. Weinhardt can be chosen in the Special Topics in Information Engineering & Management course. The current topics of the practical seminars are available at the following homepage: www.ism.kit.edu/im/lehre
The Special Topics Information Engineering and Management is equivalent to the practical seminar, as it was only offered for the major in “Information Management and Engineering” so far. With this course students majoring in “Industrial Engineering and Management” and “Economics Engineering” also have the chance of getting practical experience and enhance their scientific capabilities.

The Special Topics Information Engineering and Management can be chosen instead of a regular lecture (see module description). Please take into account, that this course can only be accounted once per module.
Course: Special Topics of Enterprise Information Systems [SBI]

Coordinators: A. Oberweis

Part of the modules: Business Processes and Information Systems (p. 65)[IW3INAIFB8]

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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

- explain basic knowledge and concepts in a subarea of “Enterprise Information Systems”,
- apply methods and instruments in a subarea of “Enterprise Information Systems”,
- choose the appropriate methods to solve given problems and apply them,
- find and discuss arguments for solution approaches.

Content
This course is a placeholder for special courses that are offered in an irregular sequence and cover selected topics in the field of enterprise information systems. These topics include in particular the design and the management of database systems, the computer-support of business processes and strategic planning of information systems and their organization.

Literature
Will be announced at the beginning of the course.
Course: Special Topics of Efficient Algorithms [25700sp]

Coordinators:  
H. Schmeck

Part of the modules:  
Algorithms and Applications (p. 64)[IW3INAIFB5]

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Learning Control / Examinations
The assessment consists of assignments or of a bonus exam (wrt §4 (2), 3 SPO), and a written exam (60 min.) in the week after the end of the lecturing period wrt (§4 (2), 1 SPO). The exam will be offered in every semester and can be repeated on regular examination dates.
If the mark obtained in the written exam is in between 1.3 and 4.0, a successful completion of the assignments or the bonus exam will improve the mark by one level (i.e. by 0.3 or 0.4).

Conditions
None.

Learning Outcomes
The student will learn how to use methods and concepts of efficient algorithms and how to demonstrate adequate innovative capabilities with respect to the used methods.
This course emphasizes the teaching of advanced concepts in relation to their applicability in the real world. Based on a fundamental understanding of the covered concepts and methods, students should know how to select appropriate concepts and methods for problem settings in their professional life, and, if necessary, to extend and apply them in an adequate form. The students should be enabled to find adequate arguments for justifying their chosen problem solutions.

Content
This course emphasizes the new topics in the area of algorithms, data structures, and computer infrastructures. The exact topics can vary according to the audiences and the time it is held.

Literature
Elective literature:
Will be announced in the lecture.

Remarks
This course can be particularly used for recognising the external courses with the topics in the area of algorithms, data-structures and computer infrastructures but are not associated in other courses in this subject area.
Course: Special Topics of Knowledge Management [25860sem]

| Coordinators: | R. Studer |
| Part of the modules: | Semantic Knowledge Management (p. 61)[IW3INAIFB2] |

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**Learning Control / Examinations**
Assessment is provided by a written exam of 60 minutes or an oral exam during the first few weeks after the lecturing period (acc. to §4(2), 1 or 2 SPO). The exam is offered each semester and may be repeated at the regular examination day.

**Conditions**
The lecture *Angewandte Informatik I - Modellierung* [2511030] is a prerequisite.

**Learning Outcomes**
The lecture serves as placeholder for course achievements abroad. The students acquire the skills, methods and tools in one specialized topic of “knowledge management” to demonstrate their mastery and innovativeness. The lecture aims at providing principles and methods in the context of the practical application of KM. On the basis of a fundamental understanding of concepts, methods, and tools, students will be able to work on advanced problems. The students will be able to find and argue for solutions of KM problems.

**Content**
The lecture serves as placeholder for course achievements abroad. The lecture deals with special topics in the area of knowledge management (incl. Knowledge Discovery and Semantic Web). The lecture deepens one of the following topics:

- Dynamic and Interoperable Systems in Knowledge Management
- Personal and Process-oriented Knowledge Management
- Formal Concept Analysis
- Semantic Search and Text Mining
- Combination of Social Software and Semantic Web

**Literature**

*Elective literature:*
Depends on the actual content.
## Course: Specific Aspects in Taxation [2561129]

**Coordinators:** B. Wigger, Armin Bader  
**Part of the modules:** Topics in Finance I (p. 46)[IW3BWLFBV5]  

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### Learning Control / Examinations
The assessment consists of an 1h written exam following Art. 4, para. 2, clause 1 of the examination regulation. The grade for this course equals the grade of the written exam.

### Conditions
None.

### Recommendations
Knowledge of the collection of public revenues is assumed. Therefore it is recommended to attend the course “Öffentliche Einnahmen” beforehand.

### Learning Outcomes
See German version.

### Content
The lecture „Special Aspects of Taxation“ focuses on the effects of different taxes. The main emphasis is on German tax legislation. In addition to that, international aspects of taxation, in particular with respect to the European integration, will be discussed.

The lecture consists of four parts: First specific tax problems of corporate, income and consumption taxes are treated. Part two introduces the advantages and disadvantages of each of these taxes, in particular their incidence (“Who actually carries the tax burden?”) and their effects within the value chain. The third part then deals with the question how the different taxes contribute to public revenues. Finally, the last part compares tax systems within and outside Europe.

As a special feature, guest lecturers will provide insight into practical aspects of taxation.

### Literature
**Elective literature:**

Course: Facility Location and Strategic Supply Chain Management [2550486]

Coordinators: S. Nickel
Part of the modules: Supply Chain Management (p. 35)[IW3WISM2], Methodical Foundations of OR (p. 59)[IW3OR6], Applications of Operations Research (p. 57)[IW3OR5]

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Learning Control / Examinations
The assessment consists of a written exam (120 min) according to Section 4 (2), 1 of the examination regulation. The exam takes place in every semester. Prerequisite for admission to examination is the successful completion of the online assessments.

Conditions
Prerequisite for admission to examination is the successful completion of the online assessments.

Learning Outcomes
The student
- knows and describes basic quantitative methods in location planning in the context of strategic Supply Chain Planning,
- applies several criteria for the evaluation of the locations of facilities in the context of classical location planning models (planar models, network models and discrete models) and advanced location planning models designed for Supply Chain Management (single-period and multi-period models),
- implements the considered models in practical problems.

Content
Since the classical work “Theory of the Location of Industries” of Weber from 1909, the determination of an optimal location of a new facility with respect to existing customers is strongly connected to strategic logistics planning. Strategic decisions concerning the location of facilities as production plants, distribution centers or warehouses are of high importance for the rentability of supply chains. Thoroughly carried out, location planning allows an efficient flow of materials and leads to lower costs and increased customer service.

Subject of the course is an introduction to the most important terms and definitions in location planning as well as the presentation of basic quantitative location planning models. Furthermore, specialized location planning models for Supply Chain Management will be addressed as they are part in many commercial SCM tools for strategic planning tasks.

Literature
Elective literature:
- Love, Morris, Wesolowsky: Facilities Location: Models and Methods, North Holland, 1988

Remarks
The lecture is held in every winter term. The planned lectures and courses for the next three years are announced online.
Course: Statistics and Econometrics in Business and Economics [2521325/2521326]

Coordinators: W. Heller
Part of the modules: Statistical Applications of Financial Risk Management (p. 56)[IW3VWL]

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

Learning Control / Examinations
See German version.

Conditions
Basic knowledge in statistics is required.

Learning Outcomes
statistically accurate use of financial market data, particularly time series analysis
Evaluation of various time series models and their applicability

Content
In Part 1 we will provide a thorough description of the quantitative part of investment theory paying attention to the mathematical, probabilistic and statistical methods now widely used in financial practice.
In Part 2 we shall study the methods of construction, identification and verification of the time-series models, which are among the most powerful instruments of the financial econometrics. The emphasis will be on the financial and economic indicators forecasting the financial time-series.

Media
transparencies lecture

Literature

• Franke/Härdle/Hafner : Einführung in die Statistik der Finanzmärkte.
• Ruppert: Statistics and Finance
• Cochran J.H. : Time Series for Macroeconomics and Finance

Elective literature:
See reading list
Course: Statistics I [2600008]

Coordinators: W. Heller

Part of the modules: Statistics (p. 26)[IW1STAT]

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Learning Control / Examinations
The assessment consists of a written exam according to Section 4 (2), 1 of the examination regulation. The exam takes place at the end of the lecture period or at the beginning of the recess period. The re-examination takes place in the following semester.

Conditions
None.

Learning Outcomes
The student understands and applies

- the basic concepts of statistical data exploration,
- the basic definitions and theorems of probability theory.

Content
A. Descriptive Statistics: univariate and bivariate analysis
B. Probability Theory: probability space, conditional and product probabilities

Media
lecture notes

Literature
Skriptum: Kurzfassung Statistik I

Elective literature:
Course: Statistics II [2600020]

**Coordinators:** W. Heller  
**Part of the modules:** Statistics (p. 26)[IW1STAT]

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**Learning Control / Examinations**
The assessment consists of a written exam according to Section 4 (2), 1 of the examination regulation. The exam takes place at the end of the lecture period or at the beginning of the recess period. The re-examination takes place in the following semester.

**Conditions**
None.

**Recommendations**
It is recommended to attend the course Statistics I [2600008] before the course Statistics II [2600020].

**Learning Outcomes**
Probability theory (continued), introduction to estimation and testing theory

**Content**
B. Probability Theory:
- transformation of probabilities,  
- parameters of location and dispersion,  
- most important discrete and continuous distributions,  
- covariance and correlation,  
- convolution and limit distributions

C. Theory of estimation and testing:
- sufficiency of statistics,  
- point estimation (optimality, ML-method),  
- internal estimations,  
- theory of tests (optimality, most important examples of tests)

**Media**
lecture notes

**Literature**
Script: Kurzfassung Statistik II  
**Elective literature:**
Course: Markov Decision Models I [2550679]

**Coordinators:** K. Waldmann

**Part of the modules:** Stochastic Methods and Simulation (p. 60)[IW3OR7], Methodical Foundations of OR (p. 59)[IW3OR6]

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**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 0.6 (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**

**Elective literature:**

Bremaud, P. (1999): Markov Chains, Gibbs Fields, Monte Carlo Simulation, and Queues; Springer
**Course: Markov Decision Models II [2550682]**

**Coordinators:** K. Waldmann

**Part of the modules:** Stochastic Methods and Simulation (p. 60)[IW3OR7]

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**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 0.6.

**Conditions**
Foundations in the field of the Markov Decision Models I [2550679] are desired.

**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**

**Elective literature:**

**Remarks**
The lecture is offered irregularly. The curriculum of the next two years is available online.
Course: Tactical and Operational Supply Chain Management [2550488]

Coordinators: S. Nickel
Part of the modules: Stochastic Methods and Simulation (p. 60)[IW3OR7], Applications of Operations Research (p. 57)[IW3OR5], Supply Chain Management (p. 35)[IW3BWLISM2]

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Learning Control / Examinations
The assessment consists of a written exam (120 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every the semester. Prerequisite for admission to examination is the succesful completion of the online assessments.

Conditions
Successful completion of the module Introduction to Operations Research [IW1OR].

Learning Outcomes
The student
- gathers expertise in fundamental techniques from procurement and distribution logistics, methods from inventory management and lot sizing,
- acquires the ability to efficiently utilize quantitative models from transportation planning (long-distance and distribution planning), inventory management and lot sizing in production,
- applies the introduced methods in more detail and in industry-relevant case-studies.

Content
The planning of material transport is an essential element of Supply Chain Management. By linking transport connections across different facilities, the material source (production plant) is connected with the material sink (customer). The general supply task can be formulated as follows (cf. Gudehus): For given material flows or shipments, choose the optimal (in terms of minimal costs) distribution and transportation chain from the set of possible logistics chains, which asserts the compliance of delivery times and further constraints. The main goal of the inventory management is the optimal determination of order quantities in terms of minimization of fixed and variable costs subject to resource constraints, supply availability and service level requirements. Similarly, the problem of lot sizing in production considers the determination of the optimal amount of products to be produced in a time slot.

The course includes an introduction to basic terms and definitions of Supply Chain Management and a presentation of fundamental quantitative planning models for distribution, vehicle routing, inventory management and lot sizing. Furthermore, case studies from practice will be discussed in detail.

Literature
Elective literature:
- Domschke: Logistik: Transporte, 5. Auflage, Oldenbourg, 2005
- Ghiani, Laporte, Musmanno: Introduction to Logistics Systems Planning and Control, Wiley, 2004
- Gudehus: Logistik, 3. Auflage, Springer, 2005

Remarks
The lecture is held in every summer term. The planned lectures and courses for the next three years are announced online.
Course: Telematics [24128]

**Coordinators:** M. Zitterbart

**Part of the modules:** Telematics (p. 71)[IW3INTM]

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**Learning Control / Examinations**

The assessment is explained in the module description.

**Conditions**

None.

**Recommendations**

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**


**Elective literature:**

- Internet standards
- Selected journal articles
Course: Theoretical Foundations of Computer Science [24005]

**Coordinators:** J. Müller-Quade, D. Wagner

**Part of the modules:** Theoretical Informatics (p. 17)[IW2INF3]

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

**Conditions**
None.

**Learning Outcomes**
The student

- has a deeper insight into the fundamentals of theoretical computer science and knows the computation models and proof techniques,
- understands the limits and possibilities of computer science in relation to the solution of definable but only partially predictable problems
- knows basic aspects of computer science in contrast to specific circumstances, such as specific computers or programming languages, and also can phrase general statements about the solvability of problems
- is able to apply the proof techniques learned for the specification of systems of computer science and for the systematic design of programs and algorithms

**Content**
There are important problems whose solutions can clearly be defined but one will never be able to calculate such a solution systematically. Other problems are “likely” to be solved only through trial and error. Other topics of the module provide the basis for circuit design, design of compilers, and many others. Most results are rigorously proved. The proof techniques learned by the way are important for the specification of systems of computer science and for the systematic design of programs and algorithms.

The module provides a deep insight into the principles and methods of theoretical computer science. In particular, this will be discussed on the basic properties of Formal Languages as foundations of programming languages and communication protocols (regular, context-free Chomsky hierarchy), machine models (finite automata, pushdown automata, Turing machines, nondeterminism, and relations to families of formal languages), equivalence of sufficiently powerful computational models (Church’s thesis), non computationable important functions (halting problem,...), Gödel’s incompleteness theorem and introduction to complexity theory, NP-complete problems and polynomial reductions.

**Media**
Slides (pdf), lecture notes, practice sheets.

**Literature**
Elective literature:

Course: Corporate Governance in Energy Economics [2581005]

Coordinators: H. Villis
Part of the modules: Energy Economics (p. 44)[IW3BWLIIP2]

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Learning Control / Examinations
The assessment consists of a written exam (60 min) 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
See German version.

Content
Course: Management and Strategy [2577900]

Coordinators: H. Lindstädt
Part of the modules: Strategy and Organization (p. 42)[IW3BWLUO1]

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Learning Control / Examinations
The assessment consists of a written exam (60 min) taking place at the beginning 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. Thereby a focus is on imparting knowledge about how price developments in oligopolistic markets can be understood, modeled and forecasted based on game theory.

Content
Concretely, after passing this course the students should be able to assess effects and implications of the following aspects:

- Preparation of strategic decisions along the ideal-typical strategy process in practice (“strategic analysis”)
- Evaluation of strategic options
- Portfolio management: Parental advantage and best owner of business entities
- Price and capacity decisions in oligopolies

Media
Slides.

Literature

The relevant excerpts and additional sources are made known during the course.
Course: Capability maturity models for software and systems engineering [2511216]

**Coordinators:** R. Kneuper

**Part of the modules:** Business Processes and Information Systems (p. 65)

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**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 master the basics of capability maturity models, oversee the whole process in project management and development processes according to CMMI and SPICE. They know how to use capability maturity models for quality assurance.

**Content**
Capability maturity models like CMMI and SPICE are an important tool for assessing and improving software development. A significantly increasing number of companies use these models in their own approach to improve their development and to demonstrate a certain minimum quality and effective external presentation. This is the case in Germany, especially in the automotive industry, but also many other industries.

Preliminary Structure of the lecture:
1. Introduction and Overview, motivation
2. Project management according to CMMI
3. Development processes according to CMMI
4. Process management and supporting processes according to CMMI
5. Differences between SPICE and CMMI
6. Introduction of capability maturity models
7. Assessments and Appraisals
8. Costs and benefits of capability maturity models

**Media**
Slides, access to internet resources.

**Literature**
Literature is given in each lecture individually.
Course: Economics I: Microeconomics [2600012]

Coordinators: C. Puppe, P. Reiss
Part of the modules: Economics (p. 24) [IW1VWL]

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Learning Control / Examinations
The assessment consists of a written exam (120 min) following §4, Abs. 1 of the examination regulation. There may be offered a practice exam in the middle of the semester. The results of this exam may be used to improve the grade of the main exam. A detailed description of the examination modalities will be given by the respective lecturer. The main exam takes place subsequent to the lecture. The re-examination is offered at the same examination period. Only repeating candidates are entitled for taking place the re-examination. For a detailed description on the exam regulations see the information of the respective chair.

Conditions
None.

Learning Outcomes
It is the main aim of this course to provide basic knowledge in economic modelling. In particular, the student should be able to analyze market processes and the determinants of market results. Furthermore, she should be able to evaluate the effects of economic policy measures on market behavior and propose alternative, more effective policy measures.

In particular, the student should learn

- to apply simple microeconomic concepts,
- to analyze the structure of real world economic phenomena,
- to judge the possible effects of economic policy measures on the behavior of economic agents (in simple decision problems),
- to suggest alternative policy measures,
- to analyze as a participant of a tutorial simple economic problems by solving written exercises and to present the results of the exercises on the blackboard,
- to become familiar with the basic literature on microeconomics.

The student should gain basic knowledge in order to help in practical problems

- to analyze the structure of microeconomics relationships and to present own problem solutions,
- solve simple economic decision problems.

Content
The students learn the basic concepts in Microeconomics and some basics in game theory. The student will understand the working of markets in modern economies and the role of decision making. Furthermore, she should be able to understand simple game theoretic argumentation in different fields of Economics.

In the two main parts of the course, problems of microeconomic decision making (household behavior, firm behavior) and problems of commodity allocation on markets (market equilibria and efficiency of markets) are discussed. In the final part of the course, basics of imperfect competition (oligopolistic markets) and of game theory as well as welfare economics are presented.

Media
downloadable from IT server

Literature
- Pindyck, Robert S./Rubinfeld, Daniel L., Mikroökonomie, 6. Aufl., Pearson. Münchsen, 2005

Elective literature:
- Offer for interested and top students: detailed top articles with proofs, algorithms, ... state-of-the-art surveys, industrial magazines and scientific journals, pointers to recent developments related to the course.
- Tutorials and perhaps simpler literature alternatives for students to fill in gaps in prerequisites (or to fresh up their memory). Alternatives with a different mode of explanation to help students understand ...
Course: Economics III: Introduction in Econometrics [2520016/2520017]

Coordinators: N.N.
Part of the modules: Statistical Applications of Financial Risk Management (p. 56)[IW3VWL]

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

Conditions
Knowledge of the lectures Statistics I + II is required.

Learning Outcomes
Familiarity with the basic concepts and methods of econometrics
Preparation of simple econometric surveys

Content
Simple and multiple linear regression (estimating parameters, confidence interval, testing, prognosis, testing assumptions)
Multi equation models
Dynamic models

Literature
- Schneeweiß: Ökonometrie ISBN 3-7908-0008-2

Elective literature:
Additional literature will be suggested in course
Course: Web Engineering [24124]

**Coordinators:** H. Hartenstein, M. Nußbaumer

**Part of the modules:** Information Services in Networks (p. 63)[IW3INAIFB4]

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<td>Winter term</td>
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</tr>
</tbody>
</table>

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

**Conditions**
None.

**Recommendations**
Knowledge of the lecture *Software Engineering II*.

**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.

**Remarks**
The course is lectured for the last time in the summer term 2014. Examination is possible until summer term 2015.
Course: [24522]

Coordinators: K. Böhm

Part of the modules: Foundations of Information Systems (p. 67) [IW3INGIS]

<table>
<thead>
<tr>
<th>ECTS Credits</th>
<th>Hours per week</th>
<th>Term</th>
<th>Instruction language</th>
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<tbody>
<tr>
<td>1</td>
<td>0/1</td>
<td>Summer term</td>
<td>de</td>
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</tbody>
</table>

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Remarks
The course is currently not lectured.
Course: Competition in Networks [26240]

Coordinators: K. Mitusch

Part of the modules: Specialization in Customer Relationship Management (p. 40)[IW3WLISM5], Applied Microeconomics (p. 55)[IW3VWL13]

<table>
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<tr>
<th>ECTS Credits</th>
<th>Hours per week</th>
<th>Term</th>
<th>Instruction language</th>
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<tbody>
<tr>
<td>4.5</td>
<td>2/1</td>
<td>Winter term</td>
<td>de</td>
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</table>

Learning Control / Examinations
Result of success is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC). Examination is offered every semester and can be retried at any regular examination date.

Conditions
None.

Recommendations
Basics of microeconomics obtained within the undergraduate programme (B.Sc) of economics are required. Useful, but not necessary, are basic knowledge of industrial economics, principal agent theory, and contract theory.

Learning Outcomes
The Students

- will get a vivid idea of the special characteristics of network industries like telecom, utilities, IT and transport sectors.
- will acquire the basic economic understanding of network industries concerning competition, competitive distortion, state intervention, pricing and financing
- will be able to apply abstract concepts and formal methods to use in these fields

Content
Network or infrastructure industries like telecommunication, transport, and utilities form the backbone of modern economies. The lecture provides an overview of the economic characteristics of network industries. The planning of networks is complicated by the multitude of aspects involved (like spatial differentiation and the like). The interactions of different companies – competition or cooperation or both – are characterized by complex interdependencies within the networks: network effects, economies of scale, effects of vertical integration, switching costs, standardization, compatibility etc. appear increasingly in these sectors and even tend to appear in combination. Additionally, government interventions can often be observed, partly driven by the aims of competition policy and partly driven by the aims of industrial policy. All these issues are brought up, analyzed formally (in part) and illustrated by several examples in the lecture.

Literature
Will be announced in the lecture.

Remarks
This lecture will not take place in wintersemester 2014/15 due to a research period. All exams will take place as usually.
Course: Seminar Economic Theory [SemWIOR2]

**Coordinators:** C. Puppe

**Part of the modules:** Seminar Module Economic Sciences (p. 82)[IW3SEMWIWI]

<table>
<thead>
<tr>
<th>ECTS Credits</th>
<th>Hours per week</th>
<th>Term</th>
<th>Instruction language</th>
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<tbody>
<tr>
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<td>2</td>
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<td>de</td>
</tr>
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</table>

**Learning Control / Examinations**

**Conditions**
See corresponding module information.
At least one of the courses *Game Theory I* [2520525] and *Welfare Economics* [2520517] should have been attended beforehand.

**Learning Outcomes**
See German version.

**Content**

**Literature**
Will be announced at the end of the recess period.

**Remarks**
see German version.
Course: Knowledge Management [2511300]

Coordinators: R. Studer
Part of the modules: Semantic Knowledge Management (p. 61)[IW3INAIFB2]

<table>
<thead>
<tr>
<th>ECTS Credits</th>
<th>Hours per week</th>
<th>Term</th>
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</thead>
<tbody>
<tr>
<td>4</td>
<td>2/1</td>
<td>Winter term</td>
<td>de</td>
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</table>

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

Students

- know different application domains of knowledge management
- know different (specifically semantic and social) technologies of knowledge management
- are able to judge the applicability of business software with regard to aspects of knowledge management
- are able to judge the long term value of knowledge management in organisations and compare it to possible costs

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)
- Linked Open Data

Media

Slides and scientific publications as reading material.

Literature

- C. Beierle, G. Kern-Isberner: Methoden wissensbasierter Systeme, Vieweg, Braunschweig/Wiesbaden, 2. überarb. Auflage, 2005

Elective literature:

Course: Welfare Economics [2520517]

Coordinators: C. Puppe
Part of the modules: Economic Theory (p. 54)

<table>
<thead>
<tr>
<th>ECTS Credits</th>
<th>Hours per week</th>
<th>Term</th>
<th>Instruction language</th>
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<tr>
<td>4,5</td>
<td>2/1</td>
<td>Summer term</td>
<td>de</td>
</tr>
</tbody>
</table>

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

Conditions
The course Economics I: Microeconomics [2600012] has to be completed beforehand.

Recommendations
It is recommended to visit the course Economics II: Macroeconomics [2600014] beforehand.

Learning Outcomes
See German version.

Content
The lecture “Welfare economics” deals with the question of efficiency and distributional properties of economic allocations, in particular allocations of market equilibria. The lecture is based on the two welfare theorems: The first welfare theorem (under weak preconditions) says that every competitive equilibrium is efficient.

According to the second welfare theorem (under stronger preconditions), every efficient allocation can be preserved as a competitive equilibrium through adequate choices of initial endowments. Afterwards, the terms and definitions of envy-freeness and the related concept of egalitarian equivalence in the context of the general theory of equilibrium will be discussed.

The second part of the lecture deals with the principle of “social justice” (i.e. distributational justice). The fundamental principles of utilitarianism, Rawl’s theory of justice as well as John Roemer’s theory of equality of opportunity are explained and critically analyzed.

Literature
Elective literature:


Remarks
The next course will be held in the summer 2015 and afterwards every two years in the summer.
Course: Workflow-Management [2511204]

**Coordinators:** A. Oberweis

**Part of the modules:** Business Processes and Information Systems (p. 65)

<table>
<thead>
<tr>
<th>ECTS Credits</th>
<th>Hours per week</th>
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</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>2/1</td>
<td>Summer term</td>
<td>de</td>
</tr>
</tbody>
</table>

**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 *Applied Informatics I - Modelling* [2511030] is expected.

**Learning Outcomes**
Students
- explain the concepts and principles of workflow management concepts and systems and their applications,
- create and evaluate business process models,
- analyze static and dynamic properties of workflows.

**Content**
A workflow is that part of a business process which is automatically executed by a computerized system. Workflow management includes the design, modelling, analysis, execution and management of workflows. Workflow management systems are standard software systems for the efficient control of processes in enterprises and organizations. Knowledge in the field of workflow management systems is especially important during the design of systems for process support.

The course covers the most important concepts of workflow management. Modelling and design techniques are presented and an overview about current workflow management systems is given. Standards, which have been proposed by the workflow management coalition (WFMC), are discussed. Petri nets are proposed as a formal modelling and analysis tool for business processes. Architecture and functionality of workflow management systems are discussed. The course is a combination of theoretical foundations of workflow management concepts and of practical application knowledge.

**Media**
Slides, Access to internet resources.

**Literature**

Further literature is given in the lecture.
7 Anhang: Qualifikationsziele Informationswirtschaft (B.Sc.)

Absolventen/innen des Bachelor-Studiengangs Informationswirtschaft verfügen über fundiertes Grundlagenwissen in den einschlägigen Bereichen der Informatik, der Wirtschaftswissenschaften und der Rechtswissenschaften. Weiterhin besitzen sie in allen drei Disziplinen vertiefte Kenntnisse in ein bis zwei Schwerpunkten.


Studien- und Prüfungsordnung der Universität Karlsruhe (TH) für den Bachelorstudiengang Informationswirtschaft
vom 15. April 2009


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

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   § 2 Akademischer Grad
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   § 4 Aufbau der Prüfungen
   § 5 Anmeldung und Zulassung zu den Prüfungen
   § 6 Durchführung von Prüfungen und Erfolgskontrollen
   § 7 Bewertung von Prüfungen und Erfolgskontrollen
   § 8 Orientierungsprüfungen, Wiederholung von Prüfungen und Erfolgskontrollen, Erlöschen des Prüfungsanspruchs
   § 9 Versäumnis, Rücktritt, Täuschung, Ordnungsverstoß
   § 10 Mutterschutz, Elternzeit, Wahrnehmung von Familienpflichten
   § 11 Bachelorarbeit
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   § 13 Zusatzleistungen und Zusatzmodule
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   § 15 Prüfer und Beisitzer
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II. Bachelorprüfung
   § 17 Umfang und Art der Bachelorprüfung
   § 18 Nachweise für die Bachelorprüfung
   § 19 Bestehen der Bachelorprüfung, Bildung der Gesamtnote
   § 20 Bachelorzeugnis, Bachelorurkunde, Transcript of Records und Diploma Supplement

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   § 21 Bescheid über Nicht-Bestehen, Bescheinigung von Prüfungsleistungen
   § 22 Ungültigkeit der Bachelorprüfung, Aberkennung des Bachelorgrades
   § 23 Einsicht in die Prüfungsakten
   § 24 In-Kraft-Treten
Die Universität Karlsruhe (TH) hat sich im Rahmen der Umsetzung des Bolognaprozesses zum Aufbau eines Europäischen Hochschulraumes zum Ziel gesetzt, dass am Abschluss der Studiendauer den Abschluss der Studiendauer an der Universität Karlsruhe (TH) der Mastergrad stehen soll. Die Universität Karlsruhe (TH) sieht daher die an der Universität Karlsruhe (TH) angebotenen konsekutiven Bachelor- und Masterstudiengänge als Gesamtkonzept mit konsekutivem Curriculum.

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

I. Allgemeine Bestimmungen

§ 1 Geltungsbereich, Zweck der Prüfung
(1) Diese Bachelorprüfungsordnung regelt Studienablauf, Prüfungen und den Abschluss des Studiums im Bachelorstudiengang Informationswirtschaft an der Universität Karlsruhe (TH).
(2) Die Bachelorprüfung (§ 17 – 20) bildet den berufsbefähigenden Abschluss dieses Studiengangs, der gemeinsam von der Fakultät für Informatik und der Fakultät für Wirtschaftswissenschaften an der Universität Karlsruhe (TH) angeboten wird. Durch die Bachelorprüfung soll festgestellt werden, ob der Studierende die für den Übergang in die Berufspraxis grundlegenden wissenschaftlichen Fachkenntnisse besitzt und die Zusammenhänge des Faches Informationswirtschaft überblickt.

§ 2 Akademischer Grad
Aufgrund der bestandenen Bachelorprüfung wird der akademische Grad „Bachelor of Science“ (abgekürzt: „B.Sc.“) für den Studiengang Informationswirtschaft (englischsprachig: Information Engineering and Management) verliehen.

§ 3 Regelstudienzeit, Studienaufbau, Leistungspunkte
(1) Die Regelstudienzeit beträgt sechs Semester. Sie umfasst neben den Lehrveranstaltungen ein Berufspraktikum, Prüfungen und die Bachelorarbeit.
(2) Die im Studium zu absolvierenden Lehrinhalte sind in Module gegliedert, die jeweils aus einer Lehrveranstaltung oder mehreren, thematisch und zeitlich aufeinander bezogenen Lehrveranstaltungen bestehen. Der Studienplan beschreibt Art, Umfang und Zuordnung der Module zu einem Fach sowie die Möglichkeiten, Module untereinander zu kombinieren. Die Fächer und ihr Umfang werden in § 17 definiert.
(4) Der Umfang der für den erfolgreichen Abschluss des Studiums erforderlichen Studienleistungen wird in Leistungspunkten gemessen und beträgt insgesamt 180 Leistungspunkte.
(5) Die Verteilung der Leistungspunkte im Studienplan auf die Semester hat in der Regel gleichmäßig zu erfolgen.
(6) Lehrveranstaltungen können in englischer Sprache angeboten werden.

§ 4 Aufbau der Prüfungen

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

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

(3) Mindestens 50 % einer Modulprüfung sind in Form von schriftlichen oder mündlichen Prüfungen (§ 4 Abs. 2, Nr. 1 und 2) abzulegen, die restlichen Prüfungen erfolgen durch Erfolgskontrollen anderer Art (§ 4 Abs. 2, Nr. 3). Ausgenommen hiervon sind die Prüfungen nach § 17 Abs. 4.

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

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

(3) Die Zulassung darf nur abgelehnt werden, wenn
   1. der Studierende in einem mit der Informationswirtschaft vergleichbaren oder einem verwandten Studiengang bereits eine Diplomvorprüfung, Diplomprüfung, Bachelor- oder Masterprüfung endgültig nicht bestanden hat, sich in einem Prüfungsverfahren befindet oder den Prüfungsanspruch in einem solchen Studiengang verloren hat oder
   2. die in § 18 genannte Voraussetzung nicht erfüllt ist.

In Zweifelsfällen entscheidet der Prüfungsausschuss.

§ 6 Durchführung von Prüfungen und Erfolgskontrollen
(1) Erfolgskontrollen werden studienbegleitend, in der Regel im Verlauf der Vermittlung der Lehrinhalte der einzelnen Module oder zeitnah danach durchgeführt.

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

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

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

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


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


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

(12) Bei mündlich durchgeführten Erfolgskontrollen anderer Art muss neben dem Prüfer ein Beisitzer anwesend sein, der zusätzlich zum Prüfer die Protokolle zeichnet.
§ 7 Bewertung von Prüfungen und Erfolgskontrollen

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

(2) Im Bachelorzeugnis dürfen nur folgende Noten verwendet werden:

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

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

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

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

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

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

(5) Jedes Modul, jede Lehrveranstaltung und jede Erfolgskontrolle darf in demselben Studien- gang bzw. einem darauf aufbauenden konsekutiven Masterstudiengang nur einmal angerechnet werden.

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

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


(9) Die Ergebnisse der Bachelorarbeit, der Modulprüfungen bzw. der Modulteilprüfungen, der Erfolgskontrollen anderer Art sowie die erworbenen Leistungspunkte werden durch das Studienbüro der Universität erfasst.
Die Noten der Module eines Faches gehen in die Fachnote mit einem Gewicht proportional zu den ausgewiesenen Leistungspunkten der Module ein. Eine Fachprüfung ist bestanden, wenn die für das Fach erforderliche Anzahl von Leistungspunkten über die im Studienplan definierten Modulprüfungen nachgewiesen wird.

Die Gesamtnote der Bachelorprüfung, die Fachnoten und die Modulnoten lauten:

<table>
<thead>
<tr>
<th>Kategorie</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>bis 1.5</td>
<td>sehr gut (very good)</td>
</tr>
<tr>
<td>von 1.6 bis 2.5</td>
<td>gut (good)</td>
</tr>
<tr>
<td>von 2.6 bis 3.5</td>
<td>befriedigend (satisfactory)</td>
</tr>
<tr>
<td>von 3.6 bis 4.0</td>
<td>ausreichend (sufficient)</td>
</tr>
</tbody>
</table>

Zusätzlich zu den Noten nach Absatz 2 werden ECTS-Noten für Fachprüfungen, Modulprüfungen und für die Bachelorprüfung nach folgender Skala vergeben:

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

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


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

Die Modulprüfungen im Modul Grundlagen der Informatik und im Modul Volkswirtschaftslehre sind bis zum Ende des Prüfungszeitraums des zweiten Fachsemesters abzulegen (Orientierungsprüfungen).

Wer die Orientierungsprüfungen einschließlich etwaiger Wiederholungen bis zum Ende des Prüfungszeitraums des dritten Fachsemesters nicht erfolgreich abgelegt hat, verliert den Prüfungsanspruch im Studiengang, es sei denn, dass er die Fristüberschreitung nicht zu vertreten hat;

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

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


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


(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 Versäumnis, Rücktritt, Täuschung, Ordnungsverstoß


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

(3) Der für den Rücktritt nach Beginn der Prüfung oder das Versäumnis geltend gemachte Grund muss dem Prüfungsausschuss unverzüglich schriftlich angezeigt und glaubhaft gemacht.

(4) Versucht der Studierende, das Ergebnis einer mündlichen oder schriftlichen Prüfung (§ 4 Abs. 2 Nr. 1 und 2) durch Täuschung oder Benutzung nicht zugelassener Hilfsmittel zu beeinflussen, gilt die betreffende Prüfung als mit „nicht ausreichend“ (5.0) bewertet. Für Erfolgskontrollen anderer Art (§ 4 Abs. 2, Nr. 3) gilt dies entsprechend.


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

§ 10 Mutterschutz, Elternzeit, Wahrnehmung von Familienpflichten


§ 11 Bachelorarbeit

(1) Voraussetzung für die Zulassung zur Bachelorarbeit ist, dass der Studierende sich in der Regel im 3. Studienjahr befindet und nicht mehr als eine der Fachprüfungen laut § 17 Absatz 2 noch nicht bestanden wurde.


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


(4) Die Bachelorarbeit kann von jedem Prüfer nach § 15 Abs. 2 vergeben und betreut werden. Soll die Bachelorarbeit außerhalb der beiden nach § 1 Abs. 2 Satz 1 beteiligten Fakultäten angefügt werden, so bedarf dies der Genehmigung des Prüfungsausschusses.

Dem Studierenden ist Gelegenheit zu geben, für das Thema Vorschläge zu machen. Die Bachelorarbeit kann auch in Form einer Gruppenarbeit zugelassen werden, wenn der als Prüfungsteilung zu bewertende Beitrag des einzelnen Studierenden aufgrund objektiver Kriterien, die eine eindeutige Abgrenzung ermöglichen, deutlich unterscheidbar ist und die Anforderung nach Absatz 1 erfüllt.

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


(8) Die Vorbereitung auf die Bachelorarbeit wird im Rahmen eines der verpflichtenden Seminare (nach § 17 Abs. 4) gewährleistet.
§ 12 Berufspraktikum
(2) Der Studierende setzt sich in eigener Verantwortung mit geeigneten privaten bzw. öffentlichen Einrichtungen in Verbindung, an denen das Praktikum abgeleistet werden kann. Der Studierende wird von einem Prüfer nach § 15 Abs. 2 und einem Firmenbetreuer betreut.
(3) Am Ende des Berufspraktikums ist dem Prüfer ein kurzer Bericht abzugeben und eine Kurzpräsentation der Erfahrungen im Berufspraktikum zu halten.
(4) Das Berufspraktikum ist abgeschlossen, wenn eine mindestens sechswöchige Tätigkeit nachgewiesen wird, der Bericht abgegeben und die Kurzpräsentation gehalten wurde. Die Durchführung des Berufspraktikums ist im Studienplan zu regeln. Das Berufspraktikum geht nicht in die Gesamtnote ein.

§ 13 Zusatzeleistungen und Zusatzmodule
(2) Der Studierende hat bei der Anmeldung zu einer Prüfung in einem Modul diese als Zusatzeleistung zu deklarieren.
(4) Neben den im Studienplan definierten fachwissenschaftlichen Modulen und Leistungen können die Zusatzeleistungen nach Absatz 1 - 3 auch aus dem Lehrangebot anderer Fakultäten und Einrichtungen gewählt werden.

§ 14 Prüfungsausschuss
(1) Für den Bachelorstudiengang Informationswirtschaft wird ein Prüfungsausschuss gebildet. Er besteht aus sechs stimmberechtigten Mitgliedern, die jeweils zur Hälfte von der Fakultät für Informatik und der Fakultät für Wirtschaftswissenschaften bestellt werden: vier Professoren, Juniorprofessoren, Hochschul- oder Privatdozenten, zwei Vertretern der Gruppe der akademischen Mitarbeiter nach § 10 Abs. 1 Satz 2 Nr. 2 LHG und einem Vertreter der Studierenden mit beratender Stimme. Im Falle der Einrichtung eines gemeinsamen Prüfungsausschusses für den Bachelor- und den Masterstudiengang Informationswirtschaft erhöht sich die Anzahl der Vertreter der Studierenden auf zwei Mitglieder mit beratender Stimme, wobei je ein Vertreter aus dem Bachelor- und ein Vertreter aus dem Masterstudiengang stammt. Die Amtszeit der nichtstudentischen Mitglieder beträgt zwei Jahre, die des studentischen Mitglieds ein Jahr.
Der Vorsitzende, sein Stellvertreter, die weiteren Mitglieder des Prüfungsausschusses sowie deren Stellvertreter werden von den jeweiligen Fakultätsräten bestellt, die Mitglieder der Gruppe der akademischen Mitarbeiter nach § 10 Abs. 1 Satz 2 Nr. 2 LHG und der Vertreter der Studierenden auf Vorschlag der Mitglieder der jeweiligen Gruppe; Wiederbestellung ist möglich. Der Vorsitzende und dessen Stellvertreter müssen Professor oder Juniorprofessor aus einer der beteiligten Fakultäten sein. Der Vorsitz wechselt zwischen den Fakultäten alle zwei Jahre. Der Vorsitzende des Prüfungsausschusses nimmt die laufenden Geschäfte wahr und wird durch die Prüfungsekretariate unterstützt.


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

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.

In Angelegenheiten des Prüfungsausschusses, die 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.

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

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

(2) Prüfer sind Hochschullehrer und habilitierte Mitglieder sowie akademische Mitarbeiter der jeweiligen Fakultät, denen die Prüfungsbefugnis übertragen wurde. Bestellt werden darf nur, wer mindestens die dem jeweiligen Prüfungsgegenstand entsprechende fachwissenschaftliche Qualifikation erworben hat. Bei der Bewertung der Bachelorarbeit muss ein Prüfer Hochschullehrer sein.

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

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

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

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

(3) Bei der Anrechnung von Studienzeiten und der Anerkennung von Studien- und Prüfungsleis-
tungen, die außerhalb der Bundesrepublik erbracht wurden, sind die von der Kultusministerkon-
ferenz und der Hochschulrektorenkonferenz gebilligten Äquivalenzvereinbarungen sowie Ab-
sprachen im Rahmen der Hochschulpartnerschaften zu beachten.

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

(5) Die Anerkennung von Teilen der Bachelorprüfung kann versagt werden, wenn in einem Stu-
diengang mehr als 80 Leistungspunkte und/oder die Bachelorarbeit anerkannt werden sollen.
Dies gilt insbesondere bei einem Studiengangwechsel sowie bei einem Studienortwechsel.

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

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

II. Bachelorprüfung

§ 17 Umfang und Art der Bachelorprüfung

(1) Die Bachelorprüfung besteht aus den Fachprüfungen nach Absatz 2 - 4 sowie der Bachelor-
arbeit (§ 11).

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

1. Betriebswirtschaftslehre im Umfang von 16 Leistungspunkten,
2. Volkswirtschaftslehre im Umfang von 5 Leistungspunkten,
3. Informatik im Umfang von 37 Leistungspunkten,
4. Mathematik im Umfang von 16 Leistungspunkten,
5. Operations Research im Umfang von 9 Leistungspunkten,
6. Statistik im Umfang von 10 Leistungspunkten,

Die Module, die ihnen zugeordneten Leistungspunkte und die Zuordnung der Module zu den
Fächern sind im Studienplan festgelegt. Zur entsprechenden Modulprüfung kann nur zugelassen
werden, wer die Anforderungen nach § 5 erfüllt.
Im dritten Studienjahr sind Fachprüfungen
1. aus dem Fach Informatik durch Module im Umfang von 18 Leistungspunkten,
2. aus wirtschaftswissenschaftlichen Fächern durch Module im Umfang von 18 Leistungspunkten sowie
3. aus dem Fach Recht durch Module im Umfang von 6 Leistungspunkten

Ferner ist im dritten Studienjahr in zwei unterschiedlichen Fächern jeweils ein Seminar im Umfang von je 3 Leistungspunkten zu absolvieren. Das Seminar wird dabei in die Fachnote des Faches eingerechnet, dem das Seminar zugeordnet ist. Die Zuordnung der Seminare zu den Fächern ist im Studienplan festgelegt.

Im dritten Studienjahr ist als eine weitere Prüfungsleistung eine Bachelorarbeit gemäß § 11 anzufertigen.

§ 18 Nachweise für die Bachelorprüfung
Voraussetzung für die Anmeldung zur letzten Modulprüfung der Bachelorprüfung ist die Bescheinigung über das erfolgreich abgeleistete Berufspraktikum nach § 12. In Ausnahmefällen, die der Studierende nicht zu vertreten hat, kann der Prüfungsausschuss die nachträgliche Vorlage dieses Nachweises genehmigen.

§ 19 Bestehen der Bachelorprüfung, Bildung der Gesamtnote
(1) Die Bachelorprüfung ist bestanden, wenn alle in § 17 genannten Prüfungsleistungen mindestens mit „ausreichend“ bewertet wurden.

(2) Die Gesamtnote der Bachelorprüfung errechnet sich als ein mit Leistungspunkten gewichteter Notendurchschnitt. Dabei werden die Noten des dritten Studienjahres (§ 17 Abs. 3 und 4) und der Bachelorarbeit doppelt gewichtet.

(3) Hat der Studierende die Bachelorarbeit mit der Note 1.0 und die Bachelorprüfung mit einer Gesamtnote von 1.2 oder besser abgeschlossen, so wird das Prädikat „mit Auszeichnung“ (with distinction) verliehen.

§ 20 Bachelorzeugnis, Bachelorurkunde, Transcript of Records und Diploma Supplement


Diploma Supplement enthält eine Abschrift der Studiendaten des Studierenden (Transcript of Records).


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

III. Schlussbestimmungen

§ 21 Bescheid über Nicht-Bestehen, Bescheinigung von Prüfungsleistungen

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

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

§ 22 Ungültigkeit der Bachelorprüfung, Aberkennung des Bachelorgrades

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

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

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


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

(6) Die Aberkennung des akademischen Bachelorgrades richtet sich nach den gesetzlichen Bestimmungen.
§ 23 Einsicht in die Prüfungsakten

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

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

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

(4) Prüfungsunterlagen sind mindestens fünf Jahre aufzubewahren.

§ 24 In-Kraft-Treten

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


Karlsruhe, den 15. April 2009

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