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1 Structure of the Bachelor Programme in Business Engineering (B.Sc.)

The bachelor programme in Business Engineering (B.Sc.) has 6 terms and consists of 180 credits (CP) including internship and bachelor thesis. The terms 1 to 3 of the programme are methodologically oriented and provide the student with the foundations of business, economic and engineering science. Terms 4 to 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 showing the structure of the Bachelor Programme](image)

In the specialization studies of the third year of the bachelor programme the student has to choose one elective module of the following disciplines: Informatics, operations research, business science, economics, engineering science, statistics, law and sociology. Furthermore, the student has to attend two seminars with a minimum of six CP within the seminar module. In addition to the key skills gained in the seminars (3 CP), the student has to acquire additional key skills totalling at least 3 credits.

It is left to the student’s individual curriculum (taking into account the examination and module regulations), in which terms the chosen modules will be started and completed. However, it is highly recommended to follow the proposed structure and schedule of the first 3 terms and to complete all courses and seminars before beginning the bachelor thesis.

![Figure 1: Structure of the Bachelor Programme(Recommendation)](image)
2 Key Skills

The bachelor programme Business Engineering (B.Sc.) at the Faculty of Economics and Business Engineering distinguishes itself by an exceptionally high level of interdisciplinarity. With the combination of business science, economics, informatics, operations research, mathematics as well as engineering and natural science, the integration of knowledge of different disciplines is an inherent element of the programme. As a result, interdisciplinary and connected thinking is encouraged in a natural way. Furthermore, tutor programs with more than 20 semester periods per week contribute significantly to the development of key skills in the bachelor programme. The integrative taught key skills, which are acquired throughout the entire programme, can be classified into the following fields:

**Soft skills**
1. Team work, social communication and creativity techniques
2. Presentations and presentation techniques
3. Logical and systematical arguing and writing

**Enabling skills**
1. Decision making in business context
2. Project management competences
3. Fundamentals of business science
4. English as a foreign language

**Orientational knowledge**
1. Acquisition of interdisciplinary knowledge
2. Institutional knowledge about economic and legal systems
3. Knowledge about international organisations
4. Media, technology and innovation

The integrative acquisition of key skills especially takes place in several compulsory courses during the bachelor programme, namely
1. Basic programme in economics and business science
2. Seminar module
3. Mentoring of the bachelor thesis
4. Internship
5. Business science, economics and informatics modules

Figure 2 shows the classification of key skills within the bachelor programme at a glance.

Besides the integrated key skills, the additive acquisition of key skills, which are totalling at least three credits within the seminar module, is scheduled. A list of recommended courses and seminars will be published online for the additive acquisition. This list is coordinated with the House of Competence.
### Art der Schlüsselqualifikation

#### Bachelorstudium

<table>
<thead>
<tr>
<th>Art der Schlüsselqualifikation</th>
<th>Grundprogramm</th>
<th>Vertiefungsprogramm</th>
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<tbody>
<tr>
<td>REWE BWL A</td>
<td>BWLB, VWL I,II</td>
<td>Seminar</td>
</tr>
</tbody>
</table>

#### Basiskompetenzen (soft skills)

- Teamarbeit, soziale Kommunikation und Kreativitätstechniken
- Präsentationserstellung und -techniken
- Logisches und systematisches Argumentieren und Schreiben
- Strukturierte Problemlösung und Kommunikation

#### Praxisorientierung (enabling skills)

- Handlungskompetenz im beruflichen Kontext
- Kompetenzen im Projektmanagement
- Betriebswirtschaftliche Grundkenntnisse
- Englisch als Fachsprache
- Orientierungswissen

#### Orientierungswissen

- Interdisziplinäres Wissen
- Institutionelles Wissen über Wirtschafts- und Rechtssysteme
- Wissen über internationale Organisationen
- Medien, Technik und Innovation

(x)* ........ist nicht zwingend SQ-vermittelnd; hängt von der Art der Aktivität ab (z.B. Auslandspraktikum, thematische Ausrichtung der Bachelorarbeit)

Figure 2: Key Skills
3 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://zvwgte.zvw.uni-karlsruhe.de/download/leitfaden_studierende.pdf

Repeating exams

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

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

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

Further information

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

Used abbreviations

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<th>LP/CP</th>
<th>Credit Points/ECTS</th>
<th>Leistungspunkte/ECTS</th>
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<td>Lehrveranstaltung</td>
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<td>RÜ</td>
<td>computing lab</td>
<td>Rechnerübung</td>
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<td>Sommersemester</td>
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<td>Schlüsselqualifikationen</td>
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<td>contact hour</td>
<td>Semesterwochenstunde</td>
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<td>Ü</td>
<td>exercise course</td>
<td>Übung</td>
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<tr>
<td>V</td>
<td>lecture</td>
<td>Vorlesung</td>
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<tr>
<td>W</td>
<td>winter term</td>
<td>Wintersemester</td>
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</table>
4 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.

**WI3BWLFBV3 - Risk and Insurance Management (S. 33)**

Anmerkungen

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

**WI3BWLFBV4 - Insurance Markets and Management (S. 34)**

Anmerkungen

The course Insurance Marketing [26323] is offered in winter term 2010/11 and is held by Dr. Edmund Schwake. Furthermore

the course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de

This module was formerly named Insurance Management.

**WI3VWL1 - Applied Game Theory (S. 46)**

Anmerkungen

See german version.

The lecture Competition in Networks [26240] was included in this module in winter term 2010/11.

**WI3VWL6 - Microeconomic Theory (S. 49)**

Anmerkungen

The lecture Competition in Networks [26240] was included in this module.

**WI3VWL9 - Public Finance (S. 51)**

Anmerkungen

The course Finanzpolitik [26122] has been replaced with the course Spezielle Steuerlehre [26129] since winter term 2010/11. The examination will be offered latest until summer term 2011 (repeaters only).

**WI3OR6 - Methodical Foundations of OR (S. 56)**

Anmerkungen

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.

**WI3INGMB13 - Introduction to Technical Logistics (S. 58)**

Anmerkungen

The courses Technische Logistik I, Grundlagen [2117081] and Technische Logistik I, Grundlagen und Systeme [2117082] are changed in content against the former course Technische Logistik I [2117501].

The course [21692] Internationale Produktion und Logistik is not offered here anymore. Examinations for the canceled courses will be offered latest until summer term 2011.

**WI3INGETIT1 - Electrical Power Engineering (S. 71)**

Anmerkungen

The course Power Network Analysis was formerly known as Electric Power System Engineering I.

The course Diagnostics on Power Network Equipment [23365] is not offered any more. Exams can still be taken until summer term 2011. Please contact the institute.

**WI3INGETIT2 - Control Engineering (S. 72)**

Anmerkungen

The cycle for the lecture System Dynamics and Control Engineering [23155] has been changed from winterterm into summert-

nerm.

**WI3INGINTER2 - Understanding and Prediction of Disasters II (S. 77)**

Anmerkungen

In agreement with the coordinator of the module other suitable courses than the ones displayed can be taken.

The module is offered as an extension module to Understanding and Prediction of Disasters I from winter term 2010/11 on, therefore credit points were reduced to 9. Together with Understanding and Prediction of Disasters I it is still possible to gain 18 credit points in total in the field of Understanding and Prediction of Disasters.
WI3INGINTER5 - Understanding and Prediction of Disasters III (S. 78)
Anmerkungen
In agreement with the coordinator of the module other suitable courses than the ones displayed can be taken. The module is offered as an extension module to Understanding and Prediction of Disasters II from winter term 2010/11 on, therefore credit points were reduced to 9. Together with Understanding and Prediction of Disasters I and II it is still possible to gain 27 credit points in total in the field of Understanding and Prediction of Disasters.

WI3INGINTER3 - Safety Science I (S. 79)
Anmerkungen
In agreement with the coordinator of the module other suitable courses than the ones displayed can be taken. From the winter term 2010/2011 on, the lecture Safety Engineering has 3 credit points.

WI3INGINTER4 - Safety Science II (S. 80)
Anmerkungen
From the winter term 2010/2011 on, the lecture Safety Engineering has 3 credit points. The module is offered as an extension module to Safety Science I from winter term 2010/11 on, therefore credit points were reduced to 9. Together with Safety Science I it is still possible to gain 18 credit points in total in the field of safety sciences.

WI3INGMB23 - Manufacturing Engineering (S. 83)
Anmerkungen
New module in winter term 2010/11.

WI3INGMB24 - Integrated Production Planning (S. 84)
Anmerkungen
New module in winter term 2010/11.

WI3INGMB22 - Specialization in Production Engineering (S. 85)
Anmerkungen
New module in winter term 2010/11.

26326 - Enterprise Risk Management (S. 154)
Anmerkungen
To attend the course please register at the secretariy of the chair of insurance science. In the winter term 2010/11 the course is held by Dr. Edmund Schwake.

26254 - International Economic Policy (S. 206)
Bedingungen
Previous visit of the lectures Economics II: Macroeconomics [25014] is recommended. Previous visit of the lecture International Economics [26252] and the successful attendance of the exam is compulsory.

26323 - Insurance Marketing (S. 199)
Anmerkungen
This course is offered in the winter term 2010/11 and is held by Dr. Edmund Schwake. This course is offered on demand. For further information, see: http://insurance.fbv.uni-karlsruhe.de To attend the course please register at the secretary of the chair of insurance science.

23155 - System Dynamics and Control Engineering (S. 323)
Anmerkungen
The cycle for the lecture System Dynamics and Control Engineering [23155] has been changed from winterterm into summerterm. The reduced form of the lecture 3+1 (6 LP) will be offered in summerterm first time. Therefore the content could be changed.

2149667 - Quality Management (S. 260)
Anmerkungen
The credits were changed to 4 CP.
5 Modules (Foundation)

5.1 All Subjects

Module: Business Administration [WI1BWL]

Coordination: Marliese Uhrig-Homburg, Martin E. Ruckes, Thomas Burdelski
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Business Administration

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Courses in module

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<td>25026/25027</td>
<td>Business Administration and Management Science C (p. 101)</td>
<td>2/0/2 W</td>
<td>4</td>
<td>H. Lindstädt, M. Ruckes, M. Uhrig-Homburg, T. Burdelski</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. The examinations take place at the beginning of the recess period. Re-examinations are offered at every ordinary examination date. The assessment procedures of each course of this module is defined for each course separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
None.

Recommendations
It is strongly recommended to attend the courses in the following sequence:
2nd term: Business Administration and Management Science B [25024/25025]
3rd term: Business Administration and Management Science C [25026/25027]

Learning Outcomes
The student
- has core skills in business administration in particular with respect to decision making and model based view of corporations
- masters the fundamentals of managerial and financial accounting as well as business administration
- is able to analyse and assess the central tasks, functions and decisions in modern corporations

This module sets the base for advanced courses in the field of business administration and management science.

Content
This module provides the fundamentals of managerial and financial accounting as well as business administration and management science. Then, the module focuses on the fields of marketing, production economics, information engineering and management, management and organization, investment and finance and the german specific term controlling.
**Module: Economics [WI1VWL]**

**Coordinations:** Siegfried Berninghaus

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

**Subject:** Economics

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<tr>
<td>25012</td>
<td>Economics I: Microeconomics (p. 341)</td>
<td>3/0/2</td>
<td>W</td>
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<td>S. Berninghaus</td>
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<td>25014</td>
<td>Economics II: Macroeconomics (p. 342)</td>
<td>3/0/2</td>
<td>S</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. The assessment procedures of each course of this module are defined for each course 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.

**Notice:** The lecture Economics I: Microeconomics [25012] is part of the preliminary examination concerning § 8(1) of the examination regulation. This examination must be passed until the end of the examination period of the second semester. Any re-examinations has to be passed until the end of the examination period of the third semester. Otherwise the examination claim will be lost.

**Conditions**

None.

**Learning Outcomes**

The student
- knows and understands economic problems,
- understands economic policy in globalized markets,
- is able to develop elementary solution concepts.

The lectures of this module have different focuses: In Economics I economic problems are seen as decision problems, Economics II looks at the dynamics of economic processes.

**Content**
Module: Introduction to Informatics [WI1INFO]

Coordination: Hartmut Schmeck, Rudi Studer, Detlef Seese
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Informatics

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### Courses in module

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<tr>
<td>25030</td>
<td>Introduction to Programming with Java (p. 253)</td>
<td>3/1/2</td>
<td>W</td>
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<td>D. Seese</td>
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<td>25074</td>
<td>Foundations of Informatics I (p. 179)</td>
<td>2/2</td>
<td>S</td>
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<td>R. Studer, S. Rudolph</td>
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<td>25076</td>
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<td>3/1</td>
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### 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.

The examinations are offered every semester. Re-examinations are offered at every ordinary examination date.

- **Introduction to Programming with Java**
  - Compulsory tests in the computer lab
  - Written exam resp. computer-based exam (120 min)
  - The successful completion of the compulsory tests in the computer lab is prerequisite for admission to the written resp. computer-based exam.
  - Those admission to the exam is only valid for the current main exam (in winter term) and the following exam (in summer term)
- **Foundations of Informatics I**
  - Written exam in the first week of the recess period (60 min)
- **Foundations of Informatics II**
  - Written exam in the first week of the recess period (90 min)
  - It is possible to gain 0.3-0.4 grading points to the written exam by successful participation in the exercises (achieving a minimum number of points received for solutions to the exercises), or by successful completion of a bonus exam (both according to Section 4 (2), 3 of the examination regulation).

When every singled examination is passed, 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 strongly recommended to attend the courses in the following sequence: **Introduction to Programming with Java** [25030], **Foundations of Informatics I** [25074] **Foundations of Informatics II** [25076]

### Learning Outcomes

The student

- knows the main principles, methods and systems of computer science,
- can use this knowledge for applications in advanced computer science courses and other areas for situation-adequate problem solving,
- is capable of finding strategic and creative responses in the search for solutions to well defined, concrete, and abstract problems.

The student can deepen the learned concepts, methods, and systems of computer science in advanced computer science lectures.

### Content
Module: Introduction to Operations Research [WI1OR]

**Coordination:** Stefan Nickel, Oliver Stein, Karl-Heinz Waldmann

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

**Subject:** Operations Research

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<td>25040</td>
<td>Introduction to Operations Research I (p. 141)</td>
<td>2/2/2</td>
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<td>S. Nickel, O. Stein, K. Waldmann</td>
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<td>25043</td>
<td>Introduction to Operations Research II (p. 142)</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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**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* [25040] before attending the course *Introduction to Operations Research II* [25043].

**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.
Module: Mass and Energy Balances for Reacting Systems [W1ING1]

Coordination: Peter Pfeifer
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

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<td>22130</td>
<td>Mass and Energy Balances for Reacting Systems (p. 319)</td>
<td>2/0</td>
<td>W</td>
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<td>A. Kruse, P. Pfeifer</td>
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Learning Control / Examinations
The assessment is carried out by a written exam about the lecture Mass and Energy Balances for Reacting Systems [22130] (according §4(2), 1 of the examination regulation).
The overall grade of this module is the grade of the written exam.

Conditions
None.

Learning Outcomes
The student

• knows and understands energy and mass balances and the analysis of balance envelopes,
• can apply energy and mass balances on selected systems and processes,
• knows the problems, methods and processes of process engineering.

Content
• Aims and approaches
• Mass balance
• Water
• Nitrogen and ammonia
• Energy balance
• Natural gas
• Carbon dioxide
Module: Material Science [W11ING2]

Coordination: M. J. Hoffmann
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

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Courses in module

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<tr>
<td>21760</td>
<td>Material Science I (p. 352)</td>
<td>2/1</td>
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Learning Control / Examinations
The assessment of the module is carried out by a written examination (150 min) about the lecture Material Science I [21760] (according to Section 4(2), 1 of the examination regulation). The assessment procedures of each course of this module is defined for each course separately.

The examination is offered every semester. Re-examinations are offered at every ordinary examination date. The examination at the end of the summer term is carried out by a written or oral exam.

The grade of the module corresponds to the grade of this examination.

Conditions
None.

Learning Outcomes
The student

- knows and understands the correlation between atomic structure, microstructure and related macroscopic properties (e.g. mechanical or electrical behaviour)
- has basic knowledge on materials development and characterization

Content

- Atomic structure and interatomic bonding
- Structure of crystalline solids
- Imperfections in solids
- Mechanical behaviour
- Physical properties
- Solidification
- Thermodynamics of heterogeneous systems
- Phase diagrams
- Ferrous alloys
Module: Engineering Mechanics [WI1ING3]

Coordination: Carsten Proppe
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

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Courses in module

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<td>21208</td>
<td>Engineering Mechanics I (p. 328)</td>
<td>1/0.5</td>
<td>W</td>
<td>2.5</td>
<td>C. Proppe</td>
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Learning Control / Examinations
The assessment of the module is carried out by a written examination about the lecture Engineering Mechanics [21208] (according to Section 4(2), 1 of the examination regulation). The assessment procedures of each course of this module is defined for each course separately.
The overall grade of the module is the grade of the written examination.

Conditions
None.

Learning Outcomes
The student
- knows and understands the basic elements of statics,
- is able to solve basic problems in statics independently.

Content
Statics: force • moment • general equilibrium conditions • center of gravity • inner forces in structure • plane frameworks • adhesion
Module: Electrical Engineering [WI1ING4]

**Coordination:** Wolfgang Menesklou  
**Degree programme:** Wirtschaftsingenieurwesen (B.Sc.)  
**Subject:** Engineering Science

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### Courses in module

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<td>23223</td>
<td>Electrical Engineering I (p. 150)</td>
<td>2/2</td>
<td>W</td>
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<td>W. Menesklou</td>
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**Learning Control / Examinations**

The assessment of the module is carried out by a written examination about the lecture *Electrical Engineering I* [23223] (according to Section 4(2), 1 of the examination regulation). The assessment procedures of each course of this module is defined for each course separately. The grade of the module corresponds to the grade of this examination.

**Conditions**

None.

**Learning Outcomes**

The student knows and understands basic terms of electrical engineering and should be able to carry out simple calculations of DC and AC circuits.

**Content**

Supporting the lecture, assignments to the curriculum are distributed. These are solved into additional (voluntary) tutorials.
Module: Mathematics [WI1MATH]

Coordination: Günter Last
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Mathematics

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Courses in module

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<td>01350</td>
<td>Mathematics I (p. 224)</td>
<td>4/2/2</td>
<td>W</td>
<td>7</td>
<td>G. Last, Folkers, Klar</td>
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<tr>
<td>01830</td>
<td>Mathematics II (p. 225)</td>
<td>4/2/2</td>
<td>S</td>
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<td>G. Last, Folkers, Klar</td>
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<tr>
<td>01352</td>
<td>Mathematics III (p. 226)</td>
<td>4/2/2</td>
<td>W</td>
<td>7</td>
<td>G. Last, Folkers, Klar</td>
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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.
The overall grade of the module is the average of the grades for each course truncated after the first decimal.
The assessment procedures of each course of this module is defined for each course separately.

Conditions
The admission to the examinations carried out regardless of the evidence of the other examinations in the module.
It is strongly recommended to attend the courses in the following sequence: Mathematics I [01350], Mathematics II [01830] Mathematics III [01352]

Learning Outcomes
Content
Module: Statistics [WI1STAT]

Coordination: Svetlozar Rachev, Markus Höchstötter
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Statistics

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Courses in module

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<td>25008/25009</td>
<td>Statistics I (p. 314)</td>
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<td>25020/25021</td>
<td>Statistics II (p. 315)</td>
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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

Notice: The lecture Statistics I [25008/25009] is part of the preliminary examination concerning Section 8(1) of the examination regulation. This examination must be passed until the end of the examination period of the second semester. Any Re-examinations has to be passed until the end of the examination period of the third semester. Otherwise the examination claim will be lost.

Recommendations

To some extend knowledge of the content of the module Mathematics [WW1MATH/WI1MATH] is assumed. Therefore it is recommended to attend the course Mathematics I [01350] before attending the module Statistics [WI1STAT]. 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

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: sufficiency of statistics, point estimation (optimality, ML-method ), internal estimations, theory of tests (optimality, most important examples of tests)
6 Modules (Specialization)

6.1 Business Administration

Module: Foundations of Marketing [WI3BWLMAR]

Co ordination: Wolfgang Gaul, Bruno Neibecker  
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)  
Subject: Business Administration

<table>
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<td>W. Gaul</td>
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<td>25150</td>
<td>Marketing and Consumer Behavior (p. 220)</td>
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<td>25154</td>
<td>Modern Market Research (p. 233)</td>
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<td>Brand Management (p. 219)</td>
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Learning Control / Examinations

The assessment consists of a general written exam according to §4 Abs. 2, Nr. 1 of examination regulation. The written exam has a duration of 120 min. and contains topics from the main lecture [25150] as well as from the chosen lectures [25154], [25156], [25177]. The examination is offered every semester. Re-examinations are offered at every ordinary examination date and has to be absolved within one year.

The overall grade for the module is the average of the grades for each course weighted by the credits of the course. It is recommended, to attend more lectures than required to fulfill 9 CP as it is possible to examine in these additional lectures and influence the final grade positively.

Conditions

Successful completion of the module Business Administration [WI1BWL].

Learning Outcomes

Content
Module: Strategy and Organization [WI3BWLULO1]

**Coordination:** Hagen Lindstädt  
**Degree programme:** Wirtschaftsingenieurwesen (B.Sc.)  
**Subject:** Business Administration

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**Courses in module**

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<td>25902</td>
<td>Managing Organizations (p. 244)</td>
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<td>Special Topics in Management: Management and IT (p. 307)</td>
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<td>W/S</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 module Business Administration [WI1BWL]. For exceptions see remarks below.

**Learning Outcomes**

**Content**

**Remarks**

See German version.
Module: Industrial Production I [WI3BWLIIIP]

Coordination: Frank Schultmann
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Business Administration

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</table>

Learning Control / Examinations
The module contains “Fundamentals of Production Management” [25950] and one optional course. The examination will be in form of individual written exams acc. to §4(2), 1 ER. Exams are offered in every semester and can be re-examined at every ordinary examination date.

The overall modular grade is calculated by weighing the individual grades with the according credit points. The grade will be truncated after the first decimal. Additional results may be considered on request. Assessment procedures are described separately for each course of the module.

Conditions
Specific precondition for “Business Engineering” (B.Sc.) and “Economics Engineering” (B.Sc.): Successful passing of the module “Business Administration” [WI1BWL]. For exceptions see remarks below.

The course “Fundamentals of Production Management” [25950] 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 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.

Remarks
See German version.
Module: Energy Economics [WI3BWL1IP2]

Coordination: Wolf Fichtner
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Business Administration

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Courses in module

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<tr>
<td>26010</td>
<td>Introduction to Energy Economics (p. 143)</td>
<td>2/2</td>
<td>S</td>
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<td>W. Fichtner</td>
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<td>26012</td>
<td>Renewable Energy Sources - Technologies and Potentials (p. 156)</td>
<td>2/0</td>
<td>W</td>
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<td>W. Fichtner</td>
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<tr>
<td>25959</td>
<td>Energy Policy (p. 153)</td>
<td>2/0</td>
<td>S</td>
<td>3.5</td>
<td>M. Wietschel</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) about the lecture Introduction to Energy Economics [26010] 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 module Business Administration [WI1BWL]. For exceptions see remarks below.

Learning Outcomes
Content
Introduction to Energy Economics
Renewable Energies
Energy Policy

Remarks
See German version.
Module: Essentials of Finance [WI3BWLFBV1]

Coordination: Marliese Uhrig-Homburg, Martin E. Ruckes
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Business Administration

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<td>26575</td>
<td>Investments (p. 208)</td>
<td>2/1</td>
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<td>M. Uhrig-Homburg</td>
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<td>25216</td>
<td>Financial Management (p. 170)</td>
<td>2/1</td>
<td>S</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 module Business Administration [WI1BWL].

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: Insurance: Calculation and Control [WI3BWLFBV2]

Coordination: Christian Hipp
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Business Administration

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<td>26300</td>
<td>Insurance Models (p. 200)</td>
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<td>S</td>
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<td>C. Hipp, N.N.</td>
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<tr>
<td>26372</td>
<td>Insurance Game (p. 198)</td>
<td>2</td>
<td>S</td>
<td>4</td>
<td>C. Hipp, N.N.</td>
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</table>

Learning Control / Examinations

The assessment is carried out as a general written exam (according to Section 4(2), 1 of the examination regulation). In the lecture Insurance Game [26372] there has to be hold an oral presentation by each student as well (according to Section 4(2), 3 of the examination regulation). 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 consists of the grade of the written exam (80 percent) and the grade of the oral presentation (20 percent).

Conditions

Successful completion of the module Business Administration [WI1BWL].

Learning Outcomes

Content
Module: Risk and Insurance Management [WI3BWLFBV3]

Coordination: Ute Werner
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Business Administration

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<td>25055</td>
<td>Principles of Insurance Management (p. 249)</td>
<td>3/0</td>
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<td>4.5</td>
<td>U. Werner</td>
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<tr>
<td>26326</td>
<td>Enterprise Risk Management (p. 154)</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 module Business Administration [WI1BWL].

Learning Outcomes
See German version.

Content
See German version.

Remarks
The course Enterprise Risk Management [26326] is held by Dr. Edmund Schwake in winter term 2010/11.
Module: Insurance Markets and Management [WI3BWLFBV4]

**Coordination:** Ute Werner

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

**Subject:** Business Administration

<table>
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<td>Insurance Marketing (p. 199)</td>
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<td>Private and Social Insurance (p. 250)</td>
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<td>W</td>
<td>2.5</td>
<td>W. Heilmann, Besserer</td>
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<td>26350</td>
<td>Current Issues in the Insurance Industry (p. 132)</td>
<td>2/0</td>
<td>S</td>
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<td>International Risk Transfer (p. 204)</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 module *Business Administration* [WI1BWL].

**Learning Outcomes**
See German version.

**Content**
See German version.

**Remarks**
The course *Insurance Marketing* [26323] is offered in winter term 2010/11 and is held by Dr. Edmund Schwake. Furthermore the course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de

This module was formerly named *Insurance Management*. 
Module: Topics in Finance I [WI3BWLFBV5]

Coordination: Marliese Uhrig-Homburg, Martin E. Ruckes
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Business Administration

ECTS Credits 9  Cycle Every term  Duration 1

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<td>25210</td>
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<tr>
<td>25232</td>
<td>Financial Intermediation (p. 171)</td>
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<tr>
<td>25299</td>
<td>Business Strategies of Banks (p. 174)</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>W. Müller</td>
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<tr>
<td>26570</td>
<td>International Finance (p. 205)</td>
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<td>S</td>
<td>3</td>
<td>M. Uhrig-Homburg, Walter</td>
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<tr>
<td>26454</td>
<td>eFinance: Information Engineering and Management for Securities Trading (p. 140)</td>
<td>2/1</td>
<td>W</td>
<td>4.5</td>
<td>C. Weinhardt, R. Riordan</td>
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<td>26129</td>
<td>Specific Aspects in Taxation (p. 309)</td>
<td>3</td>
<td>W</td>
<td>4.5</td>
<td>B. Wigger, A. Presse</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 module Business Administration [WI1BWL].
It is only possible to choose this module in combination with the module Essentials in Finance [WI3BWLFBV1]. The module is passed only after the final partial exam of Essentials in Finance is additionally passed.
In addition to that it is possible to choose the module Topics in Finance II [WI3BWLFBV6]. In this case only those courses are electable, that have not been chosen in the module Topics in Finance II [WI3BWLFBV6] yet.

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: Topics in Finance II [WI3BWLFBV6]

Coordination: Marliese Uhrig-Homburg, Martin E. Ruckes
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Business Administration

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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 module Business Administration [WI1BWL]. It is only possible to choose this module in combination with the module Essentials in Finance [WI3BWLFBV1]. The module is passed only after the final partial exam of Essentials in Finance is additionally passed.
In addition to that it is possible to choose the module Topics in Finance I [WI3BWLFBV5]. In this case only those courses are electable, that have not been chosen in the module Topics in Finance I [WI3BWLFBV5] yet.

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
Module: eBusiness and Servicemanagement [WI3BWLISM1]

Coordination: Christof Weinhardt
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Business Administration

<table>
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<th>ID</th>
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<td>eServices (p. 158)</td>
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<td>C. Weinhardt, G. Satzger</td>
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<td>Management of Business Networks (p. 216)</td>
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<td>C. Weinhardt, J. Kraemer</td>
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<td>Special Topics in Information Engineering &amp; Management (p. 305)</td>
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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 module Business Administration [WI1BWL].

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 Prof. Kersten from Concordia University, Montreal, Canada. If it is possible to organize, depending on the start of term in Canada, the case study will be worked on by the students via internet in collaboration with Canadian students. The results will jointly be presented in a telephone conference.

The course “eFinance: information engineering and management for securities trading” provides 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- and 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.
Module: Supply Chain Management [WI3BWLISM2]

**Coordination:** Christof Weinhardt

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

**Subject:** Business Administration

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<td>25486</td>
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<td>2118078</td>
<td>Logistics - Organisation, Design, and Control of Logistic Systems (p. 211)</td>
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<td>S</td>
<td>6</td>
<td>K. Furmans</td>
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<tr>
<td>2118090</td>
<td>Quantitative Methods for Supply Chain Risk Management (p. 261)</td>
<td>3/1</td>
<td>S</td>
<td>6</td>
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<td>25488</td>
<td>Tactical and Operational Supply Chain Management (p. 324)</td>
<td>2/1</td>
<td>W</td>
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<td>S. Nickel</td>
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**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 separatly.

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 module *Business Administration* [WI1BWL].

**Learning Outcomes**
The module “Supply Chain Management” imparts knowledge for strategic and operative designing and control of supply chains spanning several enterprises. The students shall be able to analyze the coordination problems within supply chains, to judge them and to support them providing appropriate information systems. In order to be able to do this it is necessary to understand the coordination and planning mechanisms from the field of Operations Research and, on the other hand, to be familiar with methods from information management. Thus, the module gives an overview of methods and instruments of Supply Chain Management for the strategical, organizational and technical design of integrated supply chains.

**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 current seminar courses for this semester, which are complementary to this module, are listed on following webpage: http://www.iism.kit.edu/im/lehre
Module: eFinance [WI3BWLISM3]

**Coordination:** Christof Weinhardt
**Degree programme:** Wirtschaftsingenieurwesen (B.Sc.)
**Subject:** Business Administration

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**Courses in module**

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<tr>
<td>26454</td>
<td>eFinance: Information Engineering and Management for Securities Trading</td>
<td>2/1 W</td>
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<td>C. Weinhardt, R. Riordan</td>
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<td>25762</td>
<td>Intelligent Systems in Finance (p. 202)</td>
<td>2/1 S</td>
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<td>26550</td>
<td>Derivatives (p. 136)</td>
<td>2/1 S</td>
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<td>M. Uhrig-Homburg</td>
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<td>25296</td>
<td>Exchanges (p. 128)</td>
<td>1 S</td>
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<tr>
<td>26570</td>
<td>International Finance (p. 205)</td>
<td>2 S</td>
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<td>M. Uhrig-Homburg, Walter</td>
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**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 module *Business Administration* [WI1BWL].

**Learning Outcomes**

In the module “eFinance: Information engineering and management in finance” the students get an overview of modern approaches of information management in the finance sector. They learn to analyze specific financial problems from the point of view of information management and also to solve these problems by using the tools provided by information management. By doing so, they get to know finance products as information products and learn the state of the art of modern information processing in the finance sector.

**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 [WI3BWLISM4]

Coordination: Andreas Geyer-Schulz
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Business Administration

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<thead>
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<td>Customer Relationship Management</td>
<td>2/1</td>
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<td></td>
<td>(p. 133)</td>
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<tr>
<td>26522</td>
<td>Analytical CRM (p. 104)</td>
<td>2/1</td>
<td>S</td>
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<tr>
<td>26520</td>
<td>Operative CRM (p. 242)</td>
<td>2/1</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2) 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. Therby 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 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 module Business Administration [WI1BWL].

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 [WI3BWLISM4] 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 [26508] is given in English.
Module: Specialization in Customer Relationship Management [WI3BWLISM5]

Coordination: Andreas Geyer-Schulz  
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)  
Subject: Business Administration

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Courses in module

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<td>Analytical CRM (p. 104)</td>
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<td>A. Geyer-Schulz</td>
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<tr>
<td>26520</td>
<td>Operative CRM (p. 242)</td>
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<td>W</td>
<td>4.5</td>
<td>A. Geyer-Schulz</td>
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<tr>
<td>25158</td>
<td>Corporate Planning and Operations Research (p. 333)</td>
<td>2/1</td>
<td>W</td>
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<td>26240</td>
<td>Competition in Networks (p. 357)</td>
<td>2/1</td>
<td>W</td>
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<td>26466</td>
<td>eServices (p. 158)</td>
<td>2/1</td>
<td>S</td>
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<td>C. Weinhardt, G. Satzger</td>
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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 module Business Administration [WI1BWL] is required.
- It is only possible to choose this module in combination with the module CRM and Servicemanagement [WI3BWLISM4]. The module is passed only after the final partial exam of CRM and Servicemanagement is additionally passed.
- Or the course Analytic CRM [26522] or the course Operative CRM [26520] 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, . . .)
Module: Sustainable Construction [WI3BWLOOW1]

Coordination: Thomas Lützkendorf
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Business Administration

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Courses in module

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<tr>
<td>26404w</td>
<td>Design, Construction and Assessment of Green Buildings I (p. 122)</td>
<td>2/1 W</td>
<td>4,5</td>
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<tr>
<td>26404</td>
<td>Sustainability Assessment of Construction Works (p. 123)</td>
<td>2/1 S</td>
<td>4,5</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 o. 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 final grade of the module is the average of the grades of each course weighted by the credits and truncated after the first decimal.

It is possible to include the grade of a seminar paper, dealing with a topic from the area of sustainable construction, into the final grade of the module (according to Section 4(2), 3 of the examination regulation). The seminar has a weight of 20 percent.

Conditions
Successful completion of the module Business Administration [WI1BWL].

Recommendations
The combination with the module Real Estate Management [WI3BWLOOW2] 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 [WI3BWLOOW2]

Coordination: Thomas Lützkendorf
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Business Administration

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Courses in module

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<td>26400w</td>
<td>Real Estate Management I (p. 264)</td>
<td>2/2</td>
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<td>26400</td>
<td>Real Estate Management II (p. 265)</td>
<td>2/2</td>
<td>S</td>
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Learning Control / Examinations

The assessment is carried out as partial exams (according to Section 4(2), 1 o. 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 of each course weighted by the credits and truncated after the first decimal.

The examination for the courses generally consist of a 60 minute written exam. A 20 minute oral exam is only offered after the second failure of the written exam. The exams for the respective parts (REM I and REM II) happen in the same semester in which the lectures take place. Therefore, REM I exams currently only take place in the winter semester and REM II exams take place in the summer semester. In each semester there are two alternative dates for the exam and exams can be re-sat at any regular exam date.

It is possible to include the grade of a seminar paper, dealing with a topic from the area of sustainable construction, into the final grade of the module (according to Section 4(2), 3 of the examination regulation). The seminar has a weight of 20 percent.

Conditions
Successful completion of the module Business Administration [WI1BWL].

Recommendations
The combination with the module Design Constructions and Assessment of Green Buildings [WI3BWLOOW1] 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 and 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: Human Resource Management [WI3BWLIAP1]

Coordination: Christine Harbring
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Business Administration

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<td>25969</td>
<td>Compensation and Motivation (p. 336)</td>
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<td>S</td>
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<td>n.n.</td>
<td>Human Resource Management and Labor Market Institutions (p. 245)</td>
<td>2/1</td>
<td>S</td>
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<td>C. Harbring</td>
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<td>25930</td>
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<td>2/1</td>
<td>W</td>
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<td>25967</td>
<td>Industrial Studies of Time and Motion (p. 192)</td>
<td>2</td>
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<td>25934</td>
<td>Selected Topics in Ergonomics (p. 114)</td>
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**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 module *Business Administration* [WI1BWL].

**Learning Outcomes**

**Content**
6.2 Economics

Module: Applied Game Theory [WI3VWL1]

Coordination: Siegfried Berninghaus
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Economics

ECTS Credits | Cycle | Duration
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Courses in module

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<td>Game Theory I (p. 310)</td>
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<td>25369</td>
<td>Game Theory II (p. 311)</td>
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<td>S. Berninghaus</td>
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<td>25371</td>
<td>Industrial Organization (p. 194)</td>
<td>2/2</td>
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<td>25373</td>
<td>Experimental Economics (p. 159)</td>
<td>2/2</td>
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<td>26240</td>
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<td>W</td>
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<td>K. Mitusch</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. Every singled lecture is examined within a 80 min. written exam at the end of the of the recess period. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

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

In the lecture Experimental Economics [25373] there may be the possibility - depending on the lecturer - to improve the final mark of the passed exam by writing a term paper and presenting it in class.

Conditions
One of the lectures Game Theory I [25525] or Game Theory II [25369] has to be completed.
Successful completion of the module Economics [WW1VWL]. For exceptions see remarks below.

Recommendations
Good knowledge of mathematics and statistics is recommended.

Learning Outcomes
The student
- analyzes economic interdependencies under use of experimental methods and evaluates theoretical concepts,
- applies theoretical algorithms to economic and managerial problems,
- is able to analyze complex strategic decision problems by means of game theoretical concepts,
- knows basic solutions concepts of simple strategic decisions and is able to apply them to concrete economic problems,
- understands economic and managerial decision problems and is able to solve them by applying suitable solution concepts,
- knows experimental methods in economics from experiment design to evaluation of data.

Content
Lectures discuss individual as well as group decisions under (un-)certainty. Tutorials apply theoretical concepts to case studies. Theoretical models are compared to empirical findings.

Remarks
See german version.
The lecture Competition in Networks [26240] was included in this module in winter term 2010/11.
Module: International Economics [WI3VWL3]

Coordination: Jan Kowalski
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Economics

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<th>CP</th>
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<tr>
<td>26254</td>
<td>International Economic Policy (p. 206)</td>
<td>2/0</td>
<td>S</td>
<td>4</td>
<td>J. Kowalski</td>
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<td>26259</td>
<td>Management and Organisation of Projects in Developing Countries (p. 218)</td>
<td>2/1</td>
<td>W</td>
<td>5</td>
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<td>26252</td>
<td>International Economics (p. 115)</td>
<td>2/1</td>
<td>W</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 exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately. The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Note the changes in course offering under “remarks”.

Conditions
Successful completion of the module Economics [WW1VWL].

Learning Outcomes
The students
- obtain comprehensive knowledge on open global economy
- become experts in dealing with the complex world-wide market, and are able to react to the challenges of the global economy

Content
Problems of the internationalisation of economic activities, European institutions and programs, as well as questions of the less developed countries and development policy.
Module: Strategic Games [WI3VWL4]

**Coordination:** Siegfried Berninghaus  
**Degree programme:** Wirtschaftsingenieurwesen (B.Sc.)  
**Subject:** Economics

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### Courses in module

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<td>Game Theory II (p. 311)</td>
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<td>S</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. Every single lecture is examined within a 80 min. written exam at the end of the recess period. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

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

### Conditions

None.

### Recommendations

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

1. Game Theory I [25525]
2. Game Theory II [25369]

### Learning Outcomes

The student
- structurizes complex strategic decision problems and applies efficient solution algorithms,
- has a broad overview over game and decision theory,
- applies taught methods to problems of political and managerial consulting,
- knows basic solution concepts of simple strategic decision situations and is able to apply them to concrete economic problems,
- knows and analyzes strategic decisions, knows advanced solution concepts and applies them,
- knows basic elements of decision theory under (un-)certainty as well as more advanced models and is able to analyze and solve these problems, understands decision behavior by confronting it with experimental economics.

### Content

The module consists of lectures in strategic decision making against other players or “nature”. Building on normal and extensive form games different strategic and non-strategic decision situations are laid out. Then more complex situations (e.g., repeated bargaining, reputation building) are discussed.
Module: Microeconomic Theory [WI3VWL6]

Coordination: Clemens Puppe
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Economics

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Courses in module

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<td>25527</td>
<td>Advanced Topics in Economic Theory (p. 97)</td>
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<td>C. Puppe, M. Hillebrand, K. Mütusch</td>
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<td>Welfare Economics (p. 360)</td>
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<td>Competition in Networks (p. 357)</td>
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Learning Control / Examinations

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

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

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

Conditions
Successful completion of the module Economics [WW1VWL].

Learning Outcomes

Content

Remarks
The lecture Competition in Networks [26240] was included in this module.
Module: Macroeconomic Theory [WI3VWL8]

Coordination: Clemens Puppe
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Economics

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Courses in module

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<td>25543</td>
<td>Theory of Economic Growth (p. 344)</td>
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<td>M. Hillebrand</td>
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Learning Control / Examinations

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

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

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

Conditions

Successful completion of the module Economics [WW1VWL].

Recommendations

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

Learning Outcomes

Content
Module: Public Finance [WI3VWL9]

Coordination: Berthold Wigger
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Economics

<table>
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Courses in module

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<td>26120</td>
<td>Public Revenues (p. 238)</td>
<td>2/1</td>
<td>S</td>
<td>4,5</td>
<td>B. Wigger, Assistenten</td>
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<td>26129</td>
<td>Specific Aspects in Taxation (p. 309)</td>
<td>3</td>
<td>W</td>
<td>4,5</td>
<td>B. Wigger, A. Presse</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 exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

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

Conditions
Successful completion of the module Economics [WW1VWL].

Learning Outcomes

Content
As a branch of Economics, Public Finance is concerned with the theory and policy of the public sector and its interrelations with the private sector. It analyzes the economic role of the state from a normative as well as from a positive point of view. The normative view examines efficiency- and equity-oriented motives for government intervention and develops fiscal policy guidelines. The positive view explains the actual behavior of economic agents in public sector affairs. Special fields of Public Finance are public revenues, i.e. taxes and public debt, public expenditures for publicly provided goods, and welfare programs.

Remarks
The course Finanzpolitik [26122] has been replaced with the course Spezielle Steuerlehre [26129] since winter term 2010/11. The examination will be offered latest until summer term 2011 (repeaters only).
6.3 Statistics

Module: Statistical Applications of Financial Risk Management [WI3STAT]

Coordination: Svetlozar Rachev
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Statistics

ECTS Credits: 9
Cycle: Every term
Duration: 1

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<td>Statistics and Econometrics in Business and Economics (p. 313)</td>
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<td>W</td>
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<td>W. Heller</td>
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<td>25016</td>
<td>Economics III: Introduction in Econometrics (p. 343)</td>
<td>2/2</td>
<td>S</td>
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<td>25355</td>
<td>Bank Management and Financial Markets, Applied Econometrics (p. 121)</td>
<td>2/2</td>
<td>S</td>
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<td>25375</td>
<td>Data Mining (p. 134)</td>
<td>2</td>
<td>W</td>
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<td>G. Nakhaeizadeh</td>
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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 module Statistics [WI1STAT].

Learning Outcomes

Content
6.4 Informatics

Module: Emphasis Informatics [WI3INFO1]

Coordination: Hartmut Schmeck, Andreas Oberweis, Detlef Seese, Rudi Studer, Stefan Tai
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Informatics

<table>
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<td>Advanced Programming - Java Network Programming (p. 254)</td>
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<td>D. Seese, Ratz</td>
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<td>25886</td>
<td>Advanced Programming - Application of Business Software (p. 255)</td>
<td>2/1/2</td>
<td>W</td>
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<td>A. Oberweis, S. Klink</td>
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<tr>
<td>25070</td>
<td>Applied Informatics I - Modelling (p. 106)</td>
<td>2/1</td>
<td>W</td>
<td>5</td>
<td>A. Oberweis, R. Studer, S. Agarwal</td>
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<tr>
<td>25033</td>
<td>Applied Informatics II - IT Systems for e-Commerce (p. 107)</td>
<td>2/1</td>
<td>S</td>
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<td>25702</td>
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<td>W</td>
<td>5</td>
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<td>Knowledge Management (p. 359)</td>
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<td>W</td>
<td>5</td>
<td>R. Studer</td>
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<td>25760</td>
<td>Complexity Management (p. 130)</td>
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<td>S</td>
<td>5</td>
<td>D. Seese</td>
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<td>25728</td>
<td>Software Engineering (p. 302)</td>
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<td>25770</td>
<td>Service Oriented Computing 1 (p. 295)</td>
<td>2/1</td>
<td>W</td>
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<td>S. Tai</td>
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<tr>
<td>Platzhalter</td>
<td>Special Topics of Applied Informatics (p. 306)</td>
<td>2/1</td>
<td>W/S</td>
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Learning Control / Examinations
The assessment is carried out as two partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module. For passing the module exam in every singled partial exam the respective minimum requirements has to be achieved.

- Partial exam II: all the rest

The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module seperately.
When every singled examination is passed, 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
Either the course Advanced Programming - Java Network Programming [25889] or the course Advanced Programming - Application of Business Software [25886] has to be attended.

Learning Outcomes
The student

- has the capability of dealing with the practical application of the Java programming language (which is the dominating programing language in many application areas) or alternatively the ability to configure, parametrize and deploy enterprise software to enable, support and automate business processes,
- is familiar with methods and systems of a core topic or core application area of computer science,
- can choose these methods and system situation adequatley and can furthermore design and employ them for problem solving,
- is able to independently find strategic and creative answers in the finding of solutions to well defined, concrete, and abstract problems.

Content
Module: Electives in Informatics [WI3INFO2]

Coordination: Hartmut Schmeck, Andreas Oberweis, Detlef Seese, Stefan Tai, Rudi Studer
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Informatics

<table>
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### Courses in module

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<td>Platzhalter</td>
<td>Special Topics of Applied Informatics (p. 306)</td>
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### Learning Control / Examinations

The assessment is carried out as two 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. For passing the module exam in every singled partial exam the respective minimum requirements has to be achieved.

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.

When every singled examination is passed, the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

### Conditions
None.

### Learning Outcomes

The student
- knows and has mastered methods and systems for core topics and core application areas of computer science,
- can choose these methods and system situation adequately and can furthermore design and employ them for problem solving,
- is able to independently find strategic and creative answers in the finding of solutions to well defined, concrete, and abstract problems.

### Content
6.5 Operations Research

Module: Applications of Operations Research [WI3OR5]

Coordination: Stefan Nickel
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Operations Research

<table>
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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

At least one of the courses Facility Location and Strategic Supply Chain Management [25486] and Tactical and Operational Supply Chain Management [25488] 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 (http://www.ior.kit.edu/).
Module: Methodical Foundations of OR [WI3OR6]

Coordination: Oliver Stein
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Operations Research

ECTS Credits: 9
Cycle: Every term
Duration: 1

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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 [25111] and Global Optimization I [25134] has to 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 module 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 [WI3OR7]

Coordination: Karl-Heinz Waldmann
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Operations Research

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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
None.

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

Content
Topics overview:
- 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 three years are announced online (http://www.ior.kit.edu/)
6.6 Engineering Sciences

Module: Introduction to Technical Logistics [WI3INGMB13]

Cooperation: Kai Furmans
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

<table>
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<td>Industrial Application of Material Handling Systems in Sorting and Distribution Systems (p. 108)</td>
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Learning Control / Examinations
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The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

To improve the overall grade of the module up to one grading scale (0.3) there might be taken an optional term paper in the field of the IFL. The term paper may not be convalidated in the seminar module.

Conditions
Successful completion of the engineering modules of the core programm.

Learning Outcomes
The student acquires

- well-founded knowledge and method knowledge in the main topics of technical logistics,
- expertise and understanding about the functionality of conveyor technology,
- ability for modeling logistic systems with adequate accuracy by using simple models,
- ability to evaluate logistic systems and to identify cause-and-effects-chains within logistic systems.

Content
The module Introduction to Technical Logistics provides first insights into main topics of logistics. Within the lectures, the interaction between several components of material handling systems will be clarified. The focus will be on technical characteristics of material handling technology and basics for sizing of material handling systems. To gain a deeper understanding, the course is accompanied by exercises and further improved by case studies.

Remarks
The courses Technische Logistik I, Grundlagen [2117081] and Technische Logistik I, Grundlagen und Systeme [2117082] are changed in content against the former course Technische Logistik I [2117501].

The course [21692] Internationale Produktion und Logistik is not offered here anymore.

Examinations for the canceled courses will be offered latest until summer term 2011.
Module: Automotive Engineering [W3INGMB5]

Coordination: Frank Gauterin
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

ECTS Credits 9
Cycle Every term
Duration 1

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<td>Fundamentals for Design of Motor-Vehicle Bodies I (p. 185)</td>
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The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
Successful completion of the engineering modules of the core programm.

Recommendations

Learning Outcomes
The student
• knows the most important components of a vehicle,
• knows and understands the functioning and the interaction of the individual components,
• knows the basics of dimensioning the components.

Content
Module: Handling Characteristics of Motor Vehicles [WI3INGMB6]

Coordination: Frank Gauterin
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

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) 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 engineering modules of the core programm.

Recommendations

Learning Outcomes
The student
- knows and understands the characteristics of vehicles, owing to the construction and design tokens,
- knows and understands especially the factors being relevant for comfort and acoustics
- is capable of fundamentally evaluating and rating handling characteristics.

Content
Module: Vehicle Development [WI3INGMB14]

Coordination: Frank Gauterin
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

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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 engineering modules of the core programme.

Recommendations

Learning Outcomes
The student
- knows and understands the procedures in automobile development,
- knows and understands the technical specifications at the development procedures,
- is aware of notable boundaries like legislation.

Content
Module: Mobile Machines [WI3INGMB15]

Coordination: Marcus Geimer
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

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Learning Control / Examinations
The assessment is carried out as a general oral exam (according to Section 4(2), 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 examination is offered every semester. Re-examinations are offered at every ordinary examination date.

The overall grade of the module is the grade of the oral examination.

The assessment may be carried out as partial oral exams (according to Section 4(2), 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. In this case the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

The assessment procedures are described for each course of the module separately.

Conditions
Successful completion of the engineering modules of the core programme.

Recommendations
Knowledge of Fluid Power Systems are helpful, otherwise it is recommended to take the course Fluid Power Systems [21093].

Learning Outcomes
The student

- knows and understands the basic structure of the machines
- masters the basic skills to develop the selected machines

Content
In the module of Mobile Machines [WI3INGMB15] the students will learn the structure of the machines and deepen the knowledge of the subject for developing the machines. After conclusion the module the student will know the latest developments in mobile machines and is able to evaluate the concepts and the trends of developments. The module is practically orientated and supported by industry partners.
Module: Combustion Engines [WI3INGMB16]

Coordination: Heiko Kubach
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

ECTS Credits 9
Cycle Every term
Duration 1

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<td>Supercharging of Internal Combustion Engines (p. 113)</td>
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<td>21134</td>
<td>Methods in Analyzing Internal Combustion (p. 229)</td>
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<td>21109</td>
<td>Motor Fuels for Combustion Engines and their Verifications (p. 126)</td>
<td>2</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the weighted average of the grades for each course and truncated after the first decimal. The weighting factors are:

- **Combustion Engines A [21101]:** 6
- **Combustion Engines B [21135]:** 4
- all the rest: 3

Conditions
Successful completion of the engineering modules of the core programme.
The course **Combustion Engines A [21101]** is obligatory.

Recommendations
Knowledge in the area of thermodynamics is helpful.

Learning Outcomes

Content
Module: Engine Development [WI3INGMB17]

Coordination: Heiko Kubach
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

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**Courses in module**

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<tr>
<td>21101</td>
<td>Combustion Engines A (p. 334)</td>
<td>4/2</td>
<td>W</td>
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<td>21135</td>
<td>Combustion Engines B (p. 335)</td>
<td>2/1</td>
<td>S</td>
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<tr>
<td>21112</td>
<td>Supercharging of Internal Combustion Engines (p. 113)</td>
<td>2</td>
<td>S</td>
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<td>Golloch</td>
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<td>21114</td>
<td>Simulation of Spray and Mixture Formation in Internal Combustion Engines (p. 301)</td>
<td>2</td>
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<td>21109</td>
<td>Motor Fuels for Combustion Engines and their Verifications (p. 126)</td>
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<td>21138</td>
<td>Internal Combustion Engines and Exhaust Gas Aftertreatment Technology (p. 181)</td>
<td>2</td>
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<td>21137</td>
<td>Engine Measurement Technologies (p. 234)</td>
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<td>S</td>
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**Learning Control / Examinations**

The assessment is carried out as partial exams (according to Section 4(2), 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 weighted average of the grades for each course and truncated after the first decimal. The weighting factors are:

- *Combustion Engines A* [21101]: 6
- *Combustion Engines B* [21135]: 4
- all the rest: 3

**Conditions**

Successful completion of the engineering modules of the core programme.

The courses *Combustion Engines A* [21101] and *Combustion Engines B* [21135] are obligatory and have to be attended.

**Recommendations**

Knowledge in the area of thermodynamics is helpful.

**Learning Outcomes**

**Content**
Module: Production Engineering I [WI3INGMB10]

Coordination: Volker Schulze
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

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Courses in module

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<td>2150660</td>
<td>Integrated Production Planning (p. 201)</td>
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<td>2149900</td>
<td>Machine Tools and Industrial Handling I (p. 355)</td>
<td>2/1</td>
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Learning Control / Examinations
Module exams take the form of written examinations (as per §4(2), 1 SPO [study and examination regulations]) about the different lectures and seminars of the module. Exams can be taken each semester during the lecture-free period and can be retaken at every official examination date. Performance assessments will be completed for every lecture and seminar of the module. The overall grade will be created from the grades of the partial examinations weighted with the respective CPs. Optionally, the module grade can be improved by writing a seminar paper (as per §4(2), 3 SPO [study and examination regulations]) at wbk Institute of Production Science.

Conditions
Prerequisites for admission to examination:
- Manufacturing Technology [21657]: Successfull Completion of the modules Material Science [WI1ING2] and Engineering Mechanics [WI1ING3]
- Integrated Production Planning [21660]: None.
- Machine Tools 1 and 2 [2149900 and 2149901]: Successful completion of the module Electrical Engineering [WI1ING4].

Learning Outcomes
The student
- knows and understands the content covered by the selected lectures and seminars of the module Production Engineering I (manufacturing engineering, organisation and planning, machine tools and robots),
- is able to use that knowledge in a targeted way for an efficient production engineering in the selected area.

Content
This module from the field of engineering science covers the basic aspects of production engineering, including one of the three subject areas manufacturing engineering, machine tool and handling technology and organisation and planning. For the module Production Engineering I, one subject area is required.
Module: Production Engineering II [WI3INGMB4]

Coordination: Volker Schulze
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

ECTS Credits 18 Cycle Every term Duration 1

Courses in module

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Learning Control / Examinations
Module exams take the form of written examinations (as per §4(2), 1 SPO [study and examination regulations]) about the different lectures and seminars of the module. Exams can be taken each semester during the lecture-free period and can be retaken at every official examination date. Performance assessments will be completed for every lecture and seminar of the module. The overall grade will be created from the grades of the partial examinations weighted with the respective CPs. Optionally, the module grade can be improved by writing a seminar paper (as per §4(2), 3 SPO [study and examination regulations]) at wbk Institute of Production Science.

Conditions
Prerequisites for admission to examination:
- Manufacturing Technology [21657]: Successfull Completion of the modules Material Science [WI1ING2] and Engineering Mechanics [WI1ING3]
- Integrated Production Planning [21660]: None.
- Machine Tools 1 and 2 [2149900 and 2149901]: Successful completion of the module Electrical Engineering [WI1ING4].

Learning Outcomes
The student
- knows and understands the content covered by the selected lectures and seminars of the module Production Engineering II (manufacturing engineering, organisation and planning, machine tools and robots),
- is able to use that knowledge in a targeted way for an efficient production engineering in the selected areas.

Content
This module from the field of engineering science covers the basic aspects of production engineering, including two of the three subject areas manufacturing engineering, machine tool and handling technology and organisation and planning. For the Production Engineering II module two subject areas are required.
Module: Production Engineering III [WI3INGMB7]

Coordination: Volker Schulze
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

ECTS Credits | Cycle | Duration
-------------|-------|---------
27 | Every term | 2

Courses in module

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Learning Control / Examinations
Module exams take the form of written examinations (as per §4(2), 1 SPO [study and examination regulations]) about the different lectures and seminars of the module. Exams can be taken each semester during the lecture-free period and can be retaken at every official examination date. Performance assessments will be completed for every lecture and seminar of the module. The overall grade will be created from the grades of the partial examinations weighted with the respective CPs. Optionally, the module grade can be improved by writing a seminar paper (as per §4(2), 3 SPO [study and examination regulations]) at wbk Institute of Production Science.

Conditions
Admission requirements for the module examinations:
- Manufacturing Engineering [21657]: Successful completion of modules Materials Science [WI1ING2] and Engineering Mechanics [WI1ING3]
- Integrated Production Planning [21660]: None.
- Machine Tools 1 and 2 [2149900 and 2149901]: Successful completion of the module Electrical Engineering [WI1ING4].

Learning Outcomes
The student
- knows and understands the content covered by the lectures and seminars of the module (manufacturing engineering, organisation and planning, machine tools and robots),
- is able to use that knowledge in a targeted way for an efficient production engineering.

Content
This module from the field of engineering science covers the basic aspects of production engineering, including manufacturing engineering, machine tools and handling technology and organisation and planning. For the module Production Engineering III all three subject areas are required.
Module: Specialization in Engineering Science [WI3INGMB8]

**Coordination:** M. J. Hoffmann  
**Degree programme:** Wirtschaftsingenieurwesen (B.Sc.)  
**Subject:** Engineering Science

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### Courses in module

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<td>Material Science II for Business Engineers (p. 353)</td>
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<td>23224</td>
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### Learning Control / Examinations

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place at the beginning of the recess period. 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 removed from the average of the partial examinations, with at least two partial exams need to be.

### Conditions

The corresponding course of the fundamental studies to each course in this module has to be completed successfully.

### Learning Outcomes

The learning objectives are given in the individual descriptions of the courses.

### Content

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*Business Engineering (B.Sc.)*

Module Handbook, Date: 23.09.2010
Module: Emphasis Material Science [WI3INGMB9]

Coordination: M. J. Hoffmann
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

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Courses in module

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<td>Constitution and Properties of Wear-resistant materials (p. 112)</td>
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<td>Introduction in Ceramics (p. 144)</td>
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<td>Systematic Selection of Materials (p. 322)</td>
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<td>Failure of Structural Materials: Fatigue and Creep (p. 338)</td>
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<td>Failure of Structural Materials: Deformation and Fracture (p. 339)</td>
<td>2 W</td>
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<td>Materials of Leightweight Construction (p. 351)</td>
<td>2 S</td>
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<td>Material Science and Engineering III (p. 354)</td>
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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
The course Material Science I [21760] has to be completed successfully.

Recommendations
It is recommended to have natural science basic knowledge and to be familiar with the content of the course Material Science II [21782].

Learning Outcomes
The student understands and could explain

- microstructure property relationships for the most relevant material classes
- is able to select appropriate materials with respect to given technical applications

Content
Module: Product Lifecycle Management [WI3INGMB21]

Coordination: Jivka Ovtcharova
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

ECTS Credits: 9
Cycle: Every term
Duration: 1

Courses in module

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<td>21366</td>
<td>Product Lifecycle Management in the Manufacturing Industry (p. 252)</td>
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<td>Computer Integrated Planning of New Products (p. 266)</td>
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<td>Efficient Creativity - Processes and Methods within the Automotive Industry (p. 139)</td>
<td>2</td>
<td>S</td>
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Learning Control / Examinations
The assessment is carried out as a written exam about Product Lifecycle Management (90 min) (according to Section 4(2), 1 of the examination regulation) and a oral exam (ca. 30 min.) about another lecture (according to Section 4(2), 2 of the examination regulation), whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module seperately.
The overall grade of the module is made up of the grade for the written examination [67%] and the grade for the oral examination [33%].

Conditions
Successful completion of the engineering modules of the core programm.

Learning Outcomes
Content

Coordination: Bernd Hoferer, Thomas Leibfried
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

<table>
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<th>ECTS Credits</th>
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<td>Systems for Electrical Energy (p. 148)</td>
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<td>2/2</td>
<td>W</td>
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<td>23356</td>
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<td>Automation of Power Grids (p. 116)</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place at the beginning of the recess period. 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 weighted average of the grades for each course and truncated after the first decimal.

Conditions
The engineering science modules of the fundamental studies have to be completed successfully.

Learning Outcomes
The student

- has basic and some advanced knowledge of electrical power engineering,
- is capable to analyse and develop electrical power engineering systems.

Content
The module deals with basic knowledge about the structure and operation of electrical power networks and their needed facilities. Further lectures give an insight into specific topics, such as Automation in electric power engineering or the procedures for generating electrical energy.

Remarks
The course Power Network Analysis was formerly known as Electric Power System Engineering I.
The course Diagnostics on Power Network Equipment [23365] is not offered any more. Exams can still be taken until summer term 2011. Please contact the institute.
Module: Control Engineering [WI3INGETIT2]

Coordination: Mathias Kluwe
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

<table>
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Courses in module

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<tr>
<td>23155</td>
<td>System Dynamics and Control Engineering</td>
<td>2/1</td>
<td>S</td>
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<td>S. Hohmann</td>
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<td>23168</td>
<td>Modelling and Identification (p. 232)</td>
<td>2/1</td>
<td>S</td>
<td>4.5</td>
<td>n.N.</td>
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</tbody>
</table>

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

The engineering science modules of the fundamental studies have to be completed successfully.

The courses are to be attended in the following sequence:

1. System Dynamics and Control Engineering [23155]
2. Modelling and Identification [23168]

Recommendations

Knowledge of integral transformations are assumed. There it is recommended to attend the courses Complex Analysis and Integral Transformations beforehand.

Learning Outcomes

The students

- get familiar with the basic concepts of control theory,
- learn and understand the elements, the structure and the behavior of dynamic systems,
- have insight in the problems of control and intuition about methods available to solve those problems as well in frequency domain as in state space,
- get familiar with the basic principles and methods for the theoretical and experimental modelling of dynamic systems.

Content

This module familiarizes students with the basic elements, structures and the behavior of dynamic systems. It gives them insight into the problems of control and intuition about methods available to solve such problems. Both frequency response and state space methods for analysis and design of dynamic systems are considered.

Above that, the students learn the basic principles and methods for the theoretical and experimental modelling of dynamic systems.

Remarks

The cycle for the lecture System Dynamics and Control Engineering [23155] has been changed from winterterm into summerterm.
Module: Fundamentals of Spatial and Infrastructural Development [WI3INGBGU1]

Coordination: Ralf Roos
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

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

Courses in module

<table>
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<tr>
<th>ID</th>
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<tr>
<td>19027</td>
<td>Basics in Transport Planning and Traffic Engineering (p. 337)</td>
<td>1/1</td>
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<td>3</td>
<td>P. Vortisch, B. Chlond</td>
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<tr>
<td>19026</td>
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<tr>
<td>19028</td>
<td>Spatial Planning and Planning Law (p. 262)</td>
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</table>

Learning Control / Examinations
The assessment of the module is carried out as a general written examination (120 minutes) according to §4(2), 1 of the examination regulation.
The exam is offered in each semester as well as the re-examination. In case of failing or to improve the examination grade an additional oral examination (according to §4(2), 2 of the examination regulation) is offered in the same examination period.
The overall grade of the module corresponds to the grade of the written examination or the average of the marks for the written and the oral assessment.

Conditions
Successful completion of the engineering modules of the core programm.

Learning Outcomes
Learning the fundamental terminology and methodology of spatial and transportation planning, traffic engineering as well as highway engineering

Content
Basic tasks and contents of different planning levels, for example: Land use and conflicts, provision of services and infrastructure as well as their costs, planning on local, regional, national and European level.

Fundamentals of transportation planning (convention for analyses, surveys of travel behaviour), fundamentals of traffic engineering

Design Basics in Highway Engineering: Road network layout, driving dynamics, principles of highway design; earthworks, pavements and their dimensioning
Module: Foundations of Guided Systems [WI3INGBGU2]

Coordination: Michael Weigel
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

ECTS Credits | Cycle | Duration
---|---|---
9 | Every term | 2

Courses in module

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<td>Railway Logistics, Management and Operating - Part I (p. 146)</td>
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</table>

Learning Control / Examinations
The assessment is carried out as a general written module exam according to Section 4 Abs. 2, Nr. 1 of the examination regulation. The module exam has a duration of 90 min.
The exam is offered each semester. The re-examination is offered upon prior agreement with the interested participants and not later than the next regular examination date.
The overall grade of the module is the grade for the exam.

Conditions
The engineering science modules of the fundamental studies have to be completed successfully.

Learning Outcomes
Content
Module: Reaction Engineering I [WI3INGCV2]

Coordination: Bettina Kraushaar-Czarnetzki
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

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

**Courses in module**

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</table>

**Learning Control / Examinations**

The assessment is carried out by a written exam (according to §4 Abs. 2, Nr. 1 of the examination regulation) about the lecture Reaction Engineering I [22114].
The assessment takes place in the recess period and can be resited at every ordinary examination date.
Permitted utilities: calculator, script, its own formulary and own notes.
The overall grade of the module is the grade of the written exam.

**Conditions**

None.

**Learning Outcomes**

The Student

- has acquired fundamental knowledge in chemical reaction engineering and knows the important reactor types used for homogeneous chemical and enzymatic reaction systems,
- can analyse the performance of reactors,
- is able to choose the suitable reactor type and to identify the optimum processing conditions for the efficient, sustainable and safe production of desired products.

**Content**

The course addresses mass balances of model reactors, selectivity control in multiple reactions, catalysis and kinetics of enzymatic reactions, energy balances and temperature effects.
Module: Understanding and Prediction of Disasters I [WI3INGINTER1]

Cooperation: Ute Werner
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

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<td>Müller</td>
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</table>

Learning Control / Examinations

The assessment is carried out as partial exams (according to Section 4(2), 1-3 of the examination regulation) of the single courses/exams 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 engineering science module of the core program.

In Remote Sensing, Remote Sensing Systems [20241] and Remote Sensing Methods [20243] can be chosen as a minimal combination, but it is strongly recommended to choose the comprehensive combination Remote Sensing [GEOD-BFB-1], which includes Remote Sensing Systems [20241], Remote Sensing Methods [20243] and Hauptvermessungübung III [20245]. There are no singular exams for Remote Sensing Systems [20241] and Remote Sensing Methods [20243]. Therefore it is only possible to choose either Remote Sensing [GEOD-BFB-1] or one of the courses Remote Sensing Systems [20241], Remote Sensing Methods [20243] or Hauptvermessungübung III [20245] (because they are already included).

Learning Outcomes

See German version.

Content

See German version.

Remarks

In agreement with the coordinator of the module other suitable courses than the ones displayed can be taken.
Module: Understanding and Prediction of Disasters II [W3INGINTER2]

Coordination: Ute Werner  
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)  
Subject: Engineering Science

ECTS Credits  
Cycle Every term  
Duration 1

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

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

Conditions  
Successful completion of the engineering science moduls of the core program.

In Remote Sensing, Remote Sensing Systems [20241] and Remote Sensing Methods [20243] can be chosen as a minimal combination, but it is strongly recommended to choose the comprehensive combination Remote Sensing [GEOD-BFB-1], which includes Remote Sensing Systems [20241], Remote Sensing Methods [20243] and Hauptvermessungsübung III [20245].

There are no singular exams for Remote Sensing Systems [20241] and Remote Sensing Methods [20243]. Therefore it is only possible to choose either Remote Sensing [GEOD-BFB-1] or one of the courses Remote Sensing Systems [20241], Remote Sensing Methods [20243] or Hauptvermessungsübung III [20245] (because they are already included).

It is only possible to choose this module in combination with the module Understanding and Prediction of Disasters I. The module is passed only after the final partial exam of Understanding and Prediction of Disasters I is additionally passed.

Learning Outcomes  
See German version.

Content  
See German version.

Remarks  
In agreement with the coordinator of the module other suitable courses than the ones displayed can be taken.

The module is offered as an extension module to Understanding and Prediction of Disasters I from winter term 2010/11 on, therefore credit points were reduced to 9. Together with Understanding and Prediction of Disasters I it is still possible to gain 18 credit points in total in the field of Understanding and Prediction of Disasters.
## Module: Understanding and Prediction of Disasters III [WI3INGINTER5]

**Coordination:** Ute Werner  
**Degree programme:** Wirtschaftsingenieurwesen (B.Sc.)  
**Subject:** Engineering Science  

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### Courses in module

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

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

### Conditions

In Remote Sensing, Remote Sensing Systems [20241] and Remote Sensing Methods [20243] can be chosen as a minimal combination, but it is strongly recommended to choose the comprehensive combination Remote Sensing [GEOD-BFB-1], which includes Remote Sensing Systems [20241], Remote Sensing Methods [20243] and Hauptvermessungsübung III [20245]. There are no singular exams for Remote Sensing Systems [20241] and Remote Sensing Methods [20243]. Therefore it is only possible to choose either Remote Sensing [GEOD-BFB-1] or one of the courses Remote Sensing Systems [20241], Remote Sensing Methods [20243] or Hauptvermessungsübung III [20245] (because they are already included). It is only possible to choose this module in combination with the module Understanding and Prediction of Disasters II. The module is passed only after the final partial exam of Understanding and Prediction of Disasters II is additionally passed.

### Learning Outcomes

See German version.

### Content

See German version.

### Remarks

In agreement with the coordinator of the module other suitable courses than the ones displayed can be taken.

The module is offered as an extension module to Understanding and Prediction of Disasters II from winter term 2010/11 on, therefore credit points were reduced to 9. Together with Understanding and Prediction of Disasters I and II it is still possible to gain 27 credit points in total in the field of Understanding and Prediction of Disasters.
Module: Safety Science I [WI3INGINTER3]

Coordination: Ute Werner
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

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Courses in module

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<td>21030</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1-3 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

Conditions
Successful completion of the engineering modules of the core program.

Learning Outcomes
See German version.

Content
See German version.

Remarks
In agreement with the coordinator of the module other suitable courses than the ones displayed can be taken.

From the winter term 2010/2011 on, the lecture Safety Engineering has 3 credit points.
Module: Safety Science II [W3INGINTER4]

**Coordination:** Ute Werner

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

**Subject:** Engineering Science

<table>
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<th>Course</th>
<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
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<tbody>
<tr>
<td>19315</td>
<td>Safety Management in Highway Engineering (p. 296)</td>
<td>1</td>
<td>W</td>
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<td>M. Zimmermann</td>
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<tr>
<td>21061</td>
<td>Safety Engineering (p. 297)</td>
<td>2</td>
<td>W</td>
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<tr>
<td>21037</td>
<td>Industrial Safety and Environmental Management (p. 193)</td>
<td>2</td>
<td>S</td>
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<td>Zülch, Kiparski</td>
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<tr>
<td>21030</td>
<td>Occupational Health and Safety Management and Systems (p. 109)</td>
<td>1</td>
<td>W</td>
<td>2</td>
<td>Zülch</td>
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<td>siwi_wahl</td>
<td>Additional Course Safety Sciences (p. 155)</td>
<td>W/S</td>
<td>2-9</td>
<td></td>
<td>U. Werner</td>
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</table>

**Learning Control / Examinations**

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

In addition to the detailed displayed courses further suitable courses of the necessary credit amounts must be taken in agreement with the coordinator of the module to complete the module. On top of the minimum requirements, suitable courses can be chosen accordingly.

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

**Conditions**

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

Successful completion of the engineering modules of the core program is still possible to gain 18 credit points in total in the field of safety sciences.

**Learning Outcomes**

See German version.

**Content**

See German version.

**Remarks**

From the winter term 2010/2011 on, the lecture Safety Engineering has 3 credit points.

The module is offered as an extension module to Safety Science I from winter term 2010/11 on, therefore credit points were reduced to 9. Together with Safety Science I it is still possible to gain 18 credit points in total in the field of safety sciences.
Module: Combustion Engines I [WI3INGMB18]

Coordination: Heiko Kubach
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

<table>
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Courses in module

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<tr>
<td>21101</td>
<td>Combustion Engines A (p. 334)</td>
<td>4/2</td>
<td>W</td>
<td>9</td>
<td>Spicher</td>
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</table>

Learning Control / Examinations

The assessment of the module is carried out by a written examination about the lecture Combustion Engines A [21101] (according to Section 4(2), 1 of the examination regulation). The grade of the module corresponds to the grade of this examination.

Conditions
None.

Learning Outcomes

Content
Module: Combustion Engines II [WI3INGMB19]

**Coordination:** Heiko Kubach  
**Degree programme:** Wirtschaftsingenieurwesen (B.Sc.)  
**Subject:** Engineering Science  

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<td>21135</td>
<td>Combustion Engines B (p. 335)</td>
<td>2/1</td>
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<tr>
<td>21112</td>
<td>Supercharging of Internal Combustion Engines (p. 113)</td>
<td>2</td>
<td>S</td>
<td>4</td>
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<td>21109</td>
<td>Motor Fuels for Combustion Engines and their Verifications (p. 126)</td>
<td>2</td>
<td>W</td>
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<td>21138</td>
<td>Internal Combustion Engines and Exhaust Gas Aftertreatment Technology (p. 181)</td>
<td>2</td>
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<td>21134</td>
<td>Methods in Analyzing Internal Combustion (p. 229)</td>
<td>2</td>
<td>S</td>
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<td>Wagner</td>
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<td>Engine Measurement Technologies (p. 234)</td>
<td>2</td>
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<td>21114</td>
<td>Simulation of Spray and Mixture Formation in Internal Combustion Engines (p. 301)</td>
<td>2</td>
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**Learning Control / Examinations**

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

**Conditions**

It is only possible to choose this module in combination with the module Combustion Engines I [WI3INGMB18]. The module is passed only after the final partial exam of Combustion Engines I is additionally passed. The course Combustion Engines B [21135] has to be attended.

**Recommendations**

Basic skills in the subject of Thermodynamics are recommended.

**Learning Outcomes**

**Content**
Module: Manufacturing Engineering [WI3INGMB23]

Coordination: Volker Schulze
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

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Courses in module

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<td>2149657</td>
<td>Manufacturing Engineering (p. 169)</td>
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Learning Control / Examinations

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

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

To improve the overall grade of the module up to one grading scale (0.3) there might be taken an optional term paper in the field of the wbk. The term paper may not be convalidated in the seminar module.

Conditions
None.

Learning Outcomes

Content

Remarks
New module in winter term 2010/11.
Module: Integrated Production Planning [WI3INGMB24]

Coordination: Volker Schulze, Gisela Lanza
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

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Courses in module

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<td>Integrated Production Planning (p. 201)</td>
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<td>Lanza, Gisela</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. The assessment procedures are described for each course of the module separately.

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

To improve the overall grade of the module up to one grading scale (0.3) there might be taken an optional term paper in the field of the wbk. The term paper may not be convalidated in the seminar module.

Conditions
None.

Learning Outcomes

Content

Remarks
New module in winter term 2010/11.
Module: Specialization in Production Engineering [WI3INGMB22]

**Coordination:** Volker Schulze

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

**Subject:** Engineering Science

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**Courses in module**

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<tr>
<td>2149667</td>
<td>Quality Management (p. 260)</td>
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<td>2149669</td>
<td>Materials and Processes in Automotive Lightweight Construction (p. 223)</td>
<td>2</td>
<td>W</td>
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<td>Machine Tools and Industrial Handling I (p. 355)</td>
<td>2/1</td>
<td>W</td>
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<td>Umformtechnik (p. 331)</td>
<td>2</td>
<td>S</td>
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<td>2150683</td>
<td>Steuerungstechnik (p. 316)</td>
<td>2</td>
<td>S</td>
<td>4</td>
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<td>Verzahntechnik (p. 340)</td>
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<td>W</td>
<td>4</td>
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**Learning Control / Examinations**

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

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

To improve the overall grade of the module up to one grading scale (0.3) there might be taken an optional term paper in the field of the wbk. The term paper may not be convalidated in the seminar module.

**Conditions**

It is only possible to choose this module in combination with the module Manufacturing Engineering [WI3INGMB23] or/and Integrated Production Planning [WI3INGMB24]. The module is passed only after the final partial exam of one of the above modules is additionally passed.

**Learning Outcomes**

**Content**

**Remarks**

New module in winter term 2010/11.
Module: Rail System Technology [WI3INGMB25]

Coordination: Peter Gratzfeld
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

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<td>2115919</td>
<td>Rail System Technology (p. 120)</td>
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<tr>
<td>2115995</td>
<td>Project Management in Rail Industry (p. 257)</td>
<td>2</td>
<td>W/S</td>
<td>3</td>
<td>P. Gratzfeld</td>
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<td>2115996</td>
<td>Rail Vehicle Technology (p. 268)</td>
<td>2</td>
<td>W/S</td>
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### Learning Control / Examinations
The assessment is carried out as a general oral exam (20 min.) (according to Section 4(2), 2 of the examination regulation) of the single courses of this module. The examination is offered every semester. Re-examinations are offered at every ordinary examination date. The overall grade of the module is the grade of the oral examination.

### Conditions
Successful completion of the engineering modules of the core programm.

### Recommendations
The lectures can be taken simultaneously.

### Learning Outcomes

- The students understand relations and interdependencies between rail vehicles, infrastructure and operation in a rail system.
- They deduct the fundamental requirements for rail vehicles out of it and assess concepts of rail vehicles.
- They know about major systems in a rail vehicle and evaluate their fitness in specific fields of application.
- The students realize that the typical business model in railway industry is a project. They learn main features and characteristics of project management in this area.

### Content

- Overview about fundamental components of a modern rail system (vehicles, infrastructure, operation)
- History and economic impact of rail systems
- Vehicle dynamics, wheel-rail-contact, train protection, traction power supply
- Main systems of rail vehicles (electric and non-electric traction drive, bogies, brakes)
- Vehicle concepts for mass transit and main line
- Main features and characteristics of project management in railway industry (project management system, organization, main processes)
Module: Unscheduled Engineering Module [WI3INGAPL]

Coordination: Prüfer einer Ingenieurwissenschaftlichen Fakultät
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Engineering Science

<table>
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</table>

Learning Control / Examinations
The assessment of the module is determined by the respective module coordinator. It can either be in the form of a general exam or partial exams, and must contain at least 9 credit points and at least 6 hours per week. The examination may contain presentations, experiments, laboratories, term papers, etc. At least 50 percent of the module examination has to be in the form of a written or an oral examination (according to Section 4 (2), 1 or 2 of the examination regulation).

The formation of the overall grade of the module will be determined by the respective module coordinator.

Conditions
None.

Learning Outcomes

Content
6.7 Law

Module: Elective Module Law [WI3JURA]

Coordination: Thomas Dreier
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Law

ECTS Credits: 9
Cycle: Every term
Duration: 2

Courses in module

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<tr>
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<tr>
<td>24012</td>
<td>Civil Law for Beginners (p. 127)</td>
<td>4/0</td>
<td>W</td>
<td>4</td>
<td>T. Dreier, P. Sester</td>
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<tr>
<td>24016</td>
<td>Public Law I - Basic Principles (p. 239)</td>
<td>2/0</td>
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<td>I. Spiecker genannt Döhmann</td>
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<tr>
<td>24520</td>
<td>Public Law II - Public Economic Law (p. 240)</td>
<td>2/0</td>
<td>S</td>
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<td>I. Spiecker genannt Döhmann</td>
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Learning Control / Examinations

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

- Civil Law for Beginners: written exam (90 min)
- Public Law I/II: overall written exam (120 min)

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

Conditions
None.

Learning Outcomes
Content
6.8 Sociology

Module: Sociology/Empirical Social Research [WI3SOZ]

Coordination: Gerd Nollmann
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Sociology

ECTS Credits: 9
Cycle: Every term
Duration: 1

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<tr>
<td>11005</td>
<td>Social structures of modern societies</td>
<td>2</td>
<td>W</td>
<td>4</td>
<td>G. Nollmann</td>
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<tr>
<td>spezSoz</td>
<td>Special Sociology (p. 308)</td>
<td>2</td>
<td>W/S</td>
<td>2</td>
<td>G. Nollmann, Pfladenhauer, Pfaff, Haupt, Grenz, Eisewicht, Kunz</td>
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<td>SozSem</td>
<td>Projectseminar (p. 258)</td>
<td>2</td>
<td>W/S</td>
<td>4</td>
<td>Bernart, Kunz, Pfaff, Haupt, Grenz, Eisewicht</td>
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</table>

Learning Control / Examinations
The assessment is carried out as a general written exam (according to Section 4(2), 1 of the examination regulation). The specific theme of the written exam is arranged with the module coordinator personally. The single courses of the module are completed with an assessment as well. The assessment procedures are described for each course of the module separately. The overall grade of the module corresponds to the grade of the written exam.

Conditions
None.

Recommendations
Knowledge of Statistics 1 and Statistics 2 is required.

Learning Outcomes
The student
- Gains theoretical and methodical knowledge of social processes and structures
- Is able to apply acquired knowledge practically
- Is able to present work results in a precise and clear way

Content
This module offers students the possibility to get to know research problems and to answer these theoretically as well as empirically. For example: Who does earn how much in his job and why? How do subcultures emerge? Why are boys’ grades in school always worse than those of girls? Do divorces have negative influences on the development of children? How does mass consumption influence the individual? Is there a world society emerging?

In addition, this module contains courses on sociological methods that are essential to answer the above questions scientifically.
Module: Qualitative Social Research [W13SOZ2]

Coordination: Gerd Nollmann, Pfadenhauer
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: Sociology

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<td>n.n.</td>
<td>Interpretative Social Research Methods (p. 230)</td>
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<td>Special Sociology (p. 308)</td>
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<td>Explorative-interpretative Project Seminar (p. 259)</td>
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<td>2/4</td>
<td>Pfadenhauer, Kunz, Grenz, Eisewicht</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
The lecture Interpretative Social Research Methods [n.n.] has to be completed successfully.

Learning Outcomes
The student

- possesses a basic overview of the well-established and some of the advanced explorative methods of data collection and interpretative methods of data evaluation,
- can address basic sociological questions to subjects of different types,
- and is capable of choosing and applying appropriate explorative-interpretative methods according to a research question.

Content
Qualitative Social Research is of major importance not only in (Social) Sciences but also in applied economic contexts. Within the framework of this module the student gets taught basic and advanced methods of non-standardised data collection, fixation and evaluation. Accordingly the module consists of three courses:

- the lecture ‘Interpretative Social Research Methods’ which ends with a written exam (4 LP).
- a course ‘Special Sociology’ of choice in which 2 or 4 credits have to be obtained (6 credits needed in course and project course combined).
- a project course focusing on explorative-interpretative methods in which 2 or 4 credits have to be obtained (6 credits needed in course and project course combined).
6.9 General Modules

Module: Seminar Module [WI3SEM]

Coordination: Marliese Uhrig-Homburg, Studiendekan (Fak. f. Wirtschaftswissenschaften)
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject:

<table>
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Courses in module
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<tr>
<td>SemAIFB1</td>
<td>Seminar in Enterprise Information Systems (p. 270)</td>
<td>2 W/S</td>
<td>3</td>
<td>3</td>
<td>R. Studer, A. Oberweis, T. Wolf, R. Kneuper</td>
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<tr>
<td>SemAIFB2</td>
<td>Seminar Efficient Algorithms (p. 271)</td>
<td>2 W/S</td>
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<td>H. Schmeck</td>
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<tr>
<td>SemAIFB3</td>
<td>Seminar Complexity Management (p. 280)</td>
<td>2 W/S</td>
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<td>SemAIFB4</td>
<td>Seminar Knowledge Management (p. 283)</td>
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<td>25293</td>
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<td>26470</td>
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<tr>
<td>SemING</td>
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<td>Fachvertreter ingenieurwissenschaftlicher Fakultäten</td>
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<td>SemiFL</td>
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<td>HoC4</td>
<td>Elective “Tutor Programmes” (p. 349)</td>
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<td>HoC5</td>
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<td>V. Schulze, Lanza, Munzinger</td>
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</table>
Learning Control / Examinations
The modul examination consists of two seminars and of at least one key qualification (KQ) course (according to §4 (3), 3 of the examination regulation). A detailed description of every singled assessment is given in the specific course characterization. The final mark for the module is the average of the marks for each of the two seminars weighted by the credits and truncated after the first decimal. Grades of the KQ courses are not included.

Conditions
All modules of the core programme should have been absolved. Furthermore the course specific preconditions must be observed.

- **Seminars**: Two seminars out of the course list, that have at least 3 CP each and are offered by a representative of the Faculty of Economics and Business Engineering, have to be chosen.
- Alternatively one of the two seminars can be absolved at a engineering department or at the Department of Mathematics. The seminar has to be offered by a representative of the respective department as well. The assessment has to meet the demands of the School of Economics and Business Engineering (active participation, term paper with a workload of at least 80 h, presentation). This alternative seminar requires an official approval and can be applied at the examination office of the School of Economics and Business Engineering. Seminars at the institutes wbk and IFL do not require these approval.
- **Key Qualification (KQ)-course(s)**: One or more courses with at least 3 CP in total of additional key qualifications have to be chosen among the courses [HoC1-5]. More detailed information can be found at the course descriptions and on http://www.hoc.kit.edu/sq-wahlbereiche.

Learning Outcomes
The student

- investigates with a selected topic in a special subject,
- analyses and discusses topical issues in the course and within the final term paper,
- discusses, presents und defends subject-specific arguments within the given topic,
- plans and realizes the final term paper mostly autonomous.

Content
Competences which are gained in the seminar module especially prepare the student for composing the final thesis. Within the term paper and the presentation the student exercises himself in scientific working techniques supported by the supervisor. Beside advancing skills in techniques of scientific working there are gained integrative key qualifications as well. A detailed description of these qualifications is given in the section “Key Qualifications” of the module handbook. Furthermore, the module also includes additional key qualifications provided by the KQ-courses.

Remarks
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.
Module: Internship [WI3EXPRAK]

**Coordination:** Der Vorsitzende des Prüfungsausschusses

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

**Subject:**

<table>
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<th>ECTS Credits</th>
<th>Cycle</th>
<th>Duration</th>
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</tbody>
</table>

**Learning Control / Examinations**

The assessment is carried out by the evidence of completed full-time internships of at least eight weeks and a presentation of the internship in the form of a written report on the activities.

1. Information on evidence of completed full-time internships:

The internship is proofed by the certificate of the intern’s office. The certificate has to be formally correct with official corporate letterhead and handwritten countersigned by a responsible employee of the company.

The certificate must at least contain the following information:

- Company / Location
- Duration: from ... to...
- Hours of work (weakly)
- Working interruption, indicating the vacation and sick days
- Department
- Headwords to the activitis

2. Information on to the presentation:

The internship report should be at least one page (typewritten, not handwritten) for each Location. It must be countersigned by a representative of the intern’s office.

**Conditions**

Internships, that were completed even before studying may be recognized, if the criteria for recognition are met. After recognition of the compulsory internship, there can be taken a semester off for a voluntary, student-related internship. The possibility is particularly interesting in view of the master programme, which requires internships of at least 20 weeks.

If the compulsory internship is absolved within the Bachelor Programme and if it takes at least 14 weeks, students may request tuition exemption, when at least 8 weeks of the internship takes place in the lecture time.

Regarding to the election of the company, in which the internship is completed, there are no specific rules. With a view to the future professional career, it is recommended to absolve the internship in a larger, possibly international company.

**Learning Outcomes**

Students

- engage in practical aspects of Business Engineering and get to know the professional requirements,
- gain a general insight into the operations of a company,
- identify companies complexity and developing knowledge and skills, which facilitate the understanding of operational sequencences,
- train key qualifications such as personal initiative (already in the application), team skills and the ability to integrate into occupational hierarchie.

**Content**

The internship may be done in economic, business and/or technical companies. At best, it is done on activities which are located at the intersection of the two fields - getting to know the specific requirements of business engineering.

A commercial internship provides an insight into business or administrative processes of business transactions. Therefor departments such as controlling, organizing, marketing and planning appear particularly suitable.

Work experiences in the departments of engineering, work preparation and provision of material or IT cover more technical aspects of the internship. But work experiences in an engineering firm go with a technical internship.

It remains the companies and interns left, which stations and areas the intern will eventually go through. But the focus should always be in accordance with operational realities of the company.
Remarks
Vacation days are not figured into the internship.
Only three sick leave days may incurred at all. Any additional sick days are not figured into the internship.
A relevant vocational education of at least two years is accepted as a performance equivalent to the internship.

It is recommended to do the internship before start of study.
Module: Bachelor Thesis [WI3THEESIS]

Coordination: Der Vorsitzende des Prüfungsausschusses
Degree programme: Wirtschaftsingenieurwesen (B.Sc.)
Subject: ECTS Credits 12 Cycle Duration

Learning Control / Examinations
The Bachelor Thesis is a written exam which shows that the student can autonomously investigate a scientific problem in Business Engineering. The Bachelor Thesis is described in detail in § 11 of the examination regulation.
The review is carried out by at least one examiner of the School of Economics and Business Engineering, or, after approval by at least one examiner of another faculty. 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.
The regular processing time takes three months. On a reasoned request of the student, the examination board can extend the processing time of a maximum of one month. If the Bachelor Thesis is not completed in time, this exam is “failed”, unless the student is not being responsible (e.g. maternity leave).
With consent of the examiner the thesis can be written in English as well. Other languages require besides the consent of the examiner the approval of the examination board. The issue of the Bachelor Thesis may only returned once and only within the first month of processing time. A new topic has to be released within four weeks.
The overall grade of the module is the grade of the Bachelor Thesis.

Conditions
Prerequisite for admission to the Bachelor thesis is that the student is usually in the 3rd Academic year (5th and 6th semester) and has at most one of the exams of the core program (according to § 17 paragraph 2 examination regulation) not been completed.
It is recommended to begin the Bachelor Thesis in the 5th or 6th Semester.
A written confirmation of the examiner about supervising the Bachelor’s Thesis is required.
Please pay regard to the institute specific rules for supervising a Bachelor Thesis.
The Bachelor Thesis has to contain the following declaration: “I hereby declare that I produced this thesis without external assistance, and that no other than the listed references have been used as sources of information. Passages taken literally or analogously from published or non published sources is marked as this.” If this declaration is not given, the Bachelor Thesis will not be accepted.

Learning Outcomes
Content
The Bachelor Thesis is the first major scientific work. The topic of the Bachelor Thesis will be chosen by the student themselves and adjusted with the examiner. The topic has to be related to Business Engineering and has to refer to subject-specific or interdisciplinary problems.
## 7 Courses

### 7.1 All Courses

**Course: Advanced Topics in Economic Theory [25527]**

<table>
<thead>
<tr>
<th>Coordinators:</th>
<th>Clemens Puppe, Marten Hillebrand, Kay Mitusch</th>
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<tbody>
<tr>
<td>Part of the modules:</td>
<td>Microeconomic Theory (p. 49)</td>
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<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>en</td>
</tr>
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</table>

#### Learning Control / Examinations

**Conditions**
None.

#### Learning Outcomes

**Content**
The focus of the course is the modern economic theory of (general) equilibrium. The course is divided into three 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 considers dynamic (stochastic) equilibrium models with a particular focus on the overlapping generations model which lie at the heart of modern macroeconomics. The third part deals with asymmetric information and introduces the basic models based on Akerlof's "Market for Lemons." The course is largely based on the textbook “Microeconomic Theory” (Chapters 1-5, 10, 13-20) by A.Mas-Colell, M.D.Whinston, 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.Whinston, and J.R.Green

**Remarks**
The lecture will be offered in the summer term 2010 for the first time. Up to now, the lecture was named *Advanced Microeconomic Theory.*
Course: Algorithms for Internet Applications [25702]

Coordinators: Hartmut Schmeck
Part of the modules: Emphasis Informatics (p. 53)[WI3INFO1], Electives in Informatic (p. 54)[WI3INFO2]

ECTS Credits: 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 Section 4(2), 1 of the examination regulation) and an additional written examination (called “bonus exam”, 60 min) (according Section 4(2), 3 of the examination regulation) (the bonus exam may be split into several shorter written tests).

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

Conditions
None.

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

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

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

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

Literature

Elective literature:
- Further references will be given in the course.
Course: Business Administration and Management Science A [25023]

**Coordinators:** Thomas Burdelski

**Part of the modules:** Business Administration (p. 17)[W11BWL]

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<th>Term</th>
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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 assessment takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Conditions**
None.

**Learning Outcomes**
After this basic course students have to be familiar with the fundamentals of General Business Administration and the principles of Management Sciences. This is necessary to understand the following courses Business Administration and Management Science B und C.

**Content**
The agenda and the following topics are treated:

- Fundamentals of Business Administration and Management Science
- Legal forms of business organisations
- Targets of corporations and corporate policy
- Analytical and planning instruments
- Decision analysis and decision making in a corporation
- The income statement as a business card of business activities
- Tax payments for a company

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

- Albach: Allgemeine Betriebswirtschaftslehre, Gabler-Verlag
- Neus: Einführung in die Betriebswirtschaftslehre, Mohr-Siebeck Verlag
- Schierenbeck: Einführung in die Betriebswirtschaftslehre, Oldenbourg Verlag
- Steven, Kistner: Betriebswirtschaftslehre im Grundstudium 1+2, Physica-Verlag
- Wöhe: Einführung in die Allgemeine Betriebswirtschaftslehre, Vahlen-Verlag

**Remarks**
The course Rechnungswesen which is held concurrently is taken into account concerning specific problems.
Course: Business Administration and Management Science B [25024/25025]

Coordinators: Wolfgang Gaul, Thomas Lützkendorf, Andreas Geyer-Schulz, Christof Weinhardt, Thomas Burdel-ski

Part of the modules: Business Administration (p. 17)[WI1BWL]

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<tr>
<td>4</td>
<td>2/0/2</td>
<td>Summer term</td>
<td>de</td>
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</table>

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, production economics and information engineering and management.

After this basic course students have to be familiar with these three topics in Business Administration and Management Science.

Content
1. Marketing:
Marketing is an organizational function to handle situations, activities, and processes for creating, communicating, and delivering value to customers in a best way. (Customer) relationship management comprises collecting, aggregating, and analyzing information (e.g., developments in the society, changing conditions of markets, alterations w.r.t. buying behavior) to benefit different target groups.

Main topics will deal with market research and optimized application of marketing mix instruments with emphasis on “marketing and the web”, “innovation management”, and “international marketing”.

2. 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.

3. Information engineering and management
In today’s economy, information is a competitive factor that calls for an interdisciplinary investigation from economics and business administration, informatics and law. In this part of the lecture, selected topics from information engineering and management and their impact in market competition are presented.

Topics include: Information in a company, Information processing: From an agent to business networks, social networks, service value networks, complex service auction, market engineering, grid und cloud computing, dynamic pricing, fundamentals of trading and market efficiency on stock exchanges.

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

Remarks
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 and Management Science C [25026/25027]

Coordinators: Hagen Lindstädt, Martin E. Ruckes, Marliese Uhrig-Homburg, Thomas Burdelski

Part of the modules: Business Administration (p. 17)[WI1BWL]

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<td>4</td>
<td>2/0/2</td>
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<td>de</td>
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</table>

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 management and organization, investment and finance and the German specific term controlling. After this course, students have to be familiar with these three topics in business administration and management science.

Content

1. Management and Organization
   A) Foundations of Management
   B) Foundations of Strategic Management
      - Process of Strategic Management
      - Strategic Analysis using the SWOT Framework
      - Formulating Strategic Options
      - Evaluation and Choice
   C) Foundations of Organization
      - Why do Organizations exist?
      - Objectives, Measures and Conditions of Managing Organizations
      - Level 1: Division of Labour and Design of Departments
      - Level 2: Choosing the Hierarchical Structure
      - Level 3: Coordination and Formalization
   D) Agency-theoretic Foundations:
      - Organization under Asymmetric Organization
      - Three Types of Informational Asymmetries
      - Type 1: Hidden Intention and Holdup
      - Type 2: Hidden Characteristics and Adverse Selection
      - Type 3: Hidden Action and Moral Hazard

2. Investment and Finance
   This part of the course deals with the fundamentals of capital market theory and provides a modern introduction to the theory and practice of capital raising and capital budgeting. These topics are covered:
   - Valuation of financial and real investments
   - Portfolio theory
   - Pricing in financial markets
   - Theory and practice of corporate finance
   - Arbitrage

3. Controlling
   Planning, control (e.g. monitoring), organization, leadership, and information systems are the core elements of a business management system. These fields have to be coordinated with one another to achieve the corporate goals in an optimal way. This coordinating function is the main task of the German specific term controlling. Thus, controlling fulfills the coordinating task within the management system in an essential way. These topics are covered:
   - Fundamentals of controlling and its context
• Instruments of controlling for business planning and control/monitoring (selected operational instruments, benchmarking as a tactical instrument and portfolio analysis as a strategic instrument)
• Instruments of controlling for information systems (performance indicators und reporting)

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

Remarks
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: Generically Meteorology / Climatology II [3201]

Coordinators: Orphal

Part of the modules: Understanding and Prediction of Disasters I (p. 76), Understanding and Prediction of Disasters II (p. 77), Understanding and Prediction of Disasters III (p. 78)

ECTS Credits 5.5
Hours per week 3/1
Term Summer term
Instruction language de

Learning Control / Examinations
The assessment consists of a written test according to Section 4(2), 3 of the examination regulation.

Conditions
None.

Learning Outcomes

Content

Remarks
For further information, see http://www.imk.uni-karlsruhe.de/english/17.php.
Course: Analytical CRM [26522]

Coordinators: Andreas Geyer-Schulz
Part of the modules: Specialization in Customer Relationship Management (p. 41)[WI3BWLISM5], CRM and Service Management (p. 40)[WI3BWLISM4]

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

<table>
<thead>
<tr>
<th>Grade</th>
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<tr>
<td>4.7</td>
<td>40</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 should

- understand the principal scientific methods from statistics and informatics used in analytical CRM and their application to enterprise decision problems and be able to independently apply these methods to standard cases,
- understand the components for creating and managing a data warehouse from operative system sources including the processes and steps involved and should be able to apply these methods to a simple example, and
- use his knowledge to conduct a standard CRM analysis on enterprise data for a business decision problem and deduce and justify a recommendation for appropriate action.

Content
The course Analytical CRM deals with methods and techniques for analysis concerning the management and improval 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 segmenatation).

Media
slides

Literature
Course: Applied Informatics I - Modelling [25070]

Coordinators: Andreas Oberweis, Rudi Studer, Sudhir Agarwal
Part of the modules: Emphasis Informatics (p. 53)[WI3INFO1], Electives in Informatics (p. 54)[WI3INFO2]

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Learning Control / Examinations
The assessment consists of a written examination (60 min) in the first week after lecture period (according to Section 4 (2),1 of the examination regulation).

Conditions
None.

Learning Outcomes
Basic knowledge about the strengths and weaknesses of various modeling approaches including their application areas.

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 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 [25033]

Coordinators: Stefan Tai
Part of the modules: Emphasis Informatics (p. 53)[WI3INFO1], Electives in Informatic (p. 54)[WI3INFO2]

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**Learning Control / Examinations**
The assessment consists of a written examination (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**
Knowledge of content of the courses *Foundations of Informatics I* [25074] and *Foundations of Informatics II* [25076] is expected.

**Learning Outcomes**
The student learns about IT methods and systems in support of modern electronic commerce. The student should be able to select, assess, design, and apply these methods and systems in a context-sensitive manner.

**Content**
The course introduces methods and systems in support of electronic commerce, including the topics:

- application architectures (incl. client server architectures)
- document description and exchange (incl. XML)
- enterprise middleware (incl. CORBA, Messaging Middleware, Java Enterprise Edition)
- Web services and SOA

**Media**
Slides, internet resources.

**Literature**
Tba in the lecture.
Course: Industrial Application of Material Handling Systems in Sorting and Distribution Systems [2118089]

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**Learning Control / Examinations**
The assessment consists of an oral exam according to §4 (2), 2 of the examination regulation. It may be a written exam (according to §4 (2), 1 of the examination regulation) in the case of large number of participants.

**Conditions**
None.

**Learning Outcomes**
The course provides basics of sorting techniques.

**Content**
- Operation characteristics, classification, configuration, dimensioning, cost consideration, sorting systems
- Relevant regulations, modern control and drive concepts
Course: Occupational Health and Safety Management and Systems [21030]

Coordinators: Zülch
Part of the modules: Safety Science I (p. 79)[WI3INGINTER3], Safety Science II (p. 80)[WI3INGINTER4]

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Learning Control / Examinations
Conditions
None.

Learning Outcomes
Content
Remarks
For further information, see http://www.ifab.uni-karlsruhe.de/747.php
Course: Topics of Sustainable Management of Housing and Real Estate [26420]

**Coordinators:** Thomas Lützkendorf

**Part of the modules:** Seminar Module (p. 91) [WISSEM]

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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: Power Transformations [23390]

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Learning Control / Examinations
The assessment consists of an oral exam (20 min) taking place at the begin of the recess period (according to Section 4 (2), 2 of the examination regulation). The exam takes place in every summer semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes
The goal is to relay theoretical fundamentals about Power Transformers and its applications. Main topics are the physical fundamentals and their application in transformer precalculation and design. Based on that the different variations in design and the various applications are discussed. Finally future trends and research and development activities in the field of power transformers are presented.

Content
The lecture is divided into the following clauses

- Applications and design variations of power transformers
- Components and design of power transformers
- Working principle of power transformers and shunt reactors. Induction law and its application for the precalculation of transformers. The magnetic field in iron coress, core designs, variations and air gaps in magnetic circuits. Magnetic materials and their properties, application in transformers and shunt reactors. Main and stray flux in transformers and calculation of the equivalent circuit. Stresses inside transformers during inrush and short circuits.
- Winding connections and vector groups of transformers, three phase power system, connected voltages and line to earth voltage, description of three phase systems, parallel connection of transformers.
- Precalculation of transformers.
- Losses in transformers and its origins in core and in the windings. Possible measures to influence loss generation. Cooling systems and its applications.
- High voltage DC transformers
- Factory testing of transformers. Performance of type tests, standard test and special tests.
- Ovaerload capability of transformer. Controlled overloading and emergency overload.
- Cervive and monitoring.
- Future trends and research and development activities.

Media
The material is distributed during any lecture

Remarks
The course consists of seven lecture blocks and one factory visit. Date and time is announced on the blackboards.
Course: Constitution and Properties of Wear-resistant materials [21643]

Coordinators: Ulrich
Part of the modules: Emphasis Material Science (p. 69) [WI3INGMB9]

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Learning Control / Examinations
The assessment consists of an oral exam (30 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation). The re-examination is offered upon agreement.

Conditions
The course Material Science I [21760] has to be completed beforehand.
Basic knowledge of natural science and knowledge of the content Material Science II [21782] is recommended.

Learning Outcomes
Students shall become familiar with the constitution, properties and changing properties of the most important groups of materials. With this basic knowledge they shall be able to decide about the technical and economical application of materials.

Content
After presentation of a general overview, concepts of surface modification (optimisation of microstructure and surface reactions) will be shown as well as innovative coating concepts (dispersion-, composite material-, gradient-, multilayer, super lattice-, solid solution strengthening, metastable- and nano-crystalline coatings).
During realisation of these coating concepts different coating materials will be used: Metallic alloy and metal-based materials, hard alloy and composite materials, metallic, covalent and heteropolar hard materials as well as ceramic and novel, metastable materials.
This will be followed by lectures on the methods of surface modification

1. mechanical: milling, blasting
2. thermal: melting, heat treatment, quench hardening
3. thermochemical: diffusion, heat treatment
4. ion implantation

and of coating: (mechanical, thermal, mechanothermal, electrochemical, CVD, PVD)
Afterwards, methods of characterisation of surfaces, thin films and bulk materials will be presented, based on the constitution (element-, phase and structure analyses), structure (macro-, micro- and nano structure, texture), properties (hardness, adhesion, toughness) and tribological behaviour of the material.
At the end of the lecture, the status quo of industrial coatings for tools and components as well as the latest developments of coating technology will be discussed.

Literature
Elective literature:

Course: Supercharging of Internal Combustion Engines [21112]

Coordinators: Golloch
Part of the modules: Engine Development (p. 64)[WI3INGMB17], Combustion Engines (p. 63)[WI3INGMB16], Combustion Engines II (p. 82)[WI3INGMB19]

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Learning Control / Examinations
The assessment consists of an oral exam (30 min) according to Section 4 (2), 2 of the examination regulation. The grade of the exam is included in the overall grade of the module with a weighting factor of 3.

Conditions
The course Combustion Engines A [21101] has to be completed beforehand.

Learning Outcomes
Content
Course: Selected Topics in Ergonomics [25934]

**Coordinators:** Dorothee Karl

**Part of the modules:** Human Resource Management (p. 45)[WI3BWLIAPI]

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**Learning Control / Examinations**
The examination will be in form of a written exam acc. to §4(2), 1 ER

**Conditions**
None.

**Learning Outcomes**

**Content**

Business Engineering (B.Sc.)
Module Handbook, Date: 23.09.2010
Course: International Economics [26252]

**Coordinators:** Jan Kowalski

**Part of the modules:** International Economics (p. 47)[WI3VWL3]

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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**

**Content**

**Literature**

**Elective literature:**

- Siebert H., Außenwirtschaft. Fischer-Verlag 1994
Course: Automation of Power Grids [23396]

**Coordinators:** Eichler

**Part of the modules:** Electrical Power Engineering (p. 71)[WI3INGETIT1]

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**Learning Control / Examinations**
The assessment consists of an oral exam (20 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 summer semester. Re-examinations are offered at every ordinary examination date.

**Conditions**
Basic knowledge of power transmission and distribution; basic knowledge of IT

**Learning Outcomes**
Understand methods, equipment, standards, current and future technology, state-of-the-art and trends of power systems control from a global (i.e. worldwide) perspective

Digital design fundamental lecture. Focus of the lecture are formal, methodical and mathematic fundamentals for the design of digital systems. Based on these, technical implementation of digital systems is elaborated, especially the design of standard digital building blocks and more complex systems based on these.

**Content**
This lecture presents an introduction to the important theoretical fundamentals of digital system design, which is scheduled for the students in the first semester of Electrical Engineering. Since the lecture can not be based on student’s knowledge of circuit technology, it focuses on abstract models for behaviours and structures. In addition the lecture will also relay the fundamentals, which are needed in other lectures.

At first the lecture delves into important conceptual information and shows that digital system design represents a special technical solution for the treatment of information. After this the concept of a system will be introduced and illustrated that complex systems require a hierarchical partitioning in order to be able to understand and design them. Based on this it can be concluded then that system design can be understood as a repeated transformation from descriptions of behaviour to descriptions of structure.

The terms message and signal are subject matter of a further chapter. Starting from time and amplitude continuous signals, simple time and value discrete binary signal representations will be introduced, as well as more complex signal forms derived from binary signals.

The representation of information by signals presupposes or implies an “agreement of allocation” between distinguishable elements of information representation and signal representation, the so-called codes. Therefore the lecture delivers the fundamental concepts of codes & coding and describes a few important classes & types of codes, which serve some of the following uses: analog/digital conversion for interfaces, error detection & error correction for numerical purposes, and optimal representation of information and/or signals. Code conversion and related topics finalize the consideration of this topic.

Formal and mathematical fundamentals will be treated in an extensive chapter. To begin the subject matter of the lecture is comprised of sets and quantities, the operations on these quantities, as well as the relations between set elements.

Afterwards several fundamentals of graph theory are introduced. It will be shown that logic algebra can serve as a basis for special Boolean algebra. Building upon the associated rules the concept of switching functions, their graphical representation and classification, the standard theories, and important basis systems for the representation of Boolean expressions will be derived and considered. Expansion theory, the computation with allocation blocks and terms, as well as measures for minimization are further topics of this chapter.

Having the formal basics available, applicable technical components and structures will be developed on the basis of binary switches, which allow for a direct conversion of formal relationships into solutions. Gates, circuit networks, synchronized sequential circuits, as well as specially derived functional units such as counters, registers, and digital memories lead to complex structures. The “All-purpose Computer” from J. von Neumann will be particularly dealt with.

To accompany the lecture material, assignments and the corresponding solutions will be given out and discussed during lecture hall exercises. Furthermore tutorials in small study groups will be held to deepen the understanding of the curriculum and methods taught. Furthermore computer exercises are offered in which digital circuits and their pattern of behaviour will be modelled and simulated with the help of the program LogicWorks.

**Media**
Slides of the lecture presentation.

**Literature**
Elective literature:

• Ernst-Günther Tietze: Netzleittechnik 1. Grundlagen; VWEW Energieverlag GmbH
• Ernst-Günther Tietze: Netzleittechnik Teil 2: Systemtechnik; VDE-Verlag
• Stuart A. Boyer: SCADA: Supervisory Control and Data Acquisition; ISA 3rd edition (June 2004)
Course: Bachelor Seminar in Information Engineering and Management [26524]

**Coordinators:** Andreas Geyer-Schulz  

**Part of the modules:** Seminar Module (p. 91) [WISSEM]

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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**
Knowledge from CRM is required. Therefore, the lecture Customer Relationship Management [26508] (or a similar one) has to be attended parallel or before the seminar.

**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 formatting 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: Bachelor Seminar in Foundations of Marketing [25191]

Coordinators: Wolfgang Gaul
Part of the modules: Seminar Module (p. 91) [WI3SEM]

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Learning Control / Examinations

Conditions
Knowledge like it is provided in the course Foundations of Marketing [WI3BWLMAR] is assumed.

Learning Outcomes
Content
Course: Rail System Technology [2115919]

Coordinators: Peter Gratzfeld
Part of the modules: Rail System Technology (p. 86)[WI3INGMB25]

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Learning Control / Examinations
See modul description.

Conditions
See modul description.

Learning Outcomes

• The students understand relations and interdependencies between rail vehicles, infrastructure and operation in a rail system.

• They can assess the suitability of existing elements in the overall system.

• They deduct the fundamental requirements for rail vehicles out of it.

Content

• Overview about fundamental components of a modern rail system (vehicles, infrastructure, operation)

• History and economic impact of rail systems

• Vehicle dynamics

• Wheel-rail-contact

• Train protection

• Traction power supply

• Vehicles

Media
All slides are available for download (Ilias-platform).

Literature
A bibliography is available for download (Ilias-platform).

Coordinators: Karl-Heinz Vollmer
Part of the modules: Statistical Applications of Financial Risk Management (p. 52)[WI3STAT]

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Learning Control / Examinations
Conditions
None.

Learning Outcomes
Content

Literature
- Bierwag: Duration-Analysis; Managing Interest Rate Risk, 1987
- Andrew Harvey: The Econometric Analysis of Time Series, 2nd. Ed. 1993
- Andrew Harvey: Time Series Models, 2nd. Ed. 1994
- Pindyck, Rubinfeld: Econometric Models and Economic Forecasts, 1998
- B. Rolfes: Gesamtbanksteuerung, 1999
Course: Design, Construction and Assessment of Green Buildings I [26404w]

**Coordinators:** Thomas Lützkendorf

**Part of the modules:** Sustainable Construction (p. 43)[WI3BWLOOW1]

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**Learning Control / Examinations**
The assessment consists of an oral exam (20 min.) according to Section 4 (2), 2 of the examination regulation. The oral exam takes place at every semester. Re-examinations are offered at every ordinary examination date.

**Conditions**
A combination with the module *Real Estate Management* [WI3BWLUO1] and with engineering science modules in the area of building physics and structural design is recommended.

**Learning Outcomes**
Knowledge in the area of sustainable construction concerning whole buildings, building components, equipment and appliances as well as building material.

**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 Construction Works [26404]

**Coordinators:** Thomas Lützkendorf

**Part of the modules:** Sustainable Construction (p. 43)[WI3BWLOOW1]

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<th>ECTS Credits</th>
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<tbody>
<tr>
<td>4,5</td>
<td>2/1</td>
<td>Summer term</td>
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**Learning Control / Examinations**
The assessment consists of a written or an oral exam (20 min.) according to Section 4 (2), 1 or 2 of the examination regulation. The exam takes place at every semester. Re-examinations are offered at every ordinary examination date.

**Conditions**
A combination with the module *Real Estate Management* [WI3BWLOOW2] and with engineering science modules from the areas building physics and structural design is recommended.

**Learning Outcomes**
Knowledge in the area of economic and environmental assessment of construction works.

**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, lifecycle 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: Design Basics in Highway Engineering [19026]

Coordinators: Ralf Roos
Part of the modules: Fundamentals of Spatial and Infrastructural Development (p. 73)[WI3INGBGU1]

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</table>

Learning Control / Examinations
See module description.

Conditions
See corresponding module information.

Learning Outcomes
Provision of first insights into methodologies and techniques in the fields of highway design and road construction.

Content
- Highway design
- Road network layout
- Driving dynamics
- Fundamental principles of highway design in location, elevation and cross section
- Road construction
- Earthworks (requirements and test methods)
- Pavements (structure, construction methods and requirements)
- Pavement design according to the German guideline RStO

Media
Lecture notes are provided for download (information will be made available in the lecture)
Course: Power Network Analysis [23371/23373]

Coordinators: Thomas Leibfried
Part of the modules: Electrical Power Engineering (p. 71)[WI3INGETIT1]

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<th>ECTS Credits</th>
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<tr>
<td>6</td>
<td>2/2</td>
<td>Winter term</td>
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Learning Control / Examinations
The assessment consists of a written exam (120 min) taking place at the beginn of the recess period (according to Section 4 (2), 1 of the examination regulation). The exam takes place in every winter semester. Re-examinations are offered at every ordinary examination date.

Conditions
This course is obligatory within the module and has to be attended.

Learning Outcomes
The goal is to relay theoretical fundamentals in the field of electric power technology and power transmission. In the first part the lecture deals with the basics of High-Voltage technology. Then the basics of transmission and distribution of electric energy is presented as well as the load flow calculation and the short-circuit calculation methods. Supporting the lecture, assignments to the curriculum are distributed. Their solution is presented and discussed during lecture hall exercises.

Content
In its first part, this lecture introduces the High-Voltage technology and its basics. Especially, the reasons for the necessity for the power transmission with high voltages are given. Basic electrical configurations and stresses occurring at multi dielectric systems are presented. Finally the first chapter deals with discharge phenomena.

The second chapter deals with the three phase system. Especially, the mathematical treatment of three phase systems and the introduction of component systems are contained in this chapter.

The third and very comprehensive chapter deals with the transmission and distribution of electric energy. Firstly, the laws of power transmission via transmission lines are presented. Then, the stability of electric power systems and possibilities to increase the power transmission capacity are discussed. Finally, the physics of energy distribution in the medium and low voltage grid is shown.

The fourth chapter deals with the Calculation of electric power networks and systems. Firstly, the preparatory steps for the calculation of the power network are shown. After discussing the basic network analysis methods, the load flow calculation are shown. Especially, the method of current iteration and the Newton Raphson method are presented and the algorithms of the individual methods are shown using an example.

The fifth chapter deals with methods for the calculation of the 3 phase short circuit. Thereby, it is distinguished between the short circuit nearby the generator and far from the generator.

In the sixth chapter the unsymmetrical faults in power networks and their calculation are discussed. Therefore, the symmetrical components are introduced as a first step. Then, the circuits in symmetrical components of all important power network equipment are presented. The chapter closes with the mathematical treatment of unsymmetrical short circuits using the symmetrical component method.

To accompany the lecture, a collection of problems can be downloaded. During lecture hall exercises their solutions will be discussed.

Media
Online material is available on: www.ieh.uni-karlsruhe.de and can be downloaded using a password.

Literature
Elective literature: Will be announced in the lecture notes.

Remarks
The course was formerly known as Electric Power System Engineering I.
Course: Motor Fuels for Combustion Engines and their Verifications [21109]

**Coordinators:** Volz

**Part of the modules:** Engine Development (p. 64)[W13INGMB17], Combustion Engines (p. 63)[W13INGMB16], Combustion Engines II (p. 82)[W13INGMB19]

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**Learning Control / Examinations**
The assessment consists of an oral exam (30 min) according to §4 (2), 2 of the examination regulation. The grade of the exam is included in the overall grade of the module with a weighting factor of 3.

**Conditions**
Successful completion of the course Combustion Engines A [21101]. Basic knowledge of chemistry is recommended.

**Learning Outcomes**

**Content**
**Course: Civil Law for Beginners [24012]**

**Coordinators:** Thomas Dreier, Peter Sester  
**Part of the modules:** Elective Module Law (p. 88)[WI3JURA]

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</table>

**Learning Control / Examinations**  
The assessment consists of a written exam (90 min) 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: Exchanges [25296]

Coordinators: Jörg Franke

Part of the modules: eFinance (p. 39)[WI3BWLISM3], Topics in Finance II (p. 36)[WI3BWLFBV6], Topics in Finance I (p. 35)[WI3BWLFBV5]

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

Literature
Elective literature:
Educational material will be offered within the lecture.
## Course: CAN-Bus Release Control [21092]

<table>
<thead>
<tr>
<th>Coordinators:</th>
<th>Marcus Geimer</th>
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<tbody>
<tr>
<td>Part of the modules:</td>
<td>Automotive Engineering (p. 59)[WI3INGMB5], Mobile Machines (p. 62)[WI3INGMB15]</td>
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### Learning Control / Examinations
Assessment for the module Mobile Machines: See module description.
Assessment for the module Automotive Engineering: The assessment consists of an oral exam (20 min) taking place in 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
Basic knowledge of electrical engineering is recommended. Programming skills are also helpful.

### Learning Outcomes
The students will get an overview of the theoretic and practical functioning of different bus systems.

After the practical oriented lessons the students will be able to visualize the communication structure of different applications, design basic systems and evaluate the complexity of programming of the complete system.

### Content
- Knowledge of the basics of data communication in networks
- Overview of the operating mode of current field buses
- Explicit observation of the operating mode and application areas of CAN buses
- Practical programming of an example application (hardware is provided)

### Literature
**Elective literature:**

### Remarks
The course will be replenished by interesting lectures of professionals.
Course: Complexity Management [25760]

Coordinators: Detlef Seese

Part of the modules: Emphasis Informatics (p. 53)[WI3INFO1], Electives in Informatic (p. 54)[WI3INFO2]

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Learning Control / Examinations
The assessment of this course consists of a written examination (60 min) (following §4(2), 1 SPO). The exam will be offered every semester and may be repeated at every ordinary exam date. Questions are in German and English, answers are possible in German or in English. In case that only a small number of candidates apply for the examination there will be offered an oral examination according to Section 4(2),1 of the examination regulation.

Conditions
None.

Recommendations
A basic knowledge in informatics is suitable.

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

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

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

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

Literature

- Franz Reither: Komplexitätsmanagement. Gerling Akademie Verlag, München 1997
- S. Wolfram: A new kind of Science. Wolfram Media Inc. 2002

Elective literature:

- N. Immerman: Descriptive Complexity; Springer-Verlag, New York 1999
- J. A. Bondy, U.S.R. Murty: Graph Theory, Springer 2008
- Christos H. Papadimitriou: Computational Complexity, Addison-Wesley, Reading, Massachusetts, 1994
• G. Frizelle, H. Richards (eds.): Tackling industrial complexity: the ideas that make a difference. University of Cambridge, Institute of Manufacturing 2002
• M. J. North, Ch. M. Macal: Managing Business Complexity, Discovering Strategic Solutions with Agent-Based Modeling and Simulation, Oxford University Press 2006
• S. Bornholdt, H. G. Schuster (Eds.): Handbook of Graphs and Networks, From the Genome to the Internet, Wiley-VCH, 2003
• Further references will be given in each lecture.

Remarks
The content of the lecture will permanently be adapted to actual developments. This can be the cause to changes of the described content and schedule.
Course: Current Issues in the Insurance Industry [26350]

Coordinators: Wolf-Rüdiger Heilmann
Part of the modules: Insurance Markets and Management (p. 34) [WI3BWLFBV4]

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</table>

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

Conditions
For the understanding of this course knowledge of Private and Social Insurance [25050] is required.

Learning Outcomes
Knowledge and understanding of important current characteristics of insurance, e.g., insurance markets, lines, products, investment, company pension schemes, corporate structures and governance as well as controlling.

Content
Current topics in insurance markets.

Literature

Elective literature:
Schwebler, Knauth, Simmert. Kapitalanlagepolitik im Versicherungsbinnenmarkt. 1994
Seng. Betriebliche Altersversorgung. 1995
von Treuberg, Angermayer. Jahresabschluss von Versicherungsunternehmen. 1995

Remarks
Block course. To attend the course please register at the secretary of the chair of insurance science.
Course: Customer Relationship Management [26508]

Coordinators: Andreas Geyer-Schulz
Part of the modules: CRM and Service Management (p. 40)[WI3BWLISM4]

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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 12) from excersise 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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<td>4.7</td>
<td>40</td>
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<td>5.0</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 concepts which also covers all CRM applications. The course is divided in the basics of Service Management as well as different topics within this concept like external and internal marketing, quality management and organizational requirements.

Media

Slides, Audio, Reader

Literature


Elective literature:

Course: Data Mining [25375]

Coordinators: Gholamreza Nakhaeizadeh
Part of the modules: Statistical Applications of Financial Risk Management (p. 52)[WI3STAT]

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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: Database Systems [25720]

**Coordinators:** Andreas Oberweis, Dr. D. Sommer

**Part of the modules:** Electives in Informatic (p. 54)[WI3INFO2]

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**Learning Control / Examinations**
The assessment consists of an 1h written exam in the first week after lecture period.

**Conditions**
Knowledge of course *Applied Informatics I - Modelling* [25070] is expected.

**Learning Outcomes**

Students

- are familiar with the concepts and principles of data base models, languages and systems and their applications,
- can design and model relational data bases on the basis of theoretical foundations,
- are able to ensure an error-free operation and the integrity of the data base and
- know how to handle enhanced data base problems occurring in the enterprises.

**Content**

Database systems (DBS) play an important role in today's companies. Internal and external data is stored and processed in databases in every company. The proper management and organization of data helps to solve many problems, enables simultaneous queries from multiple users and is the organizational and operational base for the entire working procedures and processes of the company. The lecture leads in the area of the database theory, covers the basics of database languages and database systems, considers basic concepts of object-oriented and XML databases, conveys the principles of multi-user control of databases and physical data organization. In addition, it gives an overview of business problems often encountered in practice such as:

- Correctness of data (operational, semantic integrity)
- Restore of a consistent database state
- Synchronization of parallel transactions (phantom problem).

**Media**

Slides, Access to internet resources

**Literature**

Elective literature:


Further literature will be given individually.
Course: Derivatives [26550]

**Coordinators:** Marliese Uhrig-Homburg

**Part of the modules:** eFinance (p. 39)[WI3BWLISM3], Topics in Finance II (p. 36)[WI3BWLFBV6], Topics in Finance I (p. 35)[WI3BWLFBV5]

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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: Diagnostics on Power Network Equipment [23365]

Coordinators:  
Thomas Leibfried

Part of the modules:  
Electrical Power Engineering (p. 71)[WI3INGETIT1]

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Learning Control / Examinations
The assessment consists of a written exam taking place at the beginn 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 goal is to relay further and deeper theoretical fundamentals in the field of electric power technology and power transmission. In the first part the lecture deals with the terms monitoring and diagnostics. Subsequently, the three diagnosis techniques dielectric analysis, partial discharge measurement and frequency response analysis are presented and mathematically discussed. Finally, the diagnostic methods of power transformers and generators are described.

Content
In its first part, this lecture introduces the terms monitoring and diagnostics. Doing this, the age distribution of the power network equipment in the German power grid is analyzed and the required investment within the next 10 years is estimated. Using this estimation, the necessity of condition monitoring of electric power system equipment is derived.

The second chapter deals with the dielectric analysis. First of all, the characteristics of insulations materials are discussed and a model for the description of polarisation mechanisms in the frequency domain and the time domain is derived. This enables the condition monitoring of insulation systems by three methods: the relaxation current analysis, the dissipation factor measurement over a wide frequency range and the recovery voltage measurement.

The third chapter deals with the partial discharge measurement. At first, the phenomenon of partial discharges will be discussed. Then, techniques for the measurement of partial discharges are presented. Finally, systems and their functionality for the measurement of the apparent charge, which occurs in an insulation system is described.

The fourth chapter deals with the frequency response analysis. In the first step the theoretical basics of the frequency response analysis are described. Subsequently, the different methods of the frequency response measurement are discussed. The fifth chapter deals with power transformer diagnostics. Steps by step the standard and the more advanced diagnostic methods are described. In the sixth and last chapter the methods for diagnostics on generators (rotating machinery) are described.

Media
Online material is available on: www.ieh.uni-karlsruhe.de and can be downloaded using a password.
### Course: Efficient Algorithms [25700]

**Coordinators:** Hartmut Schmeck  
**Part of the modules:** Emphasis Informatics (p. 53)[WI3INFO1], Electives in Informatic (p. 54)[WI3INFO2]

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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 w提醒§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: Efficient Creativity - Processes and Methods within the Automotive Industry [2122371]

| Coordinators: | Lamberti |
| Part of the modules: | Product Lifecycle Management (p. 70)[WI3INGMB21] |

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

Learning Control / Examinations
Conditions
None.

Learning Outcomes
Content
Course: eFinance: Information Engineering and Management for Securities Trading [26454]

Coordinators: Christof Weinhardt, Ryan Riordan
Part of the modules: eFinance (p. 39)[WI3BWLISM3], Topics in Finance II (p. 36)[WI3BWLFBV6], Topics in Finance I (p. 35)[WI3BWLFBV5], eBusiness and Servicemanagement (p. 37)[WI3BWLISM1]

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

Conditions
None.

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

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

Media
Powerpoint presentations, recorded lecture available on the internet

Literature

Elective literature:
Course: Introduction to Operations Research I [25040]

Coordinators: Stefan Nickel, Oliver Stein, Karl-Heinz Waldmann
Part of the modules: Introduction to Operations Research (p. 20) [WI1OR]

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Learning Control / Examinations
See module description.

Conditions
See module information.

Learning Outcomes
See module information.

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, game theory.
Graphs and Networks: Basic notions of graph theory, shortest paths in networks, project scheduling, maximal and minimal cost flows in networks.

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

Literature
Lecture notes
Elective literature:
- Büning, Naeve, Trenkler, Waldmann: Mathematik für Ökonomen im Hauptstudium. Oldenbourg, 2000
Course: Introduction to Operations Research II [25043]

**Coordinators:** Stefan Nickel, Oliver Stein, Karl-Heinz Waldmann

**Part of the modules:** Introduction to Operations Research (p. 20)[WI1OR]

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

**Conditions**
See corresponding module information. Especially the course *Introduction to Operations Research I* [25040] is assumed.

**Learning Outcomes**
See module information.

**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, dynamical and stochastic inventory models, queuing theory.

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

**Literature**
Lecture notes

**Elective literature:**
Course: Introduction to Energy Economics [26010]

**Coordinators:** Wolf Fichtner

**Part of the modules:** Energy Economics (p. 30)

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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**
See module description.

**Learning Outcomes**

**Content**

**Media**
Media will be provided on the e-learning platform ILIAS.
Course: Introduction in Ceramics [21755]

Coordinators: M. J. Hoffmann
Part of the modules: Emphasis Material Science (p. 69)[WI3INGMB9]

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Learning Control / Examinations
The assessment consists of an oral exam (20-30 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation). The re-examination is offered upon agreement.

Conditions
The course Material Science I [21760] has to be completed beforehand. Basic knowledge of natural science and knowledge of the content Material Science II [21782] is recommended.

Learning Outcomes
The lecture gives an overview of the relationship among processing, microstructure and properties of ceramics. Important processing routes and characterization methods will be discussed on various examples.

Content
The course is arranged in the following units:

- Atomic bonding in solids
- Crystal structures and structural imperfections
- Surfaces, interfaces and grain boundaries
- Binary and ternary phase diagrams
- Structure of glass
- Characterization and processing of ceramic powders
- Shaping methods (pressing, slip casting, injection molding)
- Densification and grain growth (sintering)
- Introduction to fracture mechanics, strength and failure probability of brittle materials
- Materials behavior at high temperatures (creep, oxidation)
- Toughening mechanisms
- Methods for microstructural characterization

Literature
Elective literature:

- H. Salmang, H. Scholze, „Keramik“, Springer-Verlag
- Kingery, Bowen, Uhlmann, „Introduction To Ceramics“, Wiley-Verlag
Course: Introduction to GIS for students of natural, engineering and geo sciences [20712/13]

**Coordinators:** Rösch

**Part of the modules:** Understanding and Prediction of Disasters I (p. 76)[WI3INGINTER1], Understanding and Prediction of Disasters II (p. 77)[WI3INGINTER2], Understanding and Prediction of Disasters III (p. 78)[WI3INGINTER5]

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**Learning Control / Examinations**

**Conditions**
None.

**Learning Outcomes**

**Content**

**Remarks**
For further information, see [http://www.gik.uni-karlsruhe.de/print/index.html?no_cache=1&P=1](http://www.gik.uni-karlsruhe.de/print/index.html?no_cache=1&P=1)
Course: Railway Logistics, Management and Operating - Part I [19306]

Coordinators: Eberhard Hohnecker
Part of the modules: Foundations of Guided Systems (p. 74) [WI3INGBGU2]

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

Learning Control / Examinations
See module description.

Conditions
See module description.

Learning Outcomes

Content
capcities of lines and stations; singalling; safety operation

Literature
Elective literature:
Fiedler: Grundlagen der Bahntechnik, Werner Verlag Düsseldorf
Pachl: Systemtechnik des Schienenverkehrs, Teubner-Verlag, Stuttgart
Course: Technique of Electrical Installation [23382]

Coordinators: Kühner
Part of the modules: Electrical Power Engineering (p. 71)[WI3INGETIT1]

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

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

Conditions
None.

Learning Outcomes
The goal is to relay practical fundamentals. The lecture gives an overview about the classical and modern methods of electrical installations of and in buildings. Furthermore, the students get an insight to regulations and engineer standards.

Content
- Capture 1: Electrical Power Distribution and Networking
- Capture 2: Electrical Power Supply of Buildings
- Capture 3: Electrical Power Supply in Buildings
- Capture 4: Protective Equipments
- Capture 5: Electrical Energy Applications
- Capture 6: Electrical Automation and System Engineering of Buildings
- Capture 7: Power Management of Buildings

Media
Online material is available on: http://www.ieh.unikarlsruhe.de/elektrische_installationstechnik.php
Course: Systems for Electrical Energy [23391/23393]

Coordinators: Thomas Leibfried
Part of the modules: Electrical Power Engineering (p. 71)[WI3INGETIT1]

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**Learning Control / Examinations**
The assessment consists of a written exam (120 min) taking place at the beginn of the recess period (according to Section 4 (2), 1 of the examination regulation). The exam takes place in every summer semester. Re-examinations are offered at every ordinary examination date.

**Conditions**
For a successful participation knowledge of the content of the course *Higher mathematics* and especially of complex computation is assumed.
The course is an obligatory course within the module and has to be attended.

**Learning Outcomes**
The goal is to relay theoretical fundamentals in the field of electrical network analysis and in the field of electrical power networks.
In the first part the lecture deals with the calculation of transients in linear electrical networks using differential equations and the Laplace transform. In the second part of the lecture the electrical power network equipment is described.
Supporting the lecture, assignments to the curriculum are distributed. Their solution is presented and discussed during lecture hall exercises.

**Content**
In its first part, this lecture is a consequent continuation of the calculation of electrical networks as it is presented in the lecture “Linear electrical networks”. In the second part of this lecture, the basics of electric power network equipment are presented.
This is the basis for all further lectures of power system technology.
The first chapter gives an introduction in the single phase and three phase AC system.
The second chapter deals with or is a repetition of electromagnetic basics. In a first step magnetic circuits and their calculation is treated. Then are subjects like main flux and stray flux are introduced, as well as self induction main inductance and stray inductance. The induction law leads directly to the transformer and the calculation of inductances and finally to the calculation of forces caused by a current flowing in a conduction which is located within a magnetic field.
The third and very comprehensive chapter deals with the mathematical description of electrical networks. Hereby, it is distinguished between networks with concentrated elements and networks with distributed elements. The calculation of networks with concentrated elements leads to differential equations with constant coefficients. Their solution as well as a special case, the sinusoidal excitation of such networks, is comprehensively demonstrated using examples. Finally, the description of electrical networks by a system of first order differential equations is shown and their solution is presented. Circuits with distributed elements are transmission lines. The transmission line theory for sinusoidal voltages and currents as well as for impulse voltages and currents is shown.
The fourth chapter deals with the Laplace Transform as a tool for electrical network analysis. First, the Duhamel integral (convolution integral) is presented. Then the Laplace Transform is derived out of the convolution integral and in a further subchapter the solution of differential equations using the Laplace Transform is demonstrated.
The fifth chapter deals with methods for network analysis. It demonstrates the mesh analysis, the nodal analysis, the superposition theorem, Norton's theorem, Thevenin's theorem and the Tellegen-Theorem. These formal methods are demonstrated using two examples circuits. These circuits are transistor amplifier with and without a transformer. This allows the calculation of networks with voltage or current dependent sources.
In the sixth chapter the structure of the electric power network is shown and explained.
The seventh chapter deals with power network equipment. Thereby, their steady state behaviour in the power network as well as their electrical and mechanical basic design is presented. The chapter contains synchronous generators, power transformers, reactors, capacitors, transmission lines and switch gear. For all of this power network equipment its steady state electrical circuit is derived. This gives the basis for all further lectures in the field of power network engineering.
To accompany the lecture, a collection of problems can be downloaded. During lecture hall exercises their solutions will be discussed.
The course comprises of the interleaved lecture blocks and exercises. Current information can be found on the IEH webpage (www.ieh.uni-karlsruhe.de).

**Media**
Online material is available on: www.ieh.uni-karlsruhe.de and can be downloaded using a password.

**Literature**
**Elective literature:**
Will be announced in the lecture notes.
Remarks
From the summer term 2010 on, the course is held in the summer term and reduced to 4.5 CP.
Course: Electrical Engineering I [23223]

Coordinators: Wolfgang Menesklou

Part of the modules: Electrical Engineering (p. 24)[WI1ING4]

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Learning Control / Examinations
The assessment consists of a written examination (120 min) taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination takes place every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes
The student is supposed to develop an understanding for the basic terms of electrical engineering and should be able to carry out simple calculations of DC and AC circuits.

Content
This course introduces undergraduate students of business engineering into the basics of electrical science and engineering. Supporting the lecture, assignments to the curriculum are distributed. These are solved into additional (voluntary) tutorials.

- DC: Electrical sources, resistance, circuits, Kirchhoff’s law
- Fields: Electrical and magnetic fields, dielectrics, inductance
- AC: Complex calculus, RLC circuits, filters

Media
Online material is available at http://www.iwe.kit.edu

Literature
Online material is available on http://www.iwe.kit.edu/

Elective literature:
Course: Electrical Engineering II [23224]

Coordinators: Wolfgang Menesklou
Part of the modules: Specialization in Engineering Science (p. 68)[WI3INGMB8]

**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 (120 min) taking place in the recess period (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.

**Conditions**
Successful completion of the module *Electrical Engineering* [Wi1ING4].

**Learning Outcomes**
The student knows and understands basic components and techniques of electrical engineering.

**Content**
This course introduces undergraduate students of business engineering into topics of advanced electrical engineering like electrical instrumentation, semiconductors, and communication systems. Within the lecture, assignments to the curriculum are discussed and are used for preparation for written examination.

**Media**
Online material is available at http://www.iwe.kit.edu

**Literature**
Online material is available on http://www.iwe.kit.edu/

**Elective literature:**
Will be announced in the lecture.
Course: Energy efficient intralogistic systems [2117500]

**Coordinators:** Schönung

**Part of the modules:** Introduction to Technical Logistics (p. 58) [WI3INGMB13]

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**Learning Control / Examinations**

The assessment consists of an oral exam according to §4 (2), 2 of the examination regulation. It may be a written exam (according to §4 (2), 1 of the examination regulation) in the case of large number of participants.

**Conditions**

Knowledge of Electrical Engineering and Technical Mechanics is recommended.

**Learning Outcomes**

The lecture provides basics for the analysis and the design of energy and resource efficient intralogistic systems for production and distribution.

**Content**

The main focuses of the course are:

- processes in Intralogistic systems
- evaluation of energy consumption of conveyors
- modeling of conveying systems
- methods for energy savings
- approaches for energy efficiency increasing of continuous and discontinuous conveyors
- dimensioning energy efficient drives
- new approaches for resource efficient conveying systems.
Course: Energy Policy [25959]

**Coordinators:** Martin Wietschel
**Part of the modules:** Energy Economics (p. 30)[WI3BWLIIP2]

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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 in every semester. Re-examinations are offered at every ordinary examination date.

**Conditions**
None.

**Learning Outcomes**

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

**Literature**
Will be announced in the lecture.
Course: Enterprise Risk Management [26326]

Coordinators: Ute Werner
Part of the modules: Risk and Insurance Management (p. 33)[W3BWLFBV3]

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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**
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.

**Remarks**
To attend the course please register at the secretary of the chair of insurance science.
In the winter term 2010/11 the course is held by Dr. Edmund Schwake.
**Course: Additional Course Safety Sciences [siwi_wahl]**

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<tr>
<th>Coordinators:</th>
<th>Ute Werner</th>
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<td>Part of the modules:</td>
<td>Safety Science II (p. 80) [WI3INGINTER4]</td>
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**Learning Control / Examinations**
See module description.

**Conditions**
See module description.
This course must be filled with one or more other courses from safety sciences to be chosen by the student in agreement with the module coordinator in order to fulfill the credits requirements of the module.

**Learning Outcomes**
Cf. to the course actually selected.

**Content**
Cf. to the course actually selected.
Course: Renewable Energy Sources - Technologies and Potentials [26012]

**Coordinators:** Wolf Fichtner

**Part of the modules:** Energy Economics (p. 30) [WI3BWLIIP2]

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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**

**Content**

**Media**
Media will likely be provided on the e-learning platform ILIAS.
Course: Energy Generation [23356]

**Coordinators:** Bernd Hoferer

**Part of the modules:** Electrical Power Engineering (p. 71)[WI3INGETIT1]

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**Learning Control / Examinations**
The assessment consists of an oral exam (20 min) taking place at the beginn of the recess period (according to Section 4 (2), 2 of the examination regulation). The exam takes place in every winter semester. Re-examinations are offered at every ordinary examination date.

**Conditions**
None.

**Learning Outcomes**
The goal is to relay theoretical fundamentals. The lecture covers the entire topic of power generation from conversion of primary energy resources in coal fired power plants and nuclear power plants to utilisation of renewable energy. The lecture gives a review of the physical fundamentals, technicaleconomical aspects and potential for development of power generation both conventional generation and renewable generation.

**Content**
- Energy resources
- Energy consumption
- Types and use of power plants
- Conversion of primary energy in power plants
- Thermodynamical fundamental terms
- Process in steam power plants
- Steam power plants components
- Flue gas cleaning
- Thermal power plants
- Nuclear power plants
- Hydroelectric power plants
- Wind energy converters
- Solar energy plants

**Media**
Material is available at the beginning of the lecture.

**Literature**

Elective literature:
Schwab; Elektroenergiesysteme; 1. Auflage 2006.
Course: eServices [26466]

Coordinators: Christof Weinhardt, Gerhard Satzger

Part of the modules: eBusiness and Servicemanagement (p. 37)[WI3BWLISM1], Specialization in Customer Relationship Management (p. 41)[WI3BWLISM5]

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

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

Conditions
None.

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

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

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

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

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

Media
PowerPoint slides;

Literature
Elective literature:
Stauss, B. et al. (Hrsg.) (2007), Service Science – Fundamentals Challenges and Future Developments.
Teboul, (2007), Services is Front Stage.
Course: Experimental Economics [25373]

Coordinators: Siegfried Berninghaus, Kroll
Part of the modules: Applied Game Theory (p. 46)[WI3VWL1]

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

Conditions
See corresponding module information.

Learning Outcomes
The students should learn

- how to gain scientific experience and knowledge (philosophy of science),
- how Game Theory and Experimental Economics influenced each other in scientific research,
- about the methods as well as the strengths and weaknesses of Experimental Economics,
- some examples of experimental research, such as markets and market equilibria, coordination games, bargaining, decision making under risk,
- how to evaluate data.

Content
Experimental Economics have become a separate field in Economics. Nearly all fields of the economic discipline use economic experiments to verify theoretical results. Besides being used for empirical validation, this method is applied in political and strategic consulting. The lecture gives an introduction to experimental methods in economics and shows differences to experiments in natural sciences. Scientific studies are used to show exemplary applications.

Media
Classroom experiments or experiments in the computer laboratory will be conducted. To some extent, slides are made available online.

Literature

Elective literature:

- Strategische Spiele; S. Berninghaus, K.-M. Ehrhart, W. Güth; Springer Verlag, 2nd ed., 2006.
- Experimental Methods: A Primer for Economists; D. Friedman, S. Sunder; Cambridge University Press, 1994.
Course: Driving Dynamics Evaluation within the Global Vehicle Simulation [21850]

Coordinators: Schick  
Part of the modules: Handling Characteristics of Motor Vehicles (p. 60)[Wi3INGMB6]

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**Learning Control / Examinations**  
The assessment will consist of an oral exam (30-40 min) taking place in the recess period (according to §4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Conditions**  
See module description.  
Previous visit of Handling Characteristics of Motor Vehicles I [21807] is recommended. See module description.

**Learning Outcomes**  
The students have an overview of the vehicle dynamics simulation, the model parametrization and the related data sources. They have good knowledge about vehicle dynamics test methods and related execution of virtual test driving (open loop, closed loop). They are able to evaluate driving behavior based on self-created results. They have achieved knowledge about influences and interactions of components such as tires, suspension, kinematics and compliance, roll bars, steering, brakes, mass distribution and powertrain and they have the qualification to design components with regard to global vehicle behavior.

**Content**  
1. Testing and evaluation methods  
2. Fundamentals of vehicle dynamics simulation  
3. Execution of virtual test driving and evaluation of the results  
4. Influence of several components and optimization of global driving behavior

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

2. Unrau, H.-J.: Scriptum zur Vorlesung “Fahreigenschaften I”  
4. IPG: Benutzerhandbuch CarMaker
Course: Handling Characteristics of Motor Vehicles I [2113807]

Coordinators: Unrau
Part of the modules: Handling Characteristics of Motor Vehicles (p. 60)[WI3INGMB6]

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Learning Control / Examinations
The assessment consists of an oral exam (30-40 min) taking place in the recess period (according to §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 students know the basic connections between drivers, vehicles and environment. They can build up a vehicle simulation model, with which forces of inertia, aerodynamic forces and tyre forces as well as the appropriate moments are considered. They have proper knowledge in the area of tyre characteristics, since a special meaning comes to the tire behavior during driving dynamics simulation.

Content
1. Problem definition: Control loop driver - vehicle - environment (e.g. coordinate systems, modes of motion of the car body and the wheels)
2. Simulation models: Creation from motion equations (method according to D'Alembert, method according to Lagrange, programme packages for automatically producing of simulation equations), model for handling characteristics (task, motion equations)
3. Tyre behavior: Basics, dry, wet and winter-smooth roadway

Literature
Elective literature:
Course: Handling Characteristics of Motor Vehicles II [2114838]

Coordinators: Frank Gauterin

Part of the modules: Handling Characteristics of Motor Vehicles (p. 60][WI3INGMB6]

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Learning Control / Examinations
The assessment will consist of an oral exam (30-40 min) taking place in the recess period (according to §4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
It is recommended to attend the course Handling Characteristics of Motor Vehicles I [21807] beforehand.

Learning Outcomes
The students have an overview of common test methods, with which the handling of vehicles is gauged. They are able to interpret results of different stationary and transient testing methods. Apart from the methods, with which e.g. the driveability in curves or the transient behaviour from vehicles can be registered, also the influences from cross-wind and from uneven roadways on the handling characteristics are well known. They are familiar with the stability behavior from single vehicles and from vehicles with trailer.

Content
1. Vehicle handling: Bases, steady state cornering, steering input step, single sine, double track switching, slalom, cross-wind behavior, uneven roadway
2. stability behavior: Basics, stability conditions for single vehicles and for vehicles with trailer

Literature
Elective literature:
1. Richter, B.: Schwerpunkte der Fahrzeugdynamik, Verlag TÜV, 1990

Business Engineering (B.Sc.)
Module Handbook, Date: 23.09.2010
Course: Vehicle Mechatronics I [2113816]

Coordinators: Ammon

Part of the modules: Handling Characteristics of Motor Vehicles (p. 60) [WI3INGMB6], Vehicle Development (p. 61) [WI3INGMB14]

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Learning Control / Examinations
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Conditions
It is recommended to have knowledge of control engineering, technical mechanics and automobile technology.

Learning Outcomes
The students have an overview of the system science field of mechatronics and its application in the area of vehicle conception, especially in the context of vehicle system dynamics. They know the tools and methods for a systematical analysis, conception, and design of mechatronic systems, focussing on mechatronically extended suspension systems.

Content
1. Introduction: Mechatronics in vehicle technology
2. Vehicle Control systems
   - Brake- and traction controls (ABS, ASR, automated power train controls)
   - Active and semiactive suspension systems, active stabilizor bars
   - Vehicle dynamics controls, driver assistance systems
3. Modelling technology
   - Mechanics - multi body dynamics
   - Electrical and electronical systems, control systems
   - Hydraulics
   - Interdisciplinary coupled systems
4. Computer simulation technology
   - Numerical integration methods
   - Quality (validation, operating areas, accuracy, performance)
   - Simulator-coupling (hardware-in-the-loop, software-in-the-loop)
5. Systemdesign (example: brake control)
   - Demands, requirements (funktion, safety, robustness)
   - Problem setup (analysis - modelling - model reduction)
   - Solution approaches
   - Evaluation (quality, efficiency, validation area, concept ripeness)

Literature

Elective literature:

1. Ammon, D., Modellbildung und Systementwicklung in der Fahrzeugdynamik, Teubner, Stuttgart, 1997
5. Roddeck, W., Einführung in die Mechatronik, Teubner, Stuttgart, 1997
Course: Vehicle Comfort and Acoustics I [2113806]

Coordinators: Frank Gauterin
Part of the modules: Handling Characteristics of Motor Vehicles (p. 60)[WI3INGMB6]

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Learning Control / Examinations
The assessment consists of an oral exam (30-40 min) taking place in 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 students know what are noise and vibration, how they are generated, and how they are perceived by human beings. They have knowledge about the requirements given by users and the public. They know which components of the vehicle are participating in which way on noise and vibration phenomenon and how they could be improved.

Content
1. Perception of noise
2. Perception of vibrations
3. Fundamentals of vibrations 1
4. Fundamentals of vibrations 2
5. Fundamentals of vibrations 3
6. Signal analysis
7. Vibration measurement technology
8. Fundamentals of acoustics 1
9. Fundamentals of acoustics 2
10. Acoustical measurement technology 1
11. Acoustical measurement technology 2
12. Suspension Noise, Vibration & Harshness
13. Tire/road noise
14. Tire/road comfort
15. Road surfaces
16. Wheel imperfection and steering wheel oscillations
17. Brake Noise, Vibration & Harshness

Media
Lecture Script

Literature
Elective literature:
2. Russel C. Hibbeler, Technische Mechanik 3, Dynamik, Pearson Studium, München, 2006

Remarks
In the following summer semester this lecture is to be continued with the lecture Vehicle Comfort and Acoustics II [21825]. In this lecture, noise and vibration characteristics as well as optimization possibilities of other components will be discussed. Moreover, the issue of traffic handled will be brought up. This lecture may be visited independently of the first part.
Course: Vehicle Comfort and Acoustics II [2114825]

Coordinators: Frank Gauterin
Part of the modules: Handling Characteristics of Motor Vehicles (p. 60)[WI3INGMB6]

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Learning Control / Examinations
The assessment consists of an oral exam (30-40 minutes) 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
The course can be attended independently from the course Vehicle Comfort and Acoustics II [21806].

Learning Outcomes
The students have knowledge about the noise and vibration properties of the chassis components and the drive train. They know what kind of noise and vibration phenomena do exist, what are the generation mechanisms behind, which components of the vehicle participate in which way and how could they be improved.

They have knowledge in the subject area of noise emission of automobiles: Noise impact, legal requirements, sources and influencing parameters, component and system optimization, target conflicts and development methods.

Content
Short introduction in the fundamentals of noise and vibration comfort.

Noise and vibration properties, comfort optimisation of
- tyres
- brakes
- chasis
- motor
- drive train.

Traffic noise.

An excursion will give insights in the development practice of a car manufacturer or a system supplier.

Media
Lecture script.
Course: Remote Sensing [GEOD-BFB-1]

Coordinators: Hinz, Weidner
Part of the modules: Understanding and Prediction of Disasters I (p. 76)\textsc{[WI3INGINTER1]}, Understanding and Prediction of Disasters II (p. 77)\textsc{[WI3INGINTER2]}, Understanding and Prediction of Disasters III (p. 78)\textsc{[WI3INGINTER5]}

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Learning Control / Examinations
Conditions
None.

Learning Outcomes
Content

Media
e-Learning-Modul “Fernerkundung” (geoinformation.net)
lecture notes

Literature
Elective literature:
Albertz: Fernerkundung

Remarks
For further information, see http://www.ipf.uni-karlsruhe.de/
Course: Remote Sensing Systems [20241/42]

**Coordinators:** Hinz, Weidner

**Part of the modules:** Understanding and Prediction of Disasters I (p. 76)[WI3INGINTER1], Understanding and Prediction of Disasters II (p. 77)[WI3INGINTER2], Understanding and Prediction of Disasters III (p. 78)[WI3INGINTER5]

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**Learning Control / Examinations**

**Conditions**
None.

**Learning Outcomes**

**Content**

**Media**
e-Learning-Modul “Fernerkundung” (geoinformation.net)
Skript

**Literature**
Elective literature:
Albertz: Fernerkundung

**Remarks**
For further information, see http://www.ipf.uni-karlsruhe.de/
Course: Remote Sensing Methods [20243/44]

Coordinators: Hinz, Weidner

Part of the modules: Understanding and Prediction of Disasters I (p. 76)[WI3INGINTER1], Understanding and Prediction of Disasters II (p. 77)[WI3INGINTER2], Understanding and Prediction of Disasters III (p. 78)[WI3INGINTER5]

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Learning Control / Examinations

Conditions
It is recommended to attend the course Thermodynamics beforehand.

Learning Outcomes

Content

Media
- e-Learning-Modul “Fernerkundung” (geoinformation.net)
- lecture notes
Course: Manufacturing Engineering [2149657]

Coordinators: Volker Schulze

Part of the modules: Production Engineering I (p. 65)[WI3INGMB10], Production Engineering III (p. 67)[WI3INGMB7], Production Engineering II (p. 66)[WI3INGMB4], Manufacturing Engineering (p. 83)[WI3INGMB23]

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Learning Control / Examinations
The assessment consists of a written exam (180 min) taking place at the beginning of the recess period (according to Section 4(2), 1) of the examination regulation). The examination takes place every semester. Re-examinations are offered at every ordinary examination date.

Conditions
Successfull Completion of the modules Material Science [WI1ING2] and Engineering Mechanics [WI1ING3]

Learning Outcomes
The student

- is able to name the different manufacturing methods and to explain their functions
- is able to classify the manufacturing methods by their general structure and functionality according to specific main groups
- is able to perform a process selection based on the methods he/she has learned about and their characteristics
- is able to identify the correlation between different methods
- is able to evaluate the different methods against specific applications on the basis of technical and economical aspects

Content
The objective of the lecture is to look at manufacturing engineering within the wider context of production engineering, to provide an overview over the different manufacturing methods and to impart detailed process knowledge of the common methods. The lecture covers the basic principles of manufacturing engineering and deals with the manufacturing methods according to their classification into main groups on the basis of technical and economical aspects. The lecture is completed with topics such as process chains in manufacturing.

The following topics will be covered:

- Introduction
- Quality control
- Primary processing (casting, plastics engineering, sintering, generative methods),
- Forming (sheet-metal forming, massive forming, plastics engineering),
- Cutting (machining with geometrically defined and geometrically undefined cutting edges, separating, abrading)
- Joining
- Coating
- Heat treatment and surface treatment
- Process chains in manufacturing
- Work preparation

Media
Slides and lecture notes for the manufacturing engineering lecture will be made available through Ilias.
## Course: Financial Management [25216]

**Coordinators:** Martin E. Ruckes  
**Part of the modules:** Essentials of Finance (p. 31)[WI3BWLFBV1]

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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 and Management Science C [25026/25027] is recommended.

### Learning Outcomes
Students get a 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 [25232]

**Coordinators:** Martin E. Ruckes

**Part of the modules:** Topics in Finance I (p. 35), Topics in Finance II (p. 36)

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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: Fluid Power Systems [21093]

**Coordinators:** Marcus Geimer

**Part of the modules:**
- Automotive Engineering (p. 59)[WI3INGMB5]
- Mobile Machines (p. 62)[WI3INGMB15]

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### Learning Control / Examinations

Assessment for the module Mobile Machines: See module description.

Assessment for the module Automotive Engineering: The assessment consists of an oral exam (20 min) taking place in the recess period (according to §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 students will be able to

- know and understand physical principles of fluid power systems
- know the current components and their operating mode
- know the advantages and disadvantages of different components
- dimension the components for a given purpose and to
- calculate simple systems

### Content

In the range of hydrostatics the following topics will be introduced:

- Hydraulic fluids
- Pumps and motors
- Valves
- Accessories
- Hydraulic circuits.

In the range of pneumatics the following topics will be introduced:

- Compressors
- Motors
- Valves
- Pneumatic circuits.
Course: Introduction to Engineering Geology and Hydrogeology [10557]

**Coordinators:** Tanja Liesch, Philipp Blum

**Part of the modules:**
- Understanding and Prediction of Disasters I (p. 76)[WI3INGINTER1]
- Understanding and Prediction of Disasters II (p. 77)[WI3INGINTER2]
- Understanding and Prediction of Disasters III (p. 78)[WI3INGINTER5]

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**Learning Control / Examinations**
Written exam at the end of the lecture period. The exam will be graded. A re-examination is offered 4-6 weeks later.

**Conditions**
none

**Recommendations**
None.

**Learning Outcomes**
Hydrogeology:
- Acquisition of hydrogeological basic knowledge and fundamental terms
- Preparation for the subsequent lecture “Principles of Hydrogeology”

**Content**
Hydrogeology:
- Hydrogeology: Definition and objectives
- Basics of the hydrologic cycle
- Basics of groundwater hydraulics: subsurface voids, porosity, aquifers ans aquifuges, types of aquifers, basics of hydro-statics and hydrodynamics, Bernoulli’s law, Darcy’s law
- Springs, wells and ponds
- Illustration of groundwater morphology
- Basics of groundwater chemistry and quality

**Literature**
Hydrogeology:
- DIN 4049, Teil 1-3
Course: Business Strategies of Banks [25299]

Coordinators: Wolfgang Müller
Part of the modules: Topics in Finance I (p. 35)[WI3BWLFBV5], Topics in Finance II (p. 36)[WI3BWLFBV6]

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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: Global Optimization I [25134]

Coordinators: Oliver Stein
Part of the modules: Applications of Operations Research (p. 55)[WI3OR5], Methodical Foundations of OR (p. 56)[WI3OR6]

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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 [25136]. In this case, the duration of the written examination takes 120 minutes. In a combined examination of Global Optimization I [25134] and Global Optimization II [25136], upon attaining more then 60% of the exercise points, the grade of the passed examination is improved by a third of a grading step. In a combined examination of Global Optimization I [25134] and Global Optimization II [25136], upon attaining more then 60% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student
- knows and understands the fundamentals of deterministic global optimization,
- is able to choose, design and apply modern techniques of deterministic global optimization in practice.

Content
In many optimization problems from economics, engineering and natural sciences, numerical solution methods are only able to efficiently identify local optimizers, while it is much harder to find globally optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate. Part I of the lecture treats methods for global optimization of convex functions under convex constraints. It is structured as follows:
- Introduction, examples, and terminology
- Existence results
- Optimality in convex optimization
- Duality, bounds, and constraint qualifications
- Numerical methods

Nonconvex optimization problems are treated in part II of the lecture. The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

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 [25136]

Coordinators: Oliver Stein
Part of the modules: Methodical Foundations of OR (p. 56)[WI3OR6]

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<th>ECTS Credits</th>
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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 to the written examination is subject to fulfilling the prerequisite.
The examination can also be combined with the examination of Global Optimization I [25134]. In this case, the duration of the written examination takes 120 minutes.
In a combined examination of Global Optimization I [25134] and Global Optimization II [25136], upon attaining more then 60% of the exercise points, the grade of the passed examination is improved by a third of a grading step.
In a combined examination of Global Optimization I [25134] and Global Optimization II [25136], upon attaining more then 60% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student

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

Content
In many optimization problems from economics, engineering and natural sciences, numerical solution methods are only able to efficiently identify local optimizers, while it is much harder to find globally optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.
The global solution of convex optimization problems is subject of part I of the lecture.
Part II of the lecture treats methods for global optimization of nonconvex functions under nonconvex constraints. It is structured as follows:

- Introduction and examples
- Convex relaxation
- Interval arithmetic
- Convex relaxation via αBB method
- Branch and bound methods
- Lipschitz optimization

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

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: Basics of Automotive Engineering I [2113805]

Coordinators: Frank Gauterin, Unrau

Part of the modules: Automotive Engineering (p. 59)[WI3INGMB5]

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Learning Control / Examinations
The assessment consists of a written exam (120 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
The students know the movements and the forces at the vehicle and are familiar with active and passive security. They have proper knowledge about operation of engines, the necessary transmission between engine and drive wheels and the power distribution. They have an overview of the components necessary for the drive and the calculation methods for sizing. They are able to lay out the appropriate modules of a vehicle.

Content
1. Driving mechanics: Driving resistances and driving performances, mechanics of the longitudinal and transverse forces, collision mechanics
2. Engine: Classification, comparison processes, real processes, waste gas emission, alternative drives
3. Transmission: Clutches (e.g. friction clutch, visco clutch), transmission (e.g. mechanical transmission, hydraulic fluid transmission)
4. Power transmission and distribution: drive shafts, cardon joints, differentials

Literature
Elective literature:
Course: Basics of Automotive Engineering II [2114835]

**Coordinators:** Frank Gauterin, Unrau

**Part of the modules:** Automotive Engineering (p. 59) [WI3INGMB5]

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**Learning Control / Examinations**
The assessment consists of a written exam (90 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**
It is recommended to attend the course *Basics of Automotive Engineering I* [21805].

**Learning Outcomes**
The students have an overview of the modules, which are necessary for the road holding of a motor vehicle and the power transmission between vehicle bodywork and roadway. They have knowledge of different wheel suspensions, the tyres, the steering elements and the brakes. They know different execution forms, the function and the influence on the driving or brake behavior. They are able to construct the appropriate components correctly.

**Content**
1. Chassis: Wheel suspensions (rear axles, front axles, kinematics of axles), tyres, springs, damping devices
2. Steering elements: Steering elements of single vehicles and of trailers
3. Brakes: Disc brake, drum brake, retarder, comparison of the designs

**Literature**

**Elective literature:**
Course: Foundations of Informatics I [25074]

<table>
<thead>
<tr>
<th>Coordinators:</th>
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<tbody>
<tr>
<td>Rudi Studer, Sebastian Rudolph</td>
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<tr>
<th>Part of the modules:</th>
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<tr>
<td>Introduction to Informatics [p. 19][WI1INFO]</td>
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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. The exam takes place every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes
Central theoretic basics and solution approaches coming from all areas of computer science are presented as well as illustrated and exercised using examples.

The following topics are covered:
- Object Oriented Modeling
- Logic (Propositional Calculus, Predicate Logic, Boolean Algebra)
- Algorithms and Their Properties
- Sort-and Search-Algorithms
- Complexity Theory
- Problem Specification
- Dynamic Data Structures

Content

Media
Lecture slides

Literature

Elective literature:

Additional literature will be announced in the lecture.
Course: Foundations of Informatics II [25076]

**Coordinators:** Hartmut Schmeck

**Part of the modules:** Introduction to Informatics ([p. 19][WI1INFO])

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**Learning Control / Examinations**

The assessment consists of a written exam (90 min.) according to Section 4(2), 1 of the examination regulation. If the grade obtained in the written exam is in between 1.3 and 4.0, a successful completion of the assignments or of a bonus exam will improve the grade by one level.

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

**Conditions**

It is recommended to attend the course *Foundations of Informatics I* [25074] beforehand.

Active participation in the practical lessons is strongly recommended.

**Learning Outcomes**

**Content**

**Literature**

**Elective literature:**

Will be announced in the lecture.
Course: Internal Combustion Engines and Exhaust Gas Aftertreatment Technology [21138]

Coordinators: Lox

Part of the modules: Engine Development (p. 64) [WI3INGMB17], Combustion Engines II (p. 82) [WI3INGMB19]

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Learning Control / Examinations
The assessment consists of an oral exam (30 min) according to §4 (2), 2 of the examination regulation. The grade of the exam is included in the overall grade of the module with a weighting factor of 3.

Conditions
The course Combustion Engines A [21101] has to be completed beforehand.

Learning Outcomes

Content

Literature
Will be announced in the lecture.
Course: Fundamentals of Production Management [25950]

Coordinators: Frank Schultmann
Part of the modules: Industrial Production I (p. 29)[WI3BWIIP]

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Learning Control / Examinations
The examination will be in form of a written exam acc. to §4(2), 1 ER. Exams are offered in every semester and can be re-examined at every ordinary examination date.

Conditions
This course is compulsory in module “Industrial Production I” [WW4BWIIP].

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.

Medien und Pflichtliteratur: können aus der alten Fassung übernommen werden.

Media
Media will be provided on learning platform.

Literature
will be announced in the course
Course: Basics of Ground Born Guided Systems [19066]

- **Coordinators:** Michael Weigel, Eberhard Hohnecker
- **Part of the modules:** Foundations of Guided Systems (p. 74) [WI3INGBGU2]

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

**Conditions**
See module description.
Siehe Modulbeschreibung.

**Learning Outcomes**

**Content**
definitions; basics in operation; track; layout of lines; dynamics; vehicles

**Literature**

**Elective literature:**
Zilch, Diederichs, Katzenbach (Hrsg): Handbuch für Bauingenieure, Springer-Verlag 2001
Course: Basics and Methods for Integration of Tires and Vehicles [21843]

**Coordinators:** Leister

**Part of the modules:** Vehicle Development (p. 61)[WI3INGMB14]

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**Learning Control / Examinations**
The assessment will consist of an oral exam (30 min) taking place in the recess period (according to §4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Conditions**
Knowledge of automobile technology is recommended.

**Learning Outcomes**
Content
Course: Fundamentals for Design of Motor-Vehicle Bodies I [21814]

Coordinates:  Bardehle
Part of the modules:  Automotive Engineering (p. 59)

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Learning Control / Examinations
The assessment consists of an oral exam (30 min) taking place in the recess period (according to §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 students have an overview of the fundamental possibilities for design and manufacture of motor-vehicle bodies. They know the complete process, from the first idea, through the concept to the dimensioned drawings (e.g. with FE-methods). They have knowledge about the fundamentals and their correlations, so that the design of relevant assemblies can be performed to the required demands.

Content
1. History and styling
2. Aerodynamics
3. Design methods (CAD/CAM, FE-methods)
4. Manufacturing methods of body parts
5. Fastening technology
6. Body in white/body-production

Literature
Elective literature:
2. Automobil Revue, Bern (Schweiz)
3. Automobil Produktion, Verlag Moderne Industrie, Landsberg
Course: Fundamentals for Design of Motor-Vehicle Bodies II [21840]

Coordinators: Bardehle
Part of the modules: Automotive Engineering (p. 59)[WI3INGMB5]

ECTS Credits 1.5 Hours per week 1 Term Summer term Instruction language de

Learning Control / Examinations
The assessment consists of an oral exam (30 min) taking place in the recess period (according to §4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
It is recommended to attend the course Fundamentals for Design of Motor-Vehicle Bodies I [21814] beforehand.

Learning Outcomes
The students know that, often the design of seemingly simple detail components can result in the solution of complex problems. They have knowledge in testing procedures of body properties. They have an overview of body parts such as bumpers, window lift mechanism and seats. They understand, as well as, parallel to the normal electrical system, about the electronic side of a motor vehicle. They have knowledge of the inert safety of a motor vehicle.

Content
1. Body properties/testing procedures
2. External body-parts
3. Interior trim
4. Compartment air conditioning
5. Electric and electronic features
6. Crash tests
7. Accident analysis, biomechanic

Literature
Elective literature:
1. Automobiltechnische Zeitschrift ATZ, Friedr. Vieweg & Sohn Verlagsges. mbH, Wiesbaden
2. Automobil Revue, Bern (Schweiz)
3. Automobil Produktion, Verlag Moderne Industrie, Landsberg
# Course: Fundamentals in the Development of Commercial Vehicles I [21812]

**Coordinators:** Zürn

**Part of the modules:** Vehicle Development (p. 61)[WI3INGMB14], Mobile Machines (p. 62)[WI3INGMB15]

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## Learning Control / Examinations

Assessment for the module *Mobile Machines:* See module description.

Assessment for the module *Automotive Engineering:* The assessment consists of an oral exam (20 min) taking place in 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 students have proper knowledge about the process of commercial vehicle development starting from the concept and the underlying original idea to the real design. They know that the customer requirements, the technical realisability, the functionality and the economy are important drivers. The students are able to develop parts and components. Furthermore they have knowledge about different cap concepts, the interior and the interior design process.

## Content

1. Definitions in the area of commercial vehicles
2. Driver of the commercial vehicle development process
3. Development process
4. Development tools
5. Specification criteria
6. Component and parts development
7. Cab

## Literature

**Elective literature:**

Course: Fundamentals in the Development of Commercial Vehicles II [21844]

Coordinators: Zürn
Part of the modules: Vehicle Development (p. 61)[WI3INGMB14], Mobile Machines (p. 62)[WI3INGMB15]

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Learning Control / Examinations
Assessment for the module Mobile Machines: See module description.
Assessment for the module Automotive Engineering: The assessment will consist of an oral exam (20 min) taking place in the recess period (according to §4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
It is recommended to attend the course Fundamentals in the Development of Passenger Vehicles I [21810] beforehand.

Learning Outcomes
The students are able to create general vehicle concepts tailored for different areas of application. They know the advantages and disadvantages of different drives. Furthermore they are familiar with components, such as transfer box, propeller shaft, powered and non-powered frontaxle etc. Beside other mechanical components, such as chassis, axle suspension and braking system, also electric and electronic systems, such as lighting, control, bus and diagnostic systems, are known.

Content
1. Drive and Drive train of Commercial Vehicles
2. Chassis
3. Axle suspension
4. Braking System
5. Elektrics
6. Elektronik Systems

Literature
Elective literature:
Course: Fundamentals in the Development of Passenger Vehicles I [21810]

Coordinators: Frech
Part of the modules: Vehicle Development (p. 61) [W3INGMB14]

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Learning Control / Examinations
The assessment consists of a written exam (90 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
The students have an overview of the fundamentals of the development of automobiles. They know the development process, the national and the international legal requirements that are to be met. They have knowledge about the thermo-management, aerodynamics and the design of an automobile.

Content
1. Process of automobile development
2. Conceptual dimensioning and design of an automobile
3. Laws and regulations – National and international boundary conditions
4. Aerodynamical dimensioning and design of an automobile I
5. Aerodynamical dimensioning and design of an automobile II
6. Thermo-management in the conflict of objectives between styling, aerodynamic and packaging guidelines I
7. Thermo-management in the conflict of objectives between styling, aerodynamic and packaging guidelines II

Media
Lecture script (will be provided during the first lesson).
**Course: Fundamentals in the Development of Passenger Vehicles II [21842]**

**Coordinators:** Frech  
**Part of the modules:** Vehicle Development (p. 61) [WI3INGMB14]

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**Learning Control / Examinations**
The assessment consists of a written exam (90 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**  
It is recommended to attend the course *Fundamentals in the Development of Passenger Vehicles I [21810]* beforehand.

**Learning Outcomes**  
The students are familiar with the selection of appropriate materials and the choice of adequate production technology. They have knowledge of the acoustical properties of the automobiles, covering both the interior sound and exterior noise. They have an overview of the testing procedures of the automobiles. They know in detail the evaluation of the properties of the complete automobile.

**Content**
1. Application-oriented material and production technology I  
2. Application-oriented material and production technology II  
3. Overall vehicle acoustics in the automobile development  
4. Drive train acoustics in the automobile development  
5. Testing of the complete vehicle  
6. Properties of the complete automobile

**Media**
Lecture script (provided during the first lessons).
Course: Hauptvermessungsübungen III [20245]

Coordinators: Stefan Hinz, Weidner

Part of the modules: Understanding and Prediction of Disasters I (p. 76)[WI3INGINTER1], Understanding and Prediction of Disasters II (p. 77)[WI3INGINTER2], Understanding and Prediction of Disasters III (p. 78)[WI3INGINTER5]

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Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Media
e-Learning-Modul “Fernerkundung” (geoinformation.net)
lecture notes

Literature

Elective literature:
Albertz: Fernerkundung
Course: Industrial Studies of Time and Motion [25967]

**Coordinators:** Simone Dürrschnabel

**Part of the modules:** Human Resource Management (p. 45)[WI3BWLIAPI]

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**Learning Control / Examinations**
The examination will be in form of a written exam acc. to §4(2), 1 ER

**Conditions**
None.

**Learning Outcomes**

**Content**
Course: Industrial Safety and Environmental Management [21037]

**Coordinators:** Zülch, Kiparski

**Part of the modules:** Safety Science I (p. 79)[WI3INGINTER3], Safety Science II (p. 80)[WI3INGINTER4]

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### Learning Control / Examinations

**Conditions**

None.

**Learning Outcomes**

**Content**

**Remarks**

Please register in the previous winter term.

Block course.

For further information, see http://www.ifab.uni-karlsruhe.de/797.php
Course: Industrial Organization [25371]

**Coordinators:** Siegfried Berninghaus

**Part of the modules:** Applied Game Theory (p. 46)[WI3VWL1]

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**Learning Control / Examinations**
The assessment consists of a written exam (80 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**
See corresponding module information.

**Learning Outcomes**
The students will learn to understand the negative effects of imperfect competition and possible political implications thereof. In every chapter of the course game theoretic models will be introduced with the objective to reveal how the theory of industrial organization can explain real world economic phenomena. The theoretical analysis of economic interrelations will be supplemented by class room experiments and if possible by presentations from business experts.

**Content**
In the first part of the course different market structures like monopoly, oligopoly and perfect competition will be introduced and compared with each other. In the main part advanced concepts on topics like price discrimination, product differentiation, collusive behavior, as well as different theoretical models on market entry and R&D will be presented.

**Media**
Slides.

**Literature**
- H. Bester (2007), Theorie der Industrieökonomik. Berlin: Springer-Verlag

**Elective literature:**
- D. Carlton, J. Perloff (2005), Modern Industrial Organization. Reading, Mass.: Addison-Wesley
- N. Schulz (2003), Wettbewerbspolitik: eine Einführung aus industrieökonomischer Perspektive, Tübingen: Mohr Siebeck
Course: Information Systems and Supply Chain Management [2118094]

Coordinators: Kilger
Part of the modules: Introduction to Technical Logistics (p. 58) [WI3INGMB13]

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Learning Control / Examinations
The assessment consists of an oral exam according to §4 (2), 2 of the examination regulation. It may be a written exam (according to §4 (2), 1 of the examination regulation) in the case of large number of participants.

Conditions
Technical understanding is required. It is recommended to attend the lecature Logistics - Organisation, Design, and Control of Logistic Systems.

Learning Outcomes
Basic knowledge of information systems for logistics processes will be delivered and the students should be able to identify the requirements of a supply chain and choose an appropriate information system.

Content
1. Overview of logistics systems and processes
2. Basic concepts of information systems and information technology
3. Introduction to IS in logistics: Overview and applications
4. Detailed discussion of selected SAP modules for logistics support

Literature
Elective literature:
Course: Seminar in Engineering Science [SemING]

Coordinators: Fachvertreter ingenieurwissenschaftlicher Fakultäten
Part of the modules: Seminar Module (p. 91) [WI3SEM]

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Learning Control / Examinations
Conditions
None.

Learning Outcomes
Content

Literature
Will be announced in the respective seminar.

Elective literature:
Will be announced in the seminar.
Course: Meteorological Measurements [03203]

**Coordinators:** Kottmeier

**Part of the modules:** Understanding and Prediction of Disasters I (p. 76)[WI3INGINTER1], Understanding and Prediction of Disasters II (p. 77)[WI3INGINTER2], Understanding and Prediction of Disasters III (p. 78)[WI3INGINTER5]

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**Learning Control / Examinations**

**Conditions**

None.

**Learning Outcomes**

**Content**
Course: Insurance Game [26372]

**Coordinators:** Christian Hipp, N.N.

**Part of the modules:** Insurance: Calculation and Control (p. 32)[WI3BWLFBV2]

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

**Conditions**
None.

**Learning Outcomes**

**Content**

**Literature**
- Insgame: Das Unternehmensplanspiel Versicherungen, Lehrstuhl für Versicherungswirtschaft, FBV, Uni Karlsruhe
- Zweifel, Eisen: Versicherungsökonomie, 2000, Kapitel 1, 2 und 5
- Aktuelle Ausgaben der Zeitschrift „Versicherungswirtschaft“
Course: Insurance Marketing [26323]

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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**

Elective literature:

- Farny, D.. Versicherungsbetriebslehre (Kapitel III.3 sowie V.4). Karlsruhe 2006
- Wiedemann, K.-P./Klee, A. Ertragsorientiertes Zielkundenmanagement für Finanzdienstleister, Wiesbaden 2003

**Remarks**

This course is offered in the winter term 2010/11 and is held by Dr. Edmund Schwake.

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

To attend the course please register at the secretary of the chair of insurance science.
Course: Insurance Models [26300]

**Coordinators:** Christian Hipp, N.N.
**Part of the modules:** Insurance: Calculation and Control (p. 32)[WI3BWLFBV2]

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

**Conditions**
None.

**Learning Outcomes**

**Content**

**Literature**

**Elective literature:**
- Versicherungsbetriebslehre: Das Risiko und seine Kalkulation. Studienhefte 21, 22, 23. gabler Studientexte
Course: Integrated Production Planning [2150660]

Coordinators: Lanza, Gisela
Part of the modules: Production Engineering I (p. 65)[WI3INGMB10], Production Engineering III (p. 67)[WI3INGMB7], Integrated Production Planning (p. 84)[WI3INGMB24], Production Engineering II (p. 66)[WI3INGMB4]

ECTS Credits | Hours per week | Term | Instruction language
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9 | 4/2 | Summer term | de

Learning Control / Examinations
Performance is assessed in the form of one written examination (180 min) during the lecture-free period (as per §4(2), 1 SPO [study and examination regulations]). The examination will take place once every semester and can be retaken at every official examination date.

Conditions
None.

Recommendations
It is recommended to attend the course Manufacturing Technology [2149657] beforehand.

Learning Outcomes
The student
- has knowledge of the content covered by this lecture and understands the challenges and the fields of action of integrated production planning,
- is able to apply the methods of integrated production planning he/she has learned about to new problems,
- is able to analyse and evaluate the suitability of the methods, procedures and techniques he/she has learned about for a specific problem.

Content
Planning factories within the context of value networks and integrated production systems (Toyota etc.) requires an integrated perspective for the consideration of all functions included in the “factory” system. This includes the planning of manufacturing systems including the product, the value network and factory production, and the examination of SOPs, the running of a factory and maintenance. Content and theory covered by this lecture are completed with many examples from industry and exercises based on real-life situations and conditions.

Main topics covered by the lecture:
1. The basic principles of production planning
2. Links between product planning and production planning
3. Integrating a production site into a production network
4. Steps and methods of factory planning
5. Approach to the integrated planning of manufacturing and assembly plants
6. Layout of production sites
7. Maintenance
8. Material flow
9. Digital factory
10. Process simulation for material flow optimisation
11. Start-up

Media
Lecture notes of the lecture Integrated Production Planning
Course: Intelligent Systems in Finance [25762]

**Coordinators:** Detlef Seese

**Part of the modules:** eFinance (p. 39)[WI3BWLISM3], Electives in Informatic (p. 54)[WI3INFO2]

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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 intelligent software agents, genetic algorithms, neural networks, support vector machines, fuzzy-logic, expert systems and intelligent hybrid systems. The presented applications focus on the finance area and are related to risk management (credit risk, operational risk), financial trading, portfolio management and economic modelling. The lecture is given in cooperation with the company msgGILLARDON. The lecture starts with an introduction of the central problems of application in this area, e.g. decision support for investors, Portfolio selection under constraints, information retrieval from business reports, automatic development of trading rules for the capital market, modelling of time series at the capital market, explanation of phenomena at capital markets by simulation, decision support in risk management (credit risk, operational risk). After this the basics of intelligent systems are discussed. Basic ideas and essential results for different stochastic heuristics for local search are discussed next, especially Hill Climbing, Simulated Annealing, Threshold Accepting and Tabu Search. After this different population-based approaches of evolutionary methods are presented, e.g. Genetic Algorithms, Evolutionary Strategies and Programming, Genetic Programming, Memetic Algorithms and Ant-Algorithms. It follows an introduction into Neural Networks, Support Vector Machines and Fuzzylogic. Software agents and agent-based stock market models are the next topic. The lecture ends with an overview on the complexity of algorithmic problems in the area of finance, giving in this way one of the key reasons for the necessity to use heuristics and intelligent systems. Essential examples and basic applications are choosen from the area of finance.

**Media**
Slides.

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


Further references will be given in each lecture.

**Elective literature:**

- Further references will be given in the lecture.

**Remarks**

The content of the lecture will permanently be adapted to actual developments. This can be the cause to changes of the described content and schedule.
Course: International Risk Transfer [26353]

Coordinators: Wolfgang Schwehr
Part of the modules: Insurance Markets and Management (p. 34)[WI3BWLFBV4]

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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 every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes
Becoming acquainted with the various possibilities of international risk transfer.

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

Literature

Remarks
Block course. To attend the course please register at the secretary of the chair of insurance science.
Course: International Finance [26570]

Coordinators: Marliese Uhrig-Homburg, Walter Part of the modules: eFinance (p. 39)[WI3BWLISM3], Topics in Finance II (p. 36)[WI3BWLFBV6], Topics in Finance I (p. 35)[WI3BWLFBV5]

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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:

- D. Eiteman et al. (2004): Multinational Business Finance, 10. Auflage
Course: International Economic Policy [26254]

Coordinators: Jan Kowalski
Part of the modules: International Economics (p. 47)[WI3VWL3]

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

Conditions
Previous visit of the lectures Economics II: Macroeconomics [25014] is recommended. Previous visit of the lecture International Economics [26252] and the successful attendance of the exam is compulsory.

Learning Outcomes
Content
Literature
Elective literature:
• Wagner, M.: „Einführung in die Weltwirtschaftspolitik“. Oldenbourg 1995
Course: Management Accounting [25210]

Coordinators: Torsten Lüdecke

Part of the modules: Topics in Finance I (p. 35)[WI3BWLFBV5], Topics in Finance II (p. 36)[WI3BWLFBV6]

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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:
Course: Investments [26575]

Coordinators: Marliese Uhrig-Homburg
Part of the modules: Essentials of Finance (p. 31)[WI3BWLFBV1]

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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 and Management Science C [25026/25027] 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: Theory of Business Cycles [25549]

**Coordinators:** Marten Hillebrand

**Part of the modules:** Macroeconomic Theory (p. 50)[WI3VWL8]

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

**Conditions**
The courses *Economics I: Microeconomics* [25012] and *Economics II: Macroeconomics* [25014] have to be completed beforehand.
According the focus of the course quantitativ-mathematical modelling should be in participant’s interest.

**Learning Outcomes**

**Content**

**Literature**

**Elective literature:**
Course: Warehouse and Distribution Systems [2118097]

Coordinators: Christian Huber
Part of the modules: Introduction to Technical Logistics (p. 58)[WI3INGMB13]

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

Learning Control / Examinations
The assessment consists of an oral exam according to §4 (2), 2 of the examination regulation. It may be a written exam (according to §4 (2), 1 of the examination regulation) in the case of large number of participants.

Conditions
None.

Learning Outcomes
This course provides basics to understand material and information processes in warehouse and distribution systems. The student will also learn to evaluate them quantitatively.

Content
- Control and organisation of distribution centers
- Analytical models for analysing and dimensioning of warehouse systems
- Distribution Center Reference Model (DCRM)
- Lean Distribution
- The processes from receiving to shipping
- Planning and controlling
- Distribution networks
Course: Logistics - Organisation, Design, and Control of Logistic Systems [2118078]

Coordinators: Kai Furmans
Part of the modules: Supply Chain Management (p. 38)[WI3BWLISM2]

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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**
Required are lectures on “Linear Algebra” and “Stochastic”.

**Learning Outcomes**
After successfully finishing this course, the student is able to plan simple material handling and logistic systems and is able to assign the right models to a certain task. He is able to evaluate the performance of the most important elements of material handling and logistic systems.

**Content**

- **Introduction**
  - historical overview
  - lines of development

- **Structure of logistics systems**
  - Distribution logistics
    - location planning
    - Vehicle Routing Planning
    - distribution centers

- **Inventory management**
  - demand forecasting
  - Inventory management policies
  - Bullwhip effect

- **Production logistics**
  - layout planning
  - material handling
  - flow control

- **Supply Management**
  - information flow
  - transportation organization
  - controlling and development of a logistics system
  - co-operation mechanisms
  - Lean SCM
  - SCOR model

**Identification Technologies**

**Media**
Blackboard, LCD projector, in exercises also PCs.

**Literature**

- Elective literature:
  - Arnold/Isermann/Kuhn/Tempelmeier. Handbuch Logistik, Springer Verlag, 2002 (Neuauflage in Arbeit)
  - Domschke. Logistik, Rundreisen und Touren, Oldenbourg Verlag, 1982
  - Domschke/Drexl. Logistik, Standorte, Oldenbourg Verlag, 1996

Business Engineering (B.Sc.)
Module Handbook, Date: 23.09.2010
• Gudehus. Logistik, Springer Verlag, 2007
• Neumann-Morlock. Operations-Research, Hanser-Verlag, 1993
• Tempelmeier. Bestandsmanagement in Supply Chains, Books on Demand 2006

Remarks
Formerly, the course was known as Logistics.
### Course: Automotive Logistics [2118085]

**Coordinators:** Kai Furmans  
**Part of the modules:** Introduction to Technical Logistics (p. 58)[WI3INGMB13]

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**Learning Control / Examinations**  
The assessment consists of an oral exam according to §4 (2), 2 of the examination regulation. It may be a written exam (according to §4 (2), 1 of the examination regulation) in the case of large number of participants.

**Conditions**  
None.

**Learning Outcomes**  
It is the aim of the course to show the importance and impact of logistic questions in the automotive industry sector.

**Content**  
A basic model of the automobile production and distribution is used to study the main elements of the automotive supply chain:

- Supply side logistics (Tasks due to disposition and physical accomplishment; methods; solution models)
- Car manufacturing with the specific questions of the interaction of body shell, paint shop and assembly (sequence planning; partial allocation for assembly)
- Car distribution and the connection to sale processes (physical accomplishment; planning and control)
Course: Logistics and Supply Chain Management [25996]

**Coordinators:** Frank Schultmann

**Part of the modules:** Industrial Production I (p. 29) [WI3BWLIP]

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**Learning Control / Examinations**

**Conditions**
None.

**Learning Outcomes**

Students shall learn foundations and main characteristics of managerial logistics and supply chain management. Following an overview of basic managerial logistics functions, students will learn the interdependencies and trade-offs between these functions and concurring aims. Additionally, students will gain knowledge in designing and steering internal and external value-creating networks.

**Content**

This course covers following topics:

- Introduction into logistics
- Fields of activity
- Aims and costs of logistics
- Performance and performance figures
- Supply logistics
- Production logistics
- Distributing logistics
- Reverse logistics
- Definition and aims of Supply Chain Management
- Concepts of Supply Chain Management
- Modeling Supply Chains

**Media**

Media will be provided on learning platform.
Course: Airport Logistics [21056]

Coordinators: Richter
Part of the modules: Introduction to Technical Logistics (p. 58) [WI3INGMB13]

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Learning Control / Examinations
The assessment consists of an oral exam according to §4 (2), 2 of the examination regulation. It may be a written exam (according to §4 (2), 1 of the examination regulation) in the case of large number of participants.

Conditions
None.

Learning Outcomes
Giving an inside view of the conveyor and material handling technical activities on airports is the aim of this course. Furthermore, an overview of air traffic and the legal situation is given.

Content
Development of air traffic:
- Legal basics
- Infrastructure (among other things person, luggage and freight conveyance)
- Supply and disposal activities
- Logistic process networks
- Information logistics

Remarks
The course takes place as a block course.
Course: Management of Business Networks [26452]

Coordinators: Christof Weinhardt, Jan Kraemer
Part of the modules: eBusiness and Servicemanagement (p. 37)[WI3BWLISM1], Supply Chain Management (p. 38)[WI3BWLISM2]

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Learning Control / Examinations
The total grade for this lecture will consist to 50% of the grade achieved in the written mid term examination, to 10% of the assignments during the exercises, and to 40% of a project work, which includes a term paper and a presentation.

Conditions
None.

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

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

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

Literature
Course: Management of Business Networks (Introduction) [26496]

Coordinators: Christof Weinhardt, Jan Kraemer
Part of the modules: Supply Chain Management (p. 38)[WI3BWLISM2]

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Learning Control / Examinations
The assessment consists of a written examination (60 min) according to Section 4(2), 1 of the examination regulation and by submitting written papers as part of the exercise according to section 4(2), 3 of the examination regulation. Grading: Exam counts for 85 %, exercises for 15 %.

Conditions
None.

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

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

Media
Powerpoint presentations, recorded lecture available on the internet.

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. The lecture was first offered in the winter term of 2009/10.
Course: Management and Organisation of Projects in Developing Countries [26259]

**Coordinators:** Niklas Sieber  
**Part of the modules:** International Economics (p. 47)[WI3VWL3]

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

**Conditions**  
None.

**Learning Outcomes**

**Content**
**Course: Brand Management [25177]**

**Coordinators:** Bruno Neibecker  
**Part of the modules:** Foundations of Marketing (p. 27) [W13BWLMAR]

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**Learning Control / Examinations**  
**Conditions**  
None.

**Learning Outcomes**  
(See description of the module)

**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 broadened 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: Marketing and Consumer Behavior [25150]

Coordinators: Wolfgang Gaul
Part of the modules: Foundations of Marketing (p. 27)[WI3BWLMAR]

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Learning Control / Examinations
See module description.

Conditions
See corresponding module description.
See corresponding module description.

Learning Outcomes

Content
Starting from the S-O-R paradigm where S stands for “stimuli”, O for “organism”, and R for “reactions”, aspects of consumer behavior are explained and possibilities are provided how marketing activities can be used to create desired influences. S-R models describe how consumer reactions depend on stimuli. Cognitive processes and psychical states help to explain how the (unobservable) interior of the organism contributes to the interpretation of reactions. In this context the adequate combination of available marketing instruments (price, product, promotion, place) will be discussed.

Literature
Further literature references are announced in the script.
Course: Marketing and Operations Research [25156]

**Coordinators:** Wolfgang Gaul
**Part of the modules:** Foundations of Marketing (p. 27)[WI3BWLMAR]

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

**Conditions**
Basics of Operations Research are required.

**Learning Outcomes**

**Content**

**Literature**
Will be announced in the lecture. Further literature references are announced in the script.
Course: Material Flow in Logistic Systems [21051]

**Coordinators:** Kai Furmans

**Part of the modules:** Introduction to Technical Logistics (p. 58) [WI3INGMB13]

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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.

**Learning Outcomes**
This course provides the basics of material handling systems. The student will learn how to model material handling systems and how to evaluate them according to quantitative aspects.

**Content**
- Material handling equipment: conveyor system, diverts, merges
- Modelling of material handling systems by graphs and matrixes
- Queueing theory
- Simulation
- Analysis of the current situation
- Planning of the target state by using material and information flow

**Literature**
**Elective literature:**
Arnold, Dieter; Furmans, Kai: Materialfluss in Logistiksystemen, Springer, 2005 (VDI)

**Remarks**
The course was formerly known as *Materialflow.*
Course: Materials and Processes in Automotive Lightweight Construction [2149669]

Coordinators: Haep}
Part of the modules: Specialization in Production Engineering [p. 85][WI3INGMB22]

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Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content
Course: Mathematics I [01350]

Coordinators: Günter Last, Folkers, Klar
Part of the modules: Mathematics (p. 25)[W1MATH]

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Learning Control / Examinations

The assessment of Mathematics I consists of two written partial exams (both according to Section 4 (2), 1 of the examination regulation):

1. Midterm exam after half of the lecture time (60 min) without utilities
2. Final exam at the beginning of the following recess period (60 min) without utilities

A re-examination is offered at the beginning of the lecture period of the following summer term. Both re-examinations taking place at the same day.

For the re-examinations both types of candidates (candidates who failed the midterm or the final exam, as well as those candidates who do not yet have passed their first attempt) are admitted.

Oral re-examinations (according to Section 8 (2) of the examination regulation) take place as individual examinations (ca. 20 min).

Mid-term exam as well as final exam has to be passed separately. The overall grade of Mathematics 1 consists of the grade of the midterm exam (50 percent) and the final exam (50 percent).

Conditions

None.

Learning Outcomes

Content

Literature

Elective literature:

Course: Mathematics II [01830]

Coordinators: Günter Last, Folkers, Klar
Part of the modules: Mathematics (p. 25)[WI1MATH]

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Learning Control / Examinations
The assessment of Mathematics II consists of two written partial exams (both according to Section 4 (2), 1 of the examination regulation):
1. Midterm exam after half of the lecture time (60 min) without utilities
2. Final exam at the beginning of the following recess period (60 min) without utilities

A re-examination is offered at the beginning of the lecture period of the following summer term. Both re-examinations taking place at the same day.
For the re-examinations both types of candidates (candidates who failed the midterm or the final exam, as well as those candidates who do not yet have passed their first attempt) are admitted.
Oral re-examinations (according to Section 8 (2) of the examination regulation) take place as individual examinations (ca. 20 min).
Midterm exam as well as final exam has to be passed separately. The overall grade of Mathematics II consists of the grade of the mid-term exam (50 percent) and the final exam (50 percent).

Conditions
Good knowledge of the content of the course Mathematics I [01350].

Learning Outcomes

Content

Literature

Elective literature:

Course: Mathematics III [01352]

**Coordinators:** Günter Last, Folkers, Klar

**Part of the modules:** Mathematics (p. 25)[WI1MATH]

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**Learning Control / Examinations**

The assessment consists of a written exam (75 min) at the beginning of the recess period (according to Section 4(2), 1 of the examination regulation.

A re-examination is offered at the beginning of the lecture period of the following summer term. For the re-examinations both types of candidates (candidates who failed the midterm or the final exam, as well as those candidates who do not yet have passed their first attempt) are admitted.

**Conditions**

Good knowledge of the content of the courses Mathematics I [01350] and Mathematics II [01830].

**Learning Outcomes**

**Content**

**Literature**

**Elective literature:**

Course: Seminar in Mathematics [SemMath]

**Coordinators:** Fachvertreter der Fakultät für Mathematik

**Part of the modules:** Seminar Module (p. 91) [WI3SEM]

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**Learning Control / Examinations**

**Conditions**
None.

**Learning Outcomes**

**Content**

**Literature**
Will be announced in the respective seminar.

**Elective literature:**
Will be announced in the seminar.
Course: Meteorological Natural Hazards [03013]

**Coordinators:** Kottmeier, Kunz

**Part of the modules:** Understanding and Prediction of Disasters I (p. 76)[WI3INGINTER1], Understanding and Prediction of Disasters II (p. 77)[WI3INGINTER2], Understanding and Prediction of Disasters III (p. 78)[WI3INGINTER5]

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**Learning Control / Examinations**

**Conditions**

None.

**Learning Outcomes**

**Content**

**Remarks**

For further information, see http://www.imk.uni-karlsruhe.de/english/17.php
Course: Methods in Analyzing Internal Combustion [21134]

Coordinators: Wagner

Part of the modules: Engine Development (p. 64)[WI3INGMB17], Combustion Engines (p. 63)[WI3INGMB16], Combustion Engines II (p. 82)[WI3INGMB19]

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Learning Control / Examinations
The assessment consists of an oral exam (30 min) according to §4 (2), 2 of the examination regulation. The grade of the exam is included in the overall grade of the module with a weighting factor of 3.

Conditions
The course Combustion Engines A [21101] has to be completed beforehand.

Learning Outcomes
Content
Course: Interpretative Social Research Methods [n.n.]

Coordinators: Pfadenhauer
Part of the modules: Qualitative Social Research (p. 90)[WI3SOZ2]

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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
The lecture is obligatory and has to be attended.

Learning Outcomes
The student
- gains a basic overview of the well-established and some of the advanced explorative methods of data collection and interpretative methods of data evaluation.
- acquires basic knowledge of methodology/the philosophy of science.
- is capable of choosing and applying appropriate explorative-interpretative methods according to a research question and arranging them in a conceptual research design.

Content
See lecture announcement.

Media
Will be announced in the lecture.

Literature
Will be announced in the lecture.

Elective literature:
Will be announced in the lecture.
Course: Mobile Machines [21073]

Coordinators: Marcus Geimer
Part of the modules: Mobile Machines (p. 62)[WI3INGMB15]

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Learning Control / Examinations
See modul description.

Conditions
Knowledge in Fluid Power are required.

Recommendations
It is recommended to attend the course Fluid Power Systems [21093] beforehand.

Learning Outcomes
The students will learn the basic structure and construction of mobile machines. The basis will be practically introduced by consultants from industry area. Thereby, the typical working process will be described.

Content
- Introduction of the required components and machines
- Basics of the structure of the whole system
- Practical insight in the development techniques

Media
Lecture notes.
Course: Modelling and Identification [23168]

Coordinators: n.N.
Part of the modules: Control Engineering (p. 72)[WI3INGETIT2]

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Learning Control / Examinations
The assessment consists of a written exam (120 min) taking place at the beginn of the recess period (according to Section 4 (2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
The course System Dynamics and Control Engineering [23155] has to be completed beforehand.

Learning Outcomes
Content
Course: Modern Market Research [25154]

Coordinators: Wolfgang Gaul
Part of the modules: Foundations of Marketing (p. 27)[WI3BWLMAR]

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Learning Control / Examinations
See module description.

Conditions
Basic knowledge of statistics.

Learning Outcomes

Content

Literature
Further literature references are announced in the script.
Course: Engine Measurement Technologies [21137]

**Coordinators:** Bernhardt

**Part of the modules:**
- Engine Development (p. 64) [W3INGMB17]
- Combustion Engines (p. 63) [W3INGMB16]
- Combustion Engines II (p. 82) [W3INGMB19]

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**Learning Control / Examinations**
The assessment consists of an oral exam (30 min) according to Section 4 (2), 2 of the examination regulation. The grade of the exam is included in the overall grade of the module with a weighting factor of 3.

**Conditions**
The course *Combustion Engines A* [21101] has to be completed beforehand.

**Learning Outcomes**

**Content**
Course: Natural Disaster Management [19632]

Coordinators: N.N.

Part of the modules: Understanding and Prediction of Disasters I (p. 76) [W3INGINTER1], Understanding and Prediction of Disasters II (p. 77) [W3INGINTER2], Understanding and Prediction of Disasters III (p. 78) [W3INGINTER5]

ECTS Credits: 1.5
Hours per week: 1
Term: Winter / Summer Term
Instruction language: en

Learning Control / Examinations
Cf. information for studies of “Ressource Engineering”.

Conditions
None.

Learning Outcomes
Cf. information for studies of “Ressource Engineering”.

Content
Cf. information for studies of “Ressource Engineering”.

Remarks
This course is offered irregularly. For further information, please cf. to the schedule of the studies in “Ressource Engineering”.

Business Engineering (B.Sc.)
Module Handbook, Date: 23.09.2010
Course: Nonlinear Optimization I [25111]

Coordinators: Oliver Stein

Part of the modules: Methodical Foundations of OR (p. 56)[WI3OR6], Stochastic Methods and Simulation (p. 57)[WI3OR7]

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 [25113]. In this case, the duration of the written examination takes 120 minutes. In a combined examination of Nonlinear Optimization I [25111] and Nonlinear Optimization II [25113], upon attaining more than 60% of the exercise points, the grade of the passed examination is improved by a third of a grading step. In a combined examination of Nonlinear Optimization I [25111] and Nonlinear Optimization II [25113], upon attaining more than 60% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student

• knows and understands fundamentals of nonlinear optimization,

• is able to choose, design and apply modern techniques of nonlinear optimization in practice.

Content
The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, we derive optimality conditions that form the basis for numerical solution methods. The lecture is structured as follows:

• Introduction, examples, and terminology
• Existence results for optimal points
• First and second order optimality 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.

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 [25113]

Coordinators: Oliver Stein
Part of the modules: Methodical Foundations of OR (p. 56)[WI3OR6]

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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 [25111]. In this case, the duration of the written exam takes 120 minutes.

In a combined exam of Nonlinear Optimization I [25111] and Nonlinear Optimization II [25113], upon attaining more then 60% of the exercise points, the grade of the passed exam is improved by a third of a grading step.

In a combined exam of Nonlinear Optimization I [25111] and Nonlinear Optimization II [25113], upon attaining more then 60% of the computer exercise points, the grade of the passed exam is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student
- knows and understands fundamentals of nonlinear optimization,
- is able to choose, design and apply modern techniques of nonlinear optimization in practice.

Content
The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, we derive optimality conditions that form the basis for numerical solution methods. Part I of the lecture treats unconstrained optimization problems. Part II of the lecture is structured as follows:
- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions for constrained problems
- Optimality conditions for constrained convex problems
- Numerical methods for constrained problems (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

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

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 [26120]

### Coordinators:
Berthold Wigger, Assistenten

### Part of the modules:
Public Finance (p. 51)[WI3VWL9]

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<tr>
<th>ECTS Credits</th>
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<th>Term</th>
<th>Instruction language</th>
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<tbody>
<tr>
<td>4.5</td>
<td>2/1</td>
<td>Summer term</td>
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</table>

### 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

#### 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, macromacroeconomic 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-incurred.

#### Literature

**Elective literature:**

Course: Public Law I - Basic Principles [24016]

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<tr>
<th>Coordinators:</th>
<th>Indra Spiecker genannt Döhmann</th>
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<tbody>
<tr>
<td>Part of the modules:</td>
<td>Elective Module Law (p. 88) [WI3JURA]</td>
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<td>Winter term</td>
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**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.

**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**
abstracts, sketches on blackboard, slides

**Literature**
tba in scriptum

**Elective literature:**
tba in scriptum

**Remarks**
From the winter term 2008 on, the Public Law I will be lectured during the winter term and Public Law II will be lectured during the summer term. This means:

1. In the winter term 2008/2009, Public Law I was being lectured.
2. In the summer term 2009, Public Law II will be lectured.
Course: Public Law II - Public Economic Law [24520]

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<td>Part of the modules:</td>
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</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.

**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**
content structure; documents

**Literature**
Will be announced in the lecture.

**Elective literature:**
tba in lecture slides

**Remarks**
In winter term 2008 on, the *Public Law I* will be lectured during the winter term and *Public Law II* will be lectured during the summer term. This means:

1. In the winter term 2008/2009, Public Law I will be lectured.
2. In the summer term 2009, Public Law II will be lectured.
Course: Economics of Uncertainty [25365]

Coordinators: Karl-Martin Ehrhart
Part of the modules: Strategic Games (p. 48)

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<td>Summer term</td>
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Learning Control / Examinations
Written exam, possible further requirements.

Conditions
See corresponding module information.
Knowledge in mathematics and statistics is required.

Learning Outcomes
The student will be made familiar with the basics in modern decision making under uncertainty so that she will be able to analyze concrete decision problems and to develop simple solution procedures. By being confronted with experimental results in decision making the student should also be able to evaluate the behavioral part of decision making.

Content
In the first part of the course we deal with problems of decision making under uncertainty and introduce models like expected utility theory, stochastic dominance, risk aversion, and prospect theory. We also consider the empirical validity of the different approaches.
In the second part the concepts learned in the first part are applied for example to search models and Bayesian games.

Media
overhead slides, possibly additional printed material.

Literature

Elective literature:
• Lippman/McCall, Economics of Uncertainty, in: Handbook of Mathematical Economics I, 1986
• DeGroot, Optimal Statistical Decisions, Kap. 1 und 2, 1970
### Course: Operative CRM [26520]

**Course: Operative CRM [26520]**

**Coordinators:** Andreas Geyer-Schulz

**Part of the modules:** Specialization in Customer Relationship Management (p. 41)[WI3BWLISM5], CRM and Service Management (p. 40)[WI3BWLISM4]

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

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<thead>
<tr>
<th>Grade</th>
<th>Minimum points</th>
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<tr>
<td>1.0</td>
<td>104</td>
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<tr>
<td>1.3</td>
<td>98</td>
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<td>80</td>
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<td>2.7</td>
<td>74</td>
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<td>3.0</td>
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<tr>
<td>3.3</td>
<td>62</td>
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<td>4.7</td>
<td>40</td>
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**Conditions**

None.

**Recommendations**

The attendance of courses Customer Relationship Management [26508] and Analytical CRM [26522] 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.
Course: Managing Organizations [25902]

Coordinators: Hagen Lindstädt
Part of the modules: Strategy and Organization (p. 28)[WI3BWLOU1]

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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
- Principles of organisational management
- Managing organisational structures and processes: the selection of design parameters
- Ideal-typical organisational structures: choice and effect of parameter combinations
- Managing organisational changes

Media
Slides.

Literature

The relevant excerpts and additional sources are made known during the course.

**Coordinators:** Christine Harbring

**Part of the modules:** Human Resource Management (p. 45)[WI3BWL1AP1]

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**Learning Control / Examinations**
The examination will be in form of a written exam acc. to §4(2), 1 ER

**Conditions**
None.

**Learning Outcomes**

**Content**
Course: Physical Basics of Laser Technology [21612]

**Coordinators:** Schneider

**Part of the modules:** Emphasis Material Science (p. 69) [WI3INGMB9]

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**Learning Control / Examinations**
The assessment consists of an oral exam (30 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation). The re-examination is offered upon agreement.

**Conditions**
Basic knowledge of physics, chemistry and material science is assumed.
It is not possible, to combine this lecture with the lecture *Laser Application in Automotive Engineering* [21642]

**Learning Outcomes**
The student

- comprehends the physical basics and understands the function of laser sources and the interactions between laser radiation and materials surfaces.
- Based on this the student is able to choose appropriate laser sources and laser process techniques for various applications in materials processing.

**Content**
Based on the description of the physical basics about the formation and the properties of laser light the lecture goes through the different types of laser beam sources used in industry these days. The lecture focus on the usage of lasers especially in materials engineering. Other areas like measurement technology or medical applications are also mentioned.

An excursion to the laser laboratory of the Institute for Materials Research (IMF I) at the Forschungszentrum Karlsruhe (FZK) will be offered.

**Media**
Lecture notes.

**Literature**
Elective literature:

- R. Poprawe: Lasertechnik für die Fertigung, 2005, Springer
Course: Polymer Engineering I [21590]

Coordinators: Peter Elsner
Part of the modules: Emphasis Material Science (p. 69) [W31NGMB9]

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</table>

Learning Control / Examinations
None.

Learning Outcomes
The field of Polymer Engineering includes synthesis, material science, processing, construction, design, tool engineering, production technology, surface engineering and recycling. The aim is, to equip the students with knowledge and technical skills, and to use the material "polymer" meeting its requirements in an economical and ecological way.

Content
1. Economical aspects of polymers
2. Introduction of mechanical, chemical and electrical properties
3. Processing of polymers (introduction)
4. Material science of polymers
5. Synthesis

Literature
Recommended literature and selected official lecture notes are provided in the lecture.
Course: Polymerengineering II [21596]

Coordinators: Peter Elsner
Part of the modules: Emphasis Material Science (p. 69) [WI3INGMB9]

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Learning Control / Examinations

Conditions
None.

Learning Outcomes
The field of Polymer Engineering includes synthesis, material science, processing, construction, design, tool engineering, production technology, surface engineering and recycling. The aim is, to equip the students with knowledge and technical skills, and to use the material “polymer” meeting its requirements in an economical and ecological way. Also the manifold production processes are discussed and compared regarding the component design.

Content
1. Processing of polymers
2. Properties of polymer components
   Based on practical examples and components
   2.1 Selection of material
   2.2 Component design
   2.3 Tool engineering
   2.4 Production technology
   2.5 Surface engineering
   2.6 Sustainability, recycling

Literature
Recommended literature and selected official lecture notes are provided in the lecture
Course: Principles of Insurance Management [25055]

**Coordinators:** Ute Werner

**Part of the modules:** Risk and Insurance Management (p. 33)[WI3BWLFBV3], Insurance Markets and Management (p. 34)[WI3BWLFBV4]

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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**

**Elective literature:**
Will be announced in the lecture.

**Remarks**
To attend the course please register at the secretariat of the chair of insurance science.
Course: Private and Social Insurance [25050]

Coordinators: Wolf-Rüdiger Heilmann, Besserer
Part of the modules: Insurance Markets and Management (p. 34)[WI3BWLFBV4]

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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 every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes
Getting to know basic terms and functioning of private and social insurance.

Content
Basic terms of insurance, i.e. characteristics, judicial and political background and functioning of private and social insurance as well as their economic and societal and political meaning.

Literature
Elective literature:
- Jahrbücher des GDV. Die deutsche Versicherungswirtschaft.

Remarks
Block course. To attend the course please register at the secretariat of the chair of insurance science.
Course: Product Lifecycle Management [21350]

**Coordinators:** Jivka Ovtcharova  
**Part of the modules:** Product Lifecycle Management (p. 70)[WI3INGMB21]

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<td>Winter term</td>
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**Learning Control / Examinations**  
The assessment consists of a written exam (90 min) according to Section 4 (2), 1 of the examination regulation. The grade corresponds to the grade of the written exam.

**Conditions**  
None.

**Learning Outcomes**

**Content**
Course: Product Lifecycle Management in the Manufacturing Industry [21366]

Coordinators: Gunter Meier
Part of the modules: Product Lifecycle Management (p. 70) [WI3INGMB21]

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Learning Control / Examinations
The assessment consists of an oral exam (30 min) according to §4 (2), 2 of the examination regulation. The grade corresponds to the grade of the oral exam.

Conditions
None.

Learning Outcomes
Content
Course: Introduction to Programming with Java [25030]

**Coordinators:** Detlef Seese

**Part of the modules:** Introduction to Informatics (p. 19)[WI1INFO]

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**Learning Control / Examinations**

The assessment consists of a written resp. computer-based exam (120 min) according to Section 4 (2),1 of the examination regulation.

The successful completion of the compulsory tests in the computer lab is prerequisite for admission to the written resp. computer-based exam.

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

**Conditions**

None.

**Learning Outcomes**

see German version

**Content**

see German version

**Literature**


**Remarks**

see German version
Course: Advanced Programming - Java Network Programming [25780]

Coordinators: Detlef Seese, Ratz
Part of the modules: Emphasis Informatics (p. 53)[WI3INFO1]

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</table>

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 tests in the computer lab is prerequisite for admission to the written exam. Further information about attendance to the exercises and practical terms will be announced in the first lecture and at the lecture homepage.

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

Conditions
None.

Recommendations
Successful completion of the course Introduction to Programming with Java [25030].

Learning Outcomes
see German version

Content
see German version

Literature

Elective literature:
- Further references will be given in the lecture.
Course: Advanced Programming - Application of Business Software [25886]

Coordinators: Andreas Oberweis, Stefan Klink
Part of the modules: Emphasis Informatics (p. 53)[W3INFO1]

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<td>2/1/2</td>
<td>Winter</td>
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Learning Control / Examinations
The assessment consists of a written examination of 2 hours (according to Section 4 (2), 1 of the examination regulation) and of assignments during the course (according to Section 4 (2), 3 of the examination regulation).
Successful participation to the computer lab is precondition for permission to the assessment. Further information will be given at the first lesson and via the homepage of the course.
The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
Knowledge of the course “Grundlagen der Informatik I und II” are helpfull.

Learning Outcomes
Students
- master basic concepts and principles of enterprise information systems,
- can model and implement operative workflows
- apply standard software for modelling businesses processes and for analysing them to given criteria
- master the installation, configuration, and parameterisation of enterprise information systems in business and
- assess economical aspects of such systems.

Content
Business information systems enable, support, and accelerate new forms of business processes and forms of organisation. They are the central infrastructure of the economy in the age of eBusiness. Thus, basic knowledge is given in lectures, in exersises and in the computer lab which deals with installation, configuration and parameterization of business information systems. The course communicates profound knowledge in following topics:
- Analysis of cooperation scenarios and business process scenarios
- Selection of modelling methods according to defined criteria
- Implementation of business process models and cooperation models with the help of standard software
- Identification and assessment of challenges during the installation of information systems
- Economical evaluation of business information systems.

Media
Slides, access to internet resources.

Literature
Elective literature:
- Schwabe, Streitz, Unland. CSCW-Kompendium. Lehr- und Handbuch zum computerunterstützten kooperativen Arbeiten.
- Krmar, Schwarzer. Wirtschaftsinformatik.

Further literature will be given during the course.
Course: Project Workshop-Automotive Engineering [2115817]

Coordinators: Frank Gauterin

Part of the modules: Handling Characteristics of Motor Vehicles (p. 60)[WI3INGMB6], Vehicle Development (p. 61)[WI3INGMB14], Automotive Engineering (p. 59)[WI3INGMB5]

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

Learning Control / Examinations
The assessment consists of a project presentation at the end of the lecture period (according to Section 4(2), 3 of the examination regulation) and an oral exam (30-40 min) in the recess period (according to Section 4(2), 2 of the examination regulation). Re-examinations are offered at every ordinary examination date.

The overall grade of the course consists of the weighted grades of both assessments:

• Processing and results of the project: 75%
• Oral exam: 25 percent

Conditions
None.

Learning Outcomes
The students are familiar with typical industrial development processes and working style. They are able to apply knowledge gained at the university to a practical task.

Content
During the Project Workshop Automotive Engineering a team of six persons will work on a task given by an German industrial partner using the instruments of project management. The task is relevant for the actual business and the results are intended to be industrialized after the completion of the project workshop. The team will generate approaches in its own responsibility and will develop solutions for practical application. Coaching will be supplied by both, company and institute. At the beginning in a start-up meeting goals and structure of the project will be specified. During the project workshop there will be weekly team meetings. Also a milestone meeting will be held together with persons from the industrial company. In a final presentation the project results will be presented to the company management and to institute representatives.

Media
Course script (will be supplied during the start-up meeting).

Literature
Elective literature:
Course: Project Management in Rail Industry [2115995]

Coordinators: Peter Gratzfeld
Part of the modules: Rail System Technology (p. 86)[W3INGMB25]

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<td>3</td>
<td>2</td>
<td>Winter / Summer Term</td>
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Learning Control / Examinations
See modul description.

Conditions
See modul description.

Learning Outcomes
- The students learn the basics of project management in rail industry.
- They realize the role of the project manager and the project core team.
- They understand the different project phases and know about processes and tools.
- They understand the governance process.

Content
- Project management system (project, project management, project phases, main processes and supporting processes, governance)
- Organization (organizational structure within a company, project organization, roles in a project organization)
- Main processes (project start, project plan, DPS, WBS, risk and opportunity management, change management, project closure)

Media
All slides are available for download (Ilias-platform).

Literature
A bibliography is available for download (Ilias-platform).
Course: Projectseminar [SozSem]

Coordinators: Bernart, Kunz, Pfaff, Haupt, Grenz, Eisewicht
Part of the modules: Sociology/Empirical Social Research (p. 89)[W13SOZ]

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<td>Winter / Summer Term</td>
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Learning Control / Examinations
Conditions
None.

Learning Outcomes
The student:

- Is able to develop sociological analyses based on the topic of the seminar
- Is able to organize a small survey or to evaluate a given data set on the research problem

Content
In this class, students will conduct small empirical projects.
Course: Explorative-interpretative Project Seminar [n.n.]

**Coordinators:** Pfadenhauer, Kunz, Grenz, Eisewicht

**Part of the modules:** Qualitative Social Research (p. 90) [WI3SOZ2]

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**Learning Control / Examinations**

The form of the assessment will be announced at the beginning of the course by the resp. lecturer. Usually at 2 Credit Points it will be an oral presentation, at 4 LP there has to be passed a term paper as well.

The modality of grading will be announced at the beginning of the course by the lecturer. Usually at 2 Credit Points the overall grade consists of the oral presentation and the active participation in the project - at 4 Credit Points it consists of the active participation and the term paper.

**Conditions**

Successful completion of the lecture *Interpretative Social Research Methods* [n.n.]. Knowledge of this lecture is required.

The lecture is compulsory in the module and has to be attended.

**Learning Outcomes**

The student

- is, based on the lecture *Interpretative Social Research Methods*, capable of choosing and applying appropriate explorative-interpretative methods according to a research question and arranging them in a conceptual research design.
- uses this capability to concretise a scientific question and to collect, fixate and evaluate suitable data.

**Content**

See seminar announcement.

**Media**

Will be announced in the lecture.

**Literature**

Will be announced in the lecture.

**Elective literature:**

Will be announced in the lecture.
Course: Quality Management [2149667]

Coordinators: Lanza, Gisela
Part of the modules: Specialization in Production Engineering (p. 85)[WI3INGMB22]

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Learning Control / Examinations
Performance is assessed in the form of one written examination (60 min) (as per §4(2), 1 or 2 SPO [study and examination regulations]) during the lecture-free period. The examination will take place once every semester and can be retaken at every official examination date.

Conditions
None.

Learning Outcomes
The student

- has knowledge of the content covered by the lecture,
- understands the quality philosophies covered by the lecture,
- is able to apply the QM tools and methods he/she has learned about in the lecture to new problems from the context of the lecture,
- is able to analyse and evaluate the suitability of the methods, procedures and techniques he/she has learned about in the lecture for a specific problem.

Content
Based on the quality philosophies Total Quality Management (TQM) and Six Sigma, the lecture deals with the requirements of modern quality management. Within this context, the process concept of a modern enterprise and the process-specific fields of application of quality assurance methods are presented. The lecture covers the current state of the art in preventive and non-preventive quality management methods in addition to manufacturing metrology, statistical methods and service-related quality management. The content is completed with the presentation of certification possibilities and legal quality aspects.

Main topics of the lecture:

1. The term “quality”
2. Total Quality Management (TQM) and Six Sigma
3. Universal methods and tools
4. QM during early product stages - product definition
5. QM during product development and in procurement
6. QM in production - manufacturing metrology
7. QM in production - statistical methods
8. QM in service
9. Quality management systems
10. Legal aspects of QM

Media
Lecture notes (available at the Institute of Production Science)

Remarks
The credits were changed to 4 CP.
Course: Quantitative Methods for Supply Chain Risk Management [2118090]

**Coordinators:** Cardeneo

**Part of the modules:** Supply Chain Management (p. 38) [WI3BWLISM2]

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**Learning Control / Examinations**

The assessment consists of an oral exam according to §4 (2), 2 of the examination regulation. It may be a written exam (according to §4 (2), 1 of the examination regulation) in the case of large number of participants.

**Conditions**

Knowledge in Logistics and Operations Research are recommended (linear and mixed integer optimization, simple graph theory, and basic knowledge of statistics).

**Learning Outcomes**

The student

- identifies, analyzes and assigns risks of logistic systems
- plans location and transport decisions under uncertainty
- knows risk-relevant elements and knows adequate countermeasures for planning processes (regarding procurement, demand, infrastructure, continuity management)

**Content**

The planning and the operation of logistics systems are strongly connected with uncertainty: It is the unknown demand, varying transportation times, unexpected delays, irregularly production yield or volatile rates of exchange: Quantities, times, qualities and prices are uncertain values. Therefore it is necessary to deal with particular these uncertain values to avoid negative effects. In this lecture we mostly work with mathematical models and methods to control the various kinds of risks.

**Literature**

Will be announced in the lecture.
Course: Spatial Planning and Planning Law [19028]

Coordinators: Dirk Engelke, Heberling

Part of the modules: Fundamentals of Spatial and Infrastructural Development (p. 73)[WI3INGBGU1]

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Learning Control / Examinations
The assessment of the module is a written examination (40 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place every semester as well as the reexamination. In case of failing or to improve the examination grade an additional oral examination (according to Section 4(2), 2 of the examination regulation) is offered in the same examination period. The grade of the module corresponds to the grade of the written examination or the average of the marks for the written and the oral assessment.

Conditions
None.

Learning Outcomes
The educational aim of the lecture is to give a first view on spatial planning and its main tasks. At the end of the semester the participants should be able to work on modest issues of spatial planning on the local level. This is due to assess quantitative aspects like temporal processes and display spatial data.

Content
- Tasks and strategies of spatial planning
- Spaces, uses and conflicts of local planning
- Spatial planning on the local level: Properties and buildings including the public technical and social infrastructure
- Planning on municipality level
- Sustainable settlement structure and land use management
- Historic view on urbanism and regional development
- Planning on different levels: Regional plans, structure plans and zoning plans
- Spatial planning and the European Dimension
- Real estate economy
- Exercise: Urban Planning in Karlsruhe Nordstadt

Literature
Elective literature:
- W. Müller: Städtebau
- W. Braam: Stadtplanung
- D. Bökemann (1982): Theorie der Raumplanung
Course: Reaction Engineering I [22114]

Coordinators: Müller
Part of the modules: Reaction Engineering I (p. 75)[WI3INGCV2]

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Learning Control / Examinations
The assessment consists of a written exam (according to §4 Abs. 2, Nr. 1 of the examination regulation) about the lecture Reaction Engineering I [22114].
The assessment takes place in the recess period and can be resit at every ordinary examination date.
Permitted utilities: calculator, script, its own formulary and own notes.

Conditions
None.

Learning Outcomes
The Student
- has acquired fundamental knowledge in chemical reaction engineering and knows the important reactor types used for homogeneous chemical and enzymatic reaction systems,
- can analyse the performance of reactors,
- is able to choose the suitable reactor type and to identify the optimum processing conditions for the efficient, sustainable and safe production of desired products.

Content
- Introduction
- Model reactors
- Selectivity control in multiple reactions
- Catalysis and kinetics of enzymatic reactions
- Energy balances and temperature effects

Media
Lecture script (available at KIT-Studierendenportal: https://studium.kit.edu and in Studentenwerk)
Exercises and accompanying lecture material (available at KIT-Studierendenportal: https://studium.kit.edu)

Literature
Elective literature:
Course: Real Estate Management I [26400w]

Coordinators: Thomas Lützkendorf
Part of the modules: Real Estate Management (p. 44)[WI3BWLOOW2]

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Learning Control / Examinations
The examination for the courses generally consist of a 60 minute written exam. A 20 minute oral exam is only offered after the second failure of the written exam. The exams for the respective parts (REM I and REM II) happen in the same semester in which the lectures take place. Therefore, REM I exams currently only take place in the winter semester and REM II exams take place in the summer semester. In each semester there are two alternative dates for the exam and exams can be re-sat at any regular exam date.

Conditions
A combination with the module Design Construction and Assessment of Green Buildings I [WI3BWLOOW1] 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
Application of economic methods to the fields of real estate economics and sustainable construction.

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 [26400]

**Coordinators:** Thomas Lützkendorf

**Part of the modules:** Real Estate Management (p. 44)[WI3BWLOOW2]

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**Learning Control / Examinations**

The examination for the courses generally consist of a 60 minute written exam. A 20 minute oral exam is only offered after the second failure of the written exam. The exams for the respective parts (REM I and REM II) happen in the same semester in which the lectures take place. Therefore, REM I exams currently only take place in the winter semester and REM II exams take place in the summer semester. In each semester there are two alternative dates for the exam and exams can be re-sat at any regular exam date.

**Conditions**

A combination with the module Design Construction and Assessment of Green Buildings I [WI3BWLOOW1] 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**

Application of economic methods to the fields of real estate economics and sustainable construction.

**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 Integrated Planning of New Products [21387]

Coordinators: Roland Kläger
Part of the modules: Product Lifecycle Management (p. 70)[WI3INGMB21]

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Learning Control / Examinations
The assessment consists of an oral exam (30 min) according to §4 (2), 2 of the examination regulation. The grade corresponds to the grade of the oral exam.

Conditions
None.

Learning Outcomes
Content
Course: Financial Accounting and Cost Accounting [25002/25003]

Coordinators: Thomas Burdelski
Part of the modules: Business Administration (p. 17)[W11BWL]

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Learning Control / Examinations
The assessment consists of a written exam (120 min) 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.

Learning Outcomes
Business transactions are economic events that affect the financial position of a business entity. After this basic course students have to be familiar with the principles of Financial and Management Accounting especially with the four financial statements and the instruments of a cost accounting system.

Content
After an introduction to the objectives of accounting the student will learn the double-Entry-System, the basic method of accounting, and the difference between accounting and bookkeeping. We examine the typical business transactions for Trading Companies and Industrial Enterprises. Financial statements are the primary means of communicating important accounting information about a business to those who have an interest in the business. Four major financial statements are used to communicate accounting information: the income statement, the statement of retained earnings, the balance sheet and the statement of cash flows, here in the context with german laws (HGB). In the second part of the course the cost accounting instruments will be analyzed: cost type accounting, cost center accounting, and unit of output costing. Aspects of modern systems in Management Accounting conclude this basic course.

Media
slides

Literature
- R. Buchner, Buchführung und Jahresabschluss, Vahlen Verlag
- A. Coenenberg, Jahresabschluss und Jahresabschlussanalyse, Verlag Moderne Industrie
- A. Coenenberg, Kostenrechnung und Kostenanalyse, Verlag Moderne Industrie
- R. Ewert, A. Wagenhofer, Interne Unternehmensrechnung, Springer Verlag
- J. Schöttler, R. Spulak, Technik des betrieblichen Rechnungswesen, Oldenbourg Verlag
Course: Rail Vehicle Technology [2115996]

**Coordinators:** Peter Gratzfeld

**Part of the modules:** Rail System Technology (p. 86)[W13INGMB25]

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

**Conditions**
See modul description.

**Learning Outcomes**

- The students learn about advantages and disadvantages of different types of traction drives and judge which one fits best for each application.
- They understand brakes from a vehicular and an operational point of view. They assess the fitness of different brake systems.
- They know about the basics of running dynamics and bogies.
- They define suitable vehicle concepts based on requirements for modern rail vehicles.

**Content**

- Main systems of rail vehicles
- Electric and non-electric traction drives
- Brakes
- Bogies
- Vehicle concepts for mass transit and main line

**Media**
All slides are available for download (Ilias-platform).

**Literature**
A bibliography is available for download (Ilias-platform).
Course: Semantic Web Technologies I [25748]

Coordinators:  Rudi Studer, Sebastian Rudolph, Andreas Harth
Part of the modules:  Electives in Informatic (p. 54) [WI3INFO2]

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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.

Learning Outcomes
- Basic knowledge about the main ideas and the realisation of Semantic Web Technologies

Content
"Semantic Web" denotes an extension of the World Wide Web by meta data and applications in order to make the meaning (semantics) of data on the web usable by intelligent systems, e.g. in e-commerce and internet portals. Central to this is the representation and processing of knowledge in form of ontologies. This lecture provides the foundations for knowledge representation and processing for the corresponding technologies and presents example applications. It covers the following topics:

- Extensible Markup Language (XML)
- Resource Description Framework (RDF) and RDF Schema
- Web Ontology Language (OWL)
- Rule Languages
- Applications

Media
Slides.

Literature

Elective literature:
Course: Seminar in Enterprise Information Systems [SemAIFB1]

Coordinators: Rudi Studer, Andreas Oberweis, Thomas Wolf, Ralf Kneuper
Part of the modules: Seminar Module (p. 91) [WI3SEM]

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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 are able to

- do literature search based on a given topic: identify relevant literature, find, assess and evaluate this literature.
- write the seminar thesis (and later the Bachelor-/Masterthesis) with a minimal learning curve by using format requirements such as those recommended by well-known publishers.
- give presentations in a scientific context in front of an auditorium. These techniques are presented and learned during the seminar.
- present results of the research in written form generally found in scientific publications.

Content
The seminar intensifies and extends specific 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 Efficient Algorithms [SemAIFB2]

**Coordinators:** Hartmut Schmeck

**Part of the modules:** Seminar Module (p. 91) [WI3SEM]

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**Learning Control / Examinations**
The assessment consists of a talk (presentation of 45-60 minutes) about the research topic of the seminar together with discussion, a written summary about the major issues of the topic (approx. 15 pages) and attending the discussions of the seminar (according Section 4(2), 3 of the examination regulation).
The grade of this course is achieved by the weighted sum of the grades (talk 50%, written summary 30% and discussion 20%). This seminar is for bachelor as well as master students. The difference between them is calculated according to different evaluation mechanisms for the written summary work and the talk.

**Conditions**
See corresponding module information.

**Learning Outcomes**
The students should learn to work on research papers by searching for new topics in computer science and by presenting the major issues of the papers.
The master students should deepen their ability to develop independent insight into new scientific topics and to communicate them through oral presentation and written summary to others.
The students will learn to deal with critical discussions on scientific presentations and written summaries through active participation in the seminar.

**Content**
Topics include the new research issues of the research group “applied Informatics”. The new topics are in the area Organic Computing, Nature-inspired optimization and service oriented architectures.
The topics of the seminars are introduced around the end of the former semester on the board A12 of the institute AIFB (building 11.40) and in Internet http://www.aifb.kit.edu/web/SeminarePraktika

**Literature**
Will be announced at the beginning of the semester.

**Remarks**
There is a limited number of participants. The students have to register for the seminar.
Course: Seminar Energy Economics [SemEW]

Coordinators: Wolf Fichtner, Dominik Möst, Patrick Jochem
Part of the modules: Seminar Module (p. 91)[WI3SEM]

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Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content
Course: Seminar Public Finance [26130]

**Coordinators:** Berthold Wigger, Assistenten

**Part of the modules:** Seminar Module (p. 91) [WISSEM]

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**Learning Control / Examinations**

**Conditions**
See module description.
Adequate for students in an advanced stage of their studies.

**Learning Outcomes**

**Content**
Preparation, presentation, and discussion of recent research papers on varying Public Finance issues. The current seminar subject, including the exact topics to work on, will be announced under http://fiwi.iww.kit.edu and on the notice board prior to the start of semester.

**Literature**
Will be announced at the beginning of the seminar.
**Course: Seminar Conveying Technology and Logistics [SemIFL]**

**Coordinators:** Kai Furmans  
**Part of the modules:** Seminar Module (p. 91)[WISSEM]

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**Learning Control / Examinations**

Participation during the information presentation. The performance review is based on the written paper and the two presentations. Active participation during the presentations is required.

**Conditions**
None.

**Learning Outcomes**

The student gets an opportunity to learn how to work academically. By delving into a scientific topic the student learns to do research and to argue specially in logistics and material handling. Through the presentation of his work the student will learn technical basics of presentation and basics of academic argumentation. Also rhetorical competence will be acquired.

**Content**

The topics of the seminar will be published under http://www.ifl.uni-karlsruhe.de/seminare.php one semester before. To participate it is necessary to sign in the semester before.
Course: Seminar in Finance [25293]

**Coordinators:** Marliese Uhrig-Homburg, Martin E. Ruckes

**Part of the modules:** Seminar Module (p. 91)[WI3SEM]

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**Learning Control / Examinations**

**Conditions**
Knowledge of the content of the modules Essentials of Finance [WI3BWLFBV1] or F1 (Finance) [WW4BWLFBV1] 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 in International Economy [SemIWW2]

**Coordinators:** Jan Kowalski

**Part of the modules:** Seminar Module (p. 91) [WI3SEM]

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**Learning Control / Examinations**

**Conditions**

None.

**Learning Outcomes**

**Content**
Course: [SemIWW3]

Coordinators: Ingrid Ott

Part of the modules: Seminar Module (p. 91)[WI3SEM]

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Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content
Course: Seminar in Industrial Production [SemIIP2]

**Course:** Seminar in Industrial Production [SemIIP2]

**Coordinators:** Frank Schultmann, Magnus Fröhling, Michael Hiete

**Part of the modules:** Seminar Module (p. 91)[WI3SEM]

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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“ [WI3BWLIIP], „Industrial Production II“ [WW4BWLIIP2] or „Industrial Production III“ [WW3BWLIIP6].

**Learning Outcomes**
Students shall gain insights into selected research projects 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]

Coordinators:  Christof Weinhardt
Part of the modules:  Seminar Module (p. 91)[WI3SEM]

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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
See corresponding module information.
Business Engineering/Economics Engineering: Preferably at least one module offered by the institute should have been chosen before attending this seminar.

Learning Outcomes
The student should be able to do a literature review based on a predefined topic in the context of information engineering and management. The approach comprises the identification of relevant literature according to the topic and an analysis as well as an evaluation of the methods presented in the literature. The student learns to present his results in a paper and in front of an audience on a academic level. This process gives him the knowledge and practice for further research work like a master thesis or a doctoral thesis.

Content
In the seminar the student should learn to apply the research methods to a predefined topic area. The topics are based on research questions in Information Engineering and Management across different industry sectors. This problem analysis requires a interdisciplinary examination.

Media
- Powerpoint,
- eLearning Platform Ilias
- Software Tools, if necessary

Literature
The student will receive the necessary literature for his research topic.

Remarks
- Students from Bachelor and Master Course can visit the seminar. The research topic as well as the evaluation of the work and the presentation will have a different focus between Bachelor and Master Course.
- All the seminars offered at the chair of Prof. Dr. Weinhardt can be chosen. The current topics of the seminars are available at the following homepage: http://www.im.uni-karlsruhe.de/lehre.
Course: Seminar Complexity Management [SemAIFB3]

Coordinators: Detlef Seese
Part of the modules: Seminar Module (p. 91)[WI3SEM]

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Learning Control / Examinations
see German version

Conditions
None.

Learning Outcomes
see German version

Content
see German version

Literature
Will be announced in the seminar.

Remarks
The number of participants is limited. Please take notice about the inscription procedure at the institutes website. Specific titles and the topics of offered seminars will be announced before the start of a semester on the website of AIFB.
Course: Seminar Service Science, Management & Engineering [26470]

**Coordinators:** Stefan Tai, Christof Weinhardt, Gerhard Satzger, Rudi Studer

**Part of the modules:** Seminar Module (p. 91)[WI3SEM]

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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 (15-20 pages), a presentation and active participation in class.
The final mark is based on the examination of the written seminar thesis but can be upgraded or downgraded according to the quality of the presentation.

**Conditions**
See corresponding module information.
Lecture eServices [26466] is recommended.

**Learning Outcomes**
Autonomously deal with a special topic in the Service Science, Management and Engineering field adhering to scientific standards.

**Content**
Each Semester, the seminar will cover topics from a different selected subfield of Service Science, Management & Engineering. Topics include service innovation, service economics, service computing, transformation and coordination of service value networks as well as collaboration for knowledge intensive services.
See the KSRI website for more information about this seminar: http://www.ksri.kit.edu

**Literature**
The student will receive the necessary literature for his research topic.
Course: Seminar Stochastic Models [SemWIOR1]

Coordinators: Karl-Heinz Waldmann
Part of the modules: Seminar Module (p. 91) [WI3SEM]

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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
In case studies students comprehend stochastic relationships and gain deep knowledge of modelling, evaluation, and optimization of stochastic systems. In group presentations, students learn basic academic presentation and argument skills.

Content
The actual topic as well as the contemporary issues are available online.

Media
Power Point and related presentation techniques.

Literature
Will be presented with the actual topic.
Course: Seminar Knowledge Management [SemAIFB4]

Coordinators: Rudi Studer

Part of the modules: Seminar Module (p. 91) [WI3SEM]

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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 Insurance Management [SemFBV1]

Coordinators: Ute Werner
Part of the modules: Seminar Module (p. 91) [WI3SEM]

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**Learning Control / Examinations**
Oral presentation, written report of 10 pages on the same topic, as well as active participation in discussion and working groups (according to §4(2), 3 SPO).
The grading consists of the weighted performance of the works performed.

**Conditions**
See corresponding module information.
The seminar is held within the courses of Insurance Management [WI3BWLFBV4] 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 [WI3BWLFBV3] and Insurance Markets and Management [WI3BWLFBV4] 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
- Service Management

For their contents refer to the information given at the referring pages.

**Literature**
Will be announced at the beginning of the lecture period.

**Remarks**
Some of the respective courses are offered on demand. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretary of the chair of insurance science.
Course: Seminar in Operational Risk Management [SemFBV2]

**Coordinators:** Ute Werner

**Part of the modules:** Seminar Module (p. 91) [WI3SEM]

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**Learning Control / Examinations**
Oral presentation, written report of 10 pages on the same topic, as well as active participation in discussion and working groups (according to §4(2), 3 SPO).
The grading consists of the weighted performance of the works performed.

**Conditions**
See corresponding module information.
The seminar is held within the courses of *Operational Risk Management I/II* [WW4BWLFBV8/9] but with special forms of working.
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 module *Risk and Insurance Management* [WI3BWLFBV3] as well as with the master modules *Operational Risk Management I* [WW4BWLFBV8] and *Operational Risk Management II* [WW4BWLFBV9]. These modules, though, are not required to be taken.

**Learning Outcomes**
See German version.

**Content**
The seminar is offered within the following courses:
- Enterprise Risk Management
- Multidisciplinary Risk Research
- Risk Communication
- Risk Management of Microfinance and Private Households
- Project Work in Risk Research

For their contents refer to the information given at the referring pages.

**Literature**
Will be announced at the beginning of the course period.

**Remarks**
Some of the respective courses are offered on demand. For further information, see: http://insurance.ftv.uni-karlsruhe.de
To attend the course please register at the secretary of the chair of insurance science.
## Course: Seminar in Ergonomics [SemIIP]

**Coordinators:** Peter Knauth, Dorothee Karl  
**Part of the modules:** Seminar Module (p. 91)[WISSEM]

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### Learning Control / Examinations

**Conditions**  
See corresponding module information.

### Learning Outcomes

**Content**

**Literature**  
Will be announced at the end of the recess period.
**Course: Seminar in Discrete Optimization [25491]**

**Coordinators:** Stefan Nickel

**Part of the modules:** Seminar Module (p. 91) [WI3SEM]

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**Learning Control / Examinations**
The assessment consists of a written seminar thesis of 20-25 pages and a presentation of 40-60 minutes (according to §4(2), 3 of the examination regulation).
The final mark for the seminar is the weighted average of the marks for the assessed assignments (seminar thesis 50 %, presentation 50%).
The seminar can be attended both by Bachelor and Master students. A differentiation will be achieved by different valuation standards for the seminar thesis and presentation.

**Conditions**
Successful completion of the module *Introduction to Operations Research* [WI1OR].

**Learning Outcomes**
The seminar aims at the presentation, critical evaluation and exemplary discussion of recent questions in discrete optimization. The focus lies on optimization models and algorithms, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management).
The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic.
Regarding the seminar presentations, the students will be familiarized with basic presentational and rhetoric skills.

**Content**
The topic of the seminar will be announced at the end of the preceding term 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: Siegfried Berninghaus

Part of the modules: Seminar Module (p. 91)[WI3SEM]

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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 [25131]

**Coordinators:** Oliver Stein

**Part of the modules:** Seminar Module (p. 91)[W3SEM]

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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 on Network Economics [26263]

**Coordinators:** Kay Mitusch

**Part of the modules:** Seminar Module (p. 91)[W3SEM]

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**Learning Control / Examinations**
The assessment consists of a seminar paper of 15-20 pages, a presentation of results and active participation in the discussion during the seminar (according to §4(2), 3 ERSC)
The grading is carried out primarily in reference to the seminar paper, however, divergent performance in the presentation will be accounted for by a corresponding adjustment. In particular, there is the chance to improve grades through good participation during the seminar.

**Conditions**
See module description.
Basic knowledge of network economics is required. The course *Competition in Networks* [26240] should be completed.

**Learning Outcomes**
The student

- can acquire a scientific article to an economic topic,
- deepens his/her knowledge in network economics,
- gets inspiration for a potential master thesis.

**Content**
The current theme of the seminar including the suggestion of topics for the seminar papers will be announced in KIM and on the notice board at the institute (http://netze.iww.kit.edu).
(The title of the seminar may change from term to term depending on the topic)
Course: Seminar in Risk Theory and Actuarial Science [SemFBV3]

Coordinators: Christian Hipp
Part of the modules: Seminar Module (p. 91) [WI3SEM]

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Learning Control / Examinations

Conditions
See corresponding module information.
Knowledge of statistics and actuary science is an advantage.
The seminar is a good addition to the Bachelor module Calculation and Control [WI3BWLFBV2] and to the Master modules Applications of Actuarial Sciences I/II [WW4BWLFBV4/5] and Insurance Statistics [WW4BWLFBV8]. However these modules are not a prerequisite for the participation in the seminar.

Learning Outcomes

Content

Literature
Will be announced at the end of the recess period.
Course: Seminar in Game and Decision Theory [SemWIOR4]

Coordinators: Siegfried Berninghaus
Part of the modules: Seminar Module (p. 91)[WI3SEM]

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Learning Control / Examinations
Term paper and presentation

Conditions
Completion of all 1st an 2nd year modules of the Bachelor Program.
See corresponding module information.

Learning Outcomes
The seminar wants to deepen the methods of scientific work. Students shall learn to discuss critical the latest research results in game theory.
Procurement of SQs: Students learn the technical basics of presentation and to argument scientifically. Also rethoric skills shall be amplified.

Content
The seminar's topic will be announced before the beginning of each semester on the internet (http://www.wior.uni-karlsruhe.de/LS_Berninghaus/Studium/).

Media
Slides.

Literature
Will be announced at the end of the recess period.
Course: Seminar: Management and Organization [25915/25916]

Coordinators: Hagen Lindstädt
Part of the modules: Seminar Module (p. 91)[WI3SEM]

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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: Seminar paper “Production Engineering” [21690sem]

Coordinators: Volker Schulze, Lanza, Munzinger
Part of the modules: Seminar Module (p. 91)[WI3SEM]

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Learning Control / Examinations
The following work and performance is required for the successful completion of the seminar:

- active participation in the seminar,
- completion of a seminar paper on the topic of the seminar (minimum input: 80 h) and
- a presentation given after completion of the seminar paper.

The seminar paper can be submitted:

- for the module: seminar module [SemING] OR
- to improve the module grade of modules: Manufacturing Engineering [WI3INGMB23], Integrated Production Planning [WI3INGMB24] or Vertiefung der Produktionstechnik [WI3INGMB22].

Each seminar paper can be submitted only once. One paper cannot be submitted for both the seminar module and the improvement of the grade.

The score of the seminar paper can be used to improve the grade of one of the above-mentioned modules. The module grade can be improved by three tenths maximum. Only seminar papers written at wbk Institute of Production Science qualify for an improvement of the module grade.

One seminar paper can be used for the improvement of one module grade (named above) maximum. For the improvement of a grade, no more than one seminar paper can be submitted.

Conditions
None.

Learning Outcomes
Complex analysis and addressing of production engineering related problem areas

Content
Students independently deal with production engineering related problems from the fields of manufacturing engineering, machine tools and handling technology and organisation, planning and logistics with tutorial assistance. The results are aggregated in the form of a seminar paper and are then illustrated in the form of a presentation.

Media
Lecture notes of the Institute of Production Science.
Course: Service Oriented Computing 1 [25770]

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**Coordinators:** Stefan Tai

**Part of the modules:** Emphasis Informatics (p. 53)[WI3INFO1], Electives in Informatic (p. 54)[WI3INFO2]

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**Learning Control / Examinations**
The assessment of this course is a written examination (60min.) in the first week after lecture period (nach §4(2), 1 SPO).

**Conditions**
Lecture AI2 [25033] is recommended.

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**Learning Outcomes**
The course introduces concepts, methods, and techniques of “service-oriented computing”, including languages for (Web) service description, methods and tools for the development of services, and platforms (middleware, runtimes) for the Web-based deployment, delivery, and execution of services. The course provides a solid technical foundation that enables the student to address the increasingly relevant challenges of developing “service-oriented architectures (SOA)” in the industry.

**Content**
Web services represent the next-generation of Web technology, and are an evolution of conventional distributed middleware. They enable new and improved ways for enterprise computing, including application interoperability and integration, and business process management. Modern software systems are being designed as service-oriented architectures (SOA), introducing increased agility and flexibility at both the software systems and the business level. Web services and SOA thus have a profound impact on software development and the businesses that they support. The course “Service-oriented Computing” introduces the concepts, methods and technology that provide a solid foundation in this area. Topics include:

- Service description
- Service engineering, including development and implementation
- Service composition (aggregation), including process-based service orchestration
- Interoperability formats and protocols
- Service platforms and runtimes (middleware)

**Media**
Slides, access to internet resources.

**Literature**
Will be announced in the lecture.
Course: Safety Management in Highway Engineering [19315]

**Coordinators:** Matthias Zimmermann

**Part of the modules:** Safety Science I (p. 79)[WI3INGINTER3], Safety Science II (p. 80)[WI3INGINTER4]

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

**Conditions**
See corresponding module information.

**Learning Outcomes**

**Content**

**Remarks**
For further information, see http://www.ise.uni-karlsruhe.de/16.php
Course: Safety Engineering [21061]

**Coordinators:** Kany
**Part of the modules:** Safety Science I (p. 79)[WI3INGINTER3], Safety Science II (p. 80)[WI3INGINTER4]

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**Learning Control / Examinations**
The assessment consists of an oral exam according to §4 (2), 2 of the examination regulation. It may be a written exam (according to §4 (2), 1 of the examination regulation) in the case of large number of participants.

**Conditions**
None.

**Learning Outcomes**

**Content**
The course provides basic knowledge of safety engineering. In particular the basics of health at the working place, job safety in Germany, national and European safety rules and the basics of safe machine design are covered. The implementation of these aspects will be illustrated by examples of material handling and storage technology. This course focuses on: basics of safety at work, safety regulations, basic safety principles of machine design, protection devices, system security with risk analysis, electronics in safety engineering, safety engineering for storage and material handling technique, electrical dangers and ergonomics. So, mainly, the technical measures of risk reduction in specific technical circumstances are covered.
Course: Simulation of coupled systems [21095]

Coordinators: Marcus Geimer
Part of the modules: Vehicle Development (p. 61)[WI3INGMB14], Mobile Machines (p. 62)[WI3INGMB15]

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Learning Control / Examinations
Assessment for the module Mobile Machines: See module description.
Assessment for the module Automotive Engineering: The assessment consists of an oral exam (20 min) taking place in 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
It is recommended to have:

- Knowledge of ProE (ideally in actual version)
- Basic knowledge of Matlab/Simulink
- Basic knowledge of dynamics of machines
- Basic knowledge of hydraulics

Learning Outcomes
The limitation of the simulation programs and the related problems will be introduced by using the example of the working movement of a wheel loader. As a solution the coupled simulation of multiple programs by using the mentioned example will be shown.

Content
- Knowledge of the basics of multi-body and hydraulic simulation programs
- Possibilities of coupled simulations
- Development of a simulation model by using the example of a wheel loader
- Documentation of the results in a short report

Literature
Elective literature:

- miscellaneous guides according the software-tools pdf-shaped
- information to the wheel-type loader
Course: Simulation I [25662]

**Coordinators:** Karl-Heinz Waldmann

**Part of the modules:** Stochastic Methods and Simulation (p. 57)[WI3OR7], Applications of Operations Research (p. 55)[WI3ORS]

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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 0.3 (according to Section 4(2), 3 of the examination regulation).

**Conditions**
Foundations in the following fields are required:

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

**Learning Outcomes**
The lecture provides insights into the typical process in planning and conducting simulation studies.

**Content**
As the world is getting more complex it is often not possible to analytically provide key figures of interest without overly simplifying the problem. Thus efficient simulation techniques become more and more important. In the lecture important basic concepts are presented in terms of selected case studies.

Topics overview: Discrete event simulation, generation of random numbers, generating discrete and continuous random variables, statistical analysis of simulated data.

**Media**
Blackboard, Slides, Flash Animations, Simulation Software

**Literature**
- Lecture Notes

**Elective literature:**

**Remarks**
The lecture is offered irregularly. The curriculum of the next two years is available online.
Course: Simulation II [25665]

Coordinators: Karl-Heinz Waldmann

Part of the modules: Stochastic Methods and Simulation (p. 57) [WI3OR7]

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

Learning Control / Examinations
The assessment consists of an 1h written exam following §4(2), 1 SPO. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3 (§4(2), 3 SPO).

Conditions
Foundations in the following fields are required:

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

not any

Learning Outcomes
The lecture provides insights into the typical process in planning and conducting simulation studies.

Content
As the world is getting more complex it is often not possible to analytically provide key figures of interest without overly simplifying the problem. Thus efficient simulation techniques become more and more important. In the lecture important basic concepts are presented in terms of selected case studies.

Topics overview: Variance reduction techniques, simulation of stochastic processes, case studies.

Media
Blackboard, Slides, Flash Animations, Simulation Software

Literature
• Lecture Notes

Elective literature:

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.
Course: Simulation of Spray and Mixture Formation in Internal Combustion Engines [21114]

**Coordinators:** Baumgarten

**Part of the modules:** Engine Development (p. 64)[WI3INGMB17], Combustion Engines (p. 63)[WI3INGMB16], Combustion Engines II (p. 82)[WI3INGMB19]

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**Learning Control / Examinations**
The assessment consists of an oral exam (30 min) according to §4 (2), 2 of the examination regulation. The grade of the exam is included in the overall grade of the module with a weighting factor of 3.

**Conditions**
The course *Combustion Engines A* [21101] has to be completed beforehand.

**Learning Outcomes**

**Content**
Course: Software Engineering [25728]

Coordinators: Andreas Oberweis, Detlef Seese

Part of the modules: Emphasis Informatics (p. 53)[WI3INFO1], Electives in Informatic (p. 54)[WI3INFO2]

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Learning Control / Examinations
The assessment consists of an 1h written exam in the first week after lecture period.

Conditions
Modul “Introduction to Informatics” [WI1INFO] is precondition

Learning Outcomes
Students

• are familiar with the concepts and principles of software engineering
• know important and common software development process models
• know methods for requirements analysis and know how to model and evaluate use case models
• know models for systems structuring and controlling as well as architecture principles of software systems.
• can model and evaluate component diagrams
• are familiar with basic concepts of software quality management and are able to apply software test and evaluation methods.

Content
The course deals with fundamental aspects of the systematically development of huge software systems. The course covers topics such as:

• software developing process models
• methods and tools for the development phases: requirements analysis, system specification, system design, programming and testing.

Media
Slides, access to internet resources.

Literature
Elective literature:

• E. Gamma et al., Design Patterns. Addison Wesley 1995.

Further literature is given in the course.
Course: Software Laboratory: OR Models I [25490]

Coordinators: Stefan Nickel
Part of the modules: Applications of Operations Research (p. 55)[WI3OR5]

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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 [25040] of the module Operations Research [WI1OR].

Learning Outcomes
The software laboratory has the goal to make the students familiar with the usage of computers in practical applications of Operations Research. An important benefit lies in the ability to assess and estimate general possibilities and fields of usage of modeling and implementation software for solving OR models in practice. As software-based planning modules are used in many companies, this course provides a reasonable preparation for students for practical planning activities.

Content
After an introduction to general concepts of modelling tools (implementation, data handling, result interpretation, . . . ), the program XPress-MP IVE with its modelling language Mosel will be presented in detail.
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
The course is offered in every winter term.
The planned lectures and courses for the next three years are announced online.
Course: Social structures of modern societies [11005]

Coordinators: Gerd Nollmann
Part of the modules: Sociology/Empirical Social Research (p. 89) [WI3SOZ]

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Learning Control / Examinations
The assessment consists of a written test according to Section 4 (2), 3 of the examination regulation. The test will be graded. The test takes place in the last lecture. Generally re-examinations are offered six weeks later.

Conditions
The lecture is obligatorily in the module and has to be completed.

Learning Outcomes
The student:
- Gains knowledge on social structures of modern societies
- Describes and explains current societal processes
- Gets to know selected research, problems and data.

Content
The lecture begins with definitions of social structures and their relation to the culture of human behaviour. Furthermore, important research, current debates, and controversies will be presented as well as continuity and change of German social structures in comparative fashion.

Important topics will be modernisation, individualisation, class structures, education and job market, social mobility, life courses and cohorts, distributions of income and wealth, family, marriage market, fertility.

The lecture stresses knowledge about data sources, official statistics, and relevant results of survey research.
Course: Special Topics in Information Engineering & Management [26478]

**Coordinators:** Christof Weinhardt

**Part of the modules:** eBusiness and Servicemanagement (p. 37)[WI3BWLISM1]

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**Learning Control / Examinations**
The student is evaluated based on the written and practical work, a presentation of the results in front of an audience and his contribution to the discussion.

**Conditions**
None.

**Learning Outcomes**
The student should be able to do a literature review based on a predefined topic in the context of information engineering and management. The approach comprises the identification of relevant literature according to the topic and an analysis as well as an evaluation of the methods presented in the literature. The practical work components should enable the student to learn and independently use scientific methods employed e.g. in case studies or experiments. The student learns to present his results in a paper and in front of an audience on an academic level. This process is helpful for further scientific work like the master or doctoral thesis.

**Content**
In this course the student should learn to apply the search methods to a predefined topic area. The topics are based on research questions in Information Engineering and Management across different industry sectors. This problem analysis requires 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**
- Power Point
- eLearning Plattform 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.iism.kit.edu/im/lehre
Course: Special Topics of Applied Informatics [Platzhalter]

**Coordinators:** Andreas Oberweis, Hartmut Schmeck, Detlef Seese, Rudi Studer, Stefan Tai

**Part of the modules:** Emphasis Informatics (p. 53)[WI3INFO1], Electives in Informatic (p. 54)[WI3INFO2]

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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 are able to handle methods and instruments in a area of applied informatics and to show the capability to be innovative with regard to applied methods.

The course will impart knowledge of basics and methods in the context of their application in practice. Based on the understanding of the imparted concepts and methods students will be able to choose the appropriate methods and apply them in the right way for problems they will face in their professional life.

Students will be enabled to find arguments for solution approaches and to argue for them.

**Content**
This course is a placeholder for special courses that are offered in an irregular sequence and cover selected topics in the field of applied informatics.

**Media**
Will be announced at the beginning of the course.

**Literature**
Will be announced at the beginning of the course.

**Remarks**
This course can be used in particular for the acceptance of external courses whose content is in the broader area of applied informatics, but cannot assigned to another course of this topic.
Course: Special Topics in Management: Management and IT [25907]

Coordinators: Hagen Lindstädt
Part of the modules: Strategy and Organization (p. 28)[WI3BWLuo1]

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Learning Control / Examinations
The assessment consists of a written exam (30 min) at the beginning of the recess period (according to Section 4(2), 1 of the examination regulation).
The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes
The course discusses management questions and concepts that are clearly motivating from a current and practical perspective. Here the integration of IT and process issues into corporate management from the management's perspective is one of the subjects of particular interest. The event takes place in close cooperation with leading, practical managers.

Content
(Excerpt):
- A summary of current management concepts and questions.

Media
Slides.

Literature
The relevant excerpts and additional sources are made known during the course.
Course: Special Sociology [spezSoz]

Coordinators: Gerd Nollmann, Pfadenhauer, Pfaff, Haupt, Grenz, Eisewicht, Kunz

Part of the modules: Sociology/Empirical Social Research (p. 89)[WI3SOZ], Qualitative Social Research (p. 90)[WI3SOZ2]

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**Learning Control / Examinations**

Module Sociology/Empirical Social Research [WI3SOZ]: The assessment consists of lecture minutes (graded) and an oral presentation (according to Section 4 (2), 3 of the examination regulation.

Module Qualitative Social Research [WI3SOZ2]: The assessment consists of an oral exam according to Section 4(2), 2 of the examination regulation.

**Conditions**

The form of the lecture has to be attended and must be completed with 2 Credit Points. The form of the lecture must not be swapped by a seminar according sociological theory, according techniques of social research or any other lecture.

**Learning Outcomes**

The student

• gains basic knowledge of a Special Sociology.

• gains knowledge of a specific problem in the Social Sciences.

• accordingly is capable of questioning further phenomena of the Social Sciences.

• is able to specify, pursue and explain own scientific questions.

**Content**

The student has the choice of the broad range of course offerings at the institute. In the course specific scientific problems and their debate will be introduced and discussed.

**Media**

Will be announced in the lecture.

**Literature**

Will be announced in the lecture.

**Elective literature:**

Will be announced in the lecture.
Course: Specific Aspects in Taxation [26129]

Coordinators: Berthold Wigger, A. Presse

Part of the modules: Public Finance (p. 51)[WI3VWL9], Topics in Finance I (p. 35)[WI3BWLFBV5], Topics in Finance II (p. 36)[WI3BWLFBV6]

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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

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: Game Theory I [25525]

Coordinators: Siegfried Berninghaus

Part of the modules: Applied Game Theory (p. 46)[WI3VWL1], Microeconomic Theory (p. 49)[WI3VWL6], Strategic Games (p. 48)[WI3VWL4]

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Learning Control / Examinations
The assessment consists of a written exam (80 minutes) according to Section 4(2),1 of the examination regulation. The exam takes place in the recess period and can be resited at every ordinary examination date.

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

Learning Outcomes
This course conveys established knowledge in theory of strategic decision making. The students shall be able to analyze strategic problems systematically and to give advice for behavior in concrete economic situations.

Content
Main topic is non-cooperative game theory. Models, solution concepts and applications are discussed for simultaneous as well as sequential games. Different equilibrium concepts are introduced and a short introduction to cooperative game theory is given.

Media
Folien, Übungsblätter.

Literature
Gibbons, A primer in Game Theory, Harvester-Wheatsheaf, 1992

Elective literature:
- Binmore, Fun and Games, DC Heath, Lexington, MA, 1991
Course: Game Theory II [25369]

**Coordinators:** Siegfried Berninghaus

**Part of the modules:** Applied Game Theory (p. 46)[WI3VWL1], Strategic Games (p. 48)[WI3VWL4]

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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 in every semester. Re-examinations are offered at every ordinary examination date.

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

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

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

**Media**
Folien, Übungsblätter.

**Literature**

**Elective literature:**
Course: Facility Location and Strategic Supply Chain Management [25486]

Coordinators: Stefan Nickel

Part of the modules: Applications of Operations Research (p. 55)[WI3OR5], Methodical Foundations of OR (p. 56)[WI3OR6], Supply Chain Management (p. 38)[WI3BWLISM2]

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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.

Conditions

None.

Learning Outcomes

The lecture covers basic quantitative methods in location planning in the context of strategic Supply Chain Planning. Besides the discussion of several criteria for the evaluation of the locations of facilities, the students are acquainted with classical location planning models (planar models, network models and discrete models) and advanced location planning models designed for Supply Chain Management (single-period and multi-period models). The exercises accompanying the lecture offer the possibility to apply the considered models to practical problems.

Content

Since the classical work “Theory of the Location of Industries” of Weber from 1909, the determination of an optimal location of a new facility with respect to existing customers is strongly connected to strategical logistics planning. Strategic decisions concerning the location of facilities as production plants, distribution centers or warehouses are of high importance for the rentability of supply chains. Thoroughly carried out, location planning allows an efficient flow of materials and leads to lower costs and increased customer service.

Subject of the course is an introduction to the most important terms and definitions in location planning as well as the presentation of basic quantitative location planning models. Furthermore, specialized location planning models for Supply Chain Management will be addressed as they are part in many commercial SCM tools for strategic planning tasks.

Literature

Elective literature:

- Love, Morris, Wesolowsky: Facilities Location: Models and Methods, North Holland, 1988

Remarks

The lecture is offered in every summer term. The planned lectures and courses for the next three years are announced online.
Course: Statistics and Econometrics in Business and Economics [25325]

**Coordinators:** Wolf-Dieter Heller

**Part of the modules:** Statistical Applications of Financial Risk Management (p. 52) [WI3STAT]

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**Learning Control / Examinations**

**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 time-series models, which are among 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**
e.g.
- 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 [25008/25009]

Coordinators: Markus Höchstötter
Part of the modules: Statistics (p. 26)[WI1STAT]

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<td>4/0/2</td>
<td>Summer term</td>
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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 should understand and apply

- the basic concepts of statistical data exploration
- the basic definitions and theorems of probability theory

Content
A. Descriptive Statistics: univariate und bivariate analysis
B. Probability Theory: probability space, conditional and product probabilities

Media
lecture notes

Literature
Skriptum: Kurzfassung Statistik I

Elective literature:

- Bosch, K.: Statistik-Taschenbuch, Oldenbourg, München etc., 1992
Course: Statistics II [25020/25021]

**Coordinators:** Markus Höchstötter

**Part of the modules:** Statistics (p. 26)[WI1STAT]

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

**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:
- Bosch, K.: Statistik-Taschenbuch, Oldenbourg, München etc., 1992
Course: Steuerungstechnik [2150683]

**Coordinators:** Gönnheimer

**Part of the modules:** Specialization in Production Engineering (p. 85)[WI3INGMB22]

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**Learning Control / Examinations**

The assessment consists of an oral exam (20 min) taking place during the recess period (according to Section 4(2), 1 or 2) of the examination regulation).

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

**Conditions**

None.

**Learning Outcomes**

Content
# Course: Markov Decision Models I [25679]

**Coordinators:** Karl-Heinz Waldmann  
**Part of the modules:** Stochastic Methods and Simulation (p. 57)[WI3OR7], Methodical Foundations of OR (p. 56)[WI3OR6]

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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 0.3 (according to Section 4(2), 3 of the examination regulation).

## Conditions
None.

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

## Content
Markov Chains, Poisson Processes, Markov Chains in Continuous Time, Queuing Systems

## Media
Blackboard, Slides, Flash Animations, Simulation Software

## Literature
Bremaud, P. (1999): Markov Chains, Gibbs Fields, Monte Carlo Simulation, and Queues; Springer
Course: Material Flows in Industrial Production [25960]

**Coordinators:** Michael Hiete
**Part of the modules:** Industrial Production I (p. 29) [WI3BWLIIIP]

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**Learning Control / Examinations**
The examination will be in form of a written exam acc. to §4(2), 1 ER. Exams are offered in every semester and can be re-examined at every ordinary examination date.

**Conditions**
Successful completion of module “Betriebswirtschaftslehre” [WI1BWL].

**Learning Outcomes**
Students shall be aware of issues concerning the material and energy flow in an economy and shall apply strategies to solve 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

**Remarks**
This lecture is called “Stoffstromorientierte Produktionswirtschaft” since the winter term 2010/2011.
Course: Mass and Energy Balances for Reacting Systems [22130]

**Coordinators:** Andrea Kruse, Peter Pfeifer

**Part of the modules:** Mass and Energy Balances for Reacting Systems (p. 21)

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**Learning Control / Examinations**
The assessment consists of a written exam (according §4(2), 1 of the examination regulation).
Permitted utilities: calculator, script, its own formulary and own notes.

**Conditions**
None.

**Learning Outcomes**
The student

- knows and understands energy and mass balances and the analysis of balance envelopes,
- can apply energy and mass balances on selected systems and processes,
- knows the problems, methods and processes of process engineering.

**Content**
- Aims and approaches
- Mass balance
- Water
- Nitrogen and ammonia
- Energy balance
- Natural gas
- Carbon dioxide

**Media**
Lecture script (available at KIT-Studierendenportal: https://studium.kit.edu and in Studentenwerk)
Exercises and accompanying lecture material (available at KIT-Studierendenportal: https://studium.kit.edu)
Course: Strategic Human Resource Management [25930]

Coordinators: Christine Harbring
Part of the modules: Human Resource Management (p. 45)[WI3BWLIA1P1]

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Learning Control / Examinations
The examination will be in form of a written exam acc. to §4(2), 1 ER

Conditions
None.

Learning Outcomes
Content
Course: Structural and Functional Ceramics [21775]

**Coordinators:** M. J. Hoffmann

**Part of the modules:** Emphasis Material Science (p. 69) [WI3INGMB9]

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**Learning Control / Examinations**
The assessment consists of an oral exam (20-30 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation). The re-examination is offered upon agreement.

**Conditions**
Basic knowledge of experimental physics and chemistry is recommended. It is recommended to attend the course *Introduction in Ceramics* [21755].

**Learning Outcomes**
Based on concrete examples the importance of microstructural constitution on mechanical, thermal, chemical and electrical properties is shown.

**Content**
The lecture gives an overview on structure and properties of technical relevant structural and functional ceramic materials and parts. The following groups of materials are presented: Silicon Nitride, Silicon Carbide, Alumina, Zirconia, Ferroelectric ceramics.

**Literature**
*Elective literature:*
H. Salmang, H. Scholze, „Keramik“, Springer-Verlag;
Kingery, Bowen, Uhlmann, „Introduction To Ceramics“, Wiley-Verlag
## Course: Systematic Selection of Materials [21576]

### Coordinators:
- Wanner

### Part of the modules:
- Emphasis Material Science (p. 69) [WI3INGMB9]

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### Learning Control / Examinations
The assessment consists of an oral exam (20-30 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation). The re-examination is offered upon agreement.

### Conditions
- The course *Material Science I* [21760] has to be completed beforehand.
- Basic knowledge of natural science and knowledge of the content *Material Science II* [21782] is recommended.

### Learning Outcomes
The students are able to select the best material for a given application. They are proficient in selecting materials on base of performance indices and materials selection charts. They can identify conflicting objectives and find sound compromises. They are aware of the potential and the limits of hybrid material concepts (composites, bimaterials, foams) and can determine whether following such a concept yields a useful benefit.

### Content
Important aspects and criteria of materials selection are examined and guidelines for a systematic approach to materials selection are developed. The following topics are covered: the status of materials selection in mechanical design and product development; the most important classes of materials and their property profiles;

### Literature
**Elective literature:**
Course: System Dynamics and Control Engineering [23155]

Coordinators: Sören Hohmann
Part of the modules: Control Engineering (p. 72)[WI3INGETIT2]

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Learning Control / Examinations
The assessment consists of a written exam (120 min) taking place at the beginn of the recess period (according to §4 (2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
Knowledge of integral transformations is assumed. Therefore it is recommeded to attend the course Complex Analysis and Integral Transformations beforehand or to acquire a good knowledge through private study (see literature), but a proof of performance is not necessary.

Learning Outcomes
As the system dynamics and control engineering fundamental lecture, the course familiars with the basic elements, structures and the behavior of dynamic systems. It gives them insight into the problems of control and intuition about methods available to solve such problems. Both frequency response and state space methods for anlisys and design of dynamic systems are considered.

Content
- **Introduction**
  open-loop and closed-loop control systems; basic concepts and definitions, structure of automation systems, control system design, examples of control systems
- **Elements of Control Circuits - Classification and Description**
  properties of dynamic systems, linear approximation about an operation point, information flow between transfer elements, block diagram models and transformations, behavior of elementary control circuit elements, polar plots (Nyquist diagrams), Bode diagrams
- **Frequency Response Analysis of Continuous Linear Control Circuits**
  control system characteristics, stability, stability criterions, steady-state behavior of control circuits, sensitivity to parameter variations
- **Frequency Response Design**
  system performance specification, classification of controller design methods, typical linear controllers, frequency response design using the Bode diagram, controller design according to Ziegler - Nichols, absolute value optimum design, feed forward control, secondary control, cascaded control, root locus analysis and design
- **State Space Representation of Continuous Systems**
  state space equations, controllability and observability, solution of state equations, Linear State Variable Feedback Systems, pole placement design, linear optimal control (Riccati-controller)
- **State Observers**
  full order observer, control through observers, separation principle

Literature
- Föllinger, Otto: Regelungstechnik, Hüthig-Verlag, 8.Auflage, 1994
- Lunze, Jan: Regelungstechnik 1, Springer-Verlag, 1996

Elective literature:
Will be announced in the lecture.

Remarks
The cycle for the lecture System Dynamics and Control Engineering [23155] has been changed from winterterm into sum-merterm. The reduced form of the lecture 3+1 (6 LP) will be offered in summerterm first time. Therefore the content could be changed.
Course: Tactical and Operational Supply Chain Management [25488]

**Coordinators:** Stefan Nickel

**Part of the modules:** Applications of Operations Research (p. 55)[WI3OR5], Stochastic Methods and Simulation (p. 57)[WI3OR7], Supply Chain Management (p. 38)[WI3BWLISM2]

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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.

**Conditions**
Successful completion of the module *Introduction to Operations Research* [WI1OR].

**Learning Outcomes**
The main goal of the lecture is the presentation of fundamental techniques from procurement and distribution logistics. A further aspect is set on methods from inventory management and lot sizing. Students acquire the ability to efficiently utilize quantitative models from transportation planning (long-distance and distribution planning), inventory management and lot sizing in production. The introduced methods will be discussed in more detail and illustrated with case-studies in the accompanying exercises.

**Content**
The planning of material transport is an essential element of Supply Chain Management. By linking transport connections across different facilities, the material source (production plant) is connected with the material sink (customer). The general supply task can be formulated as follows (cf. Gudehus): For given material flows or shipments, choose the optimal (in terms of minimal costs) distribution and transportation chain from the set of possible logistics chains, which asserts the compliance of delivery times and further constraints. The main goal of the inventory management is the optimal determination of order quantities in terms of minimization of fixed and variable costs subject to resource constraints, supply availability and service level requirements. Similarly, the problem of lot sizing in production considers the determination of the optimal amount of products to be produced in a time slot.

The course includes an introduction to basic terms and definitions of Supply Chain Management and a presentation of fundamental quantitative planning models for distribution, vehicle routing, inventory management and lot sizing. Furthermore, case studies from practice will be discussed in detail.

**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 offered in every winter term.
The planned lectures and courses for the next three years are announced online.
Course: [2117081]

Coordinators: Martin Mittwollen
Part of the modules: Introduction to Technical Logistics (p. 58)[WI3INGMB13]

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

Conditions
None.

Learning Outcomes
After successfully finishing this course, the student is able to work with fundamental questions of conveyor technology. He knows crucial parts and cause and effects of machines and processes of technical logistics.

Content
Introduction
  • historical overview
  • application examples
  • structure
processes and machines of technical logistics
  • model of causes and effects inside technical logistics
  • systemization of conveyors
transported materials
  • bulk material
  • Piece goods
  • Transporting support means.
Drive devices
  • Energy transmission
  • Transfer elements
  • Model of lifting and driving devices
  • Characteristics of loads and drives
  • Drive control
  • Selection and design of electric drives
Closed loop control

Media
Blackboard, LCD projector, work sheets

Literature

Elective literature:
  • M. Scheffler: Grundlagen der Fördertechnik – Elemente und Triebwerke (und ähnliche)
  • Dubbel: Taschenbuch für den Maschinenbau, Kapitel: Fördertechnik
  • R. Fischer: Elektrische Maschinen

Remarks
The course is changed in content against the former Technische Logistik I [2117501].
Course: Technical Logistics I, basics and systems [2117082]

Coordinators: Martin Mittwollen
Part of the modules: Introduction to Technical Logistics (p. 58)[WI3INGMB13]

ECTS Credits
6 (ggf. kontextabhängig)

Hours per week
3/1

Term
Winter term

Instruction language
de

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

Conditions
None.

Learning Outcomes
After successfully finishing this course, the student is able to work with fundamental questions of conveyor technology. He knows crucial parts and cause and effects of machines and processes of technical logistics. Key elements become embedded in material flow systems.

Content
Introduction
  • historical overview
  • application examples
  • structure

processes and machines of technical logistics
  • model of causes and effects inside technical logistics
  • systemization of conveyors

transported materials
  • bulk material
  • Piece goods
  • Transporting support means.

Drive devices
  • Energy transmission
  • Transfer elements
  • Model of lifting and driving devices
  • Characteristics of loads and drives
  • Drive control
  • Selction and design of electric drives
  • Closed loop control

Material flow systems
  • Key elements of material flow systems
  • Identification
  • Performance
  • Storage racks

Media
Blackboard, LCD projector, work sheets

Literature
Elective literature:
  • M. Scheffler: Grundlagen der Förderotechnik – Elemente und Triebwerke (und ähnliche)
  • Dubbel: Taschenbuch für den Maschinenbau, Kapitel: Fördertechnik
  • R. Fischer: Elektrische Maschinen
• H. Martin: Transport- und Lagerlogistik
• R. Koether: Technische Logistik
• Arnold, Furmans: Materialfluss in Logistiksystemen (from 6th edition)

Remarks
The course is changed in content against the former Technische Logistik I [2117501].
Course: Engineering Mechanics I [21208]

Coordinators: Carsten Proppe
Part of the modules: Engineering Mechanics (p. 23)[WI1ING3]

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Learning Control / Examinations
The assessment consists of a written examination taking place in the recess period (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.
Permitted utilities: non-programmable calculator, literature

Conditions
None.

Learning Outcomes
The student
- knows and understands the basic elements of statics,
- is able to solve basic calculations in statics independently.

Content
Statics: force · moment · general equilibrium conditions · center of mass · inner force in structure · plane frameworks · theory of adhesion
Course: Engineering Mechanics II [21226]

**Coordinators:** Carsten Proppe

**Part of the modules:** Specialization in Engineering Science (p. 68) [WI3INGMB8]

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**Learning Control / Examinations**

The assessment consists of a written examination (75 min) taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination is offered every semester. Re-examinations are offered at every ordinary examination date.

Permitted utilities: non-programmable calculator, literature.

**Conditions**

The module *Technical Mechanics I* [WI1ING3] has to be completed beforehand.

**Learning Outcomes**

**Content**
Course: Tectonic Stress in Petroleum Rock Mechanics [04013]

**Coordinators:** Müller

**Part of the modules:** Understanding and Prediction of Disasters I (p. 76)[WI3INGINTER1], Understanding and Prediction of Disasters II (p. 77)[WI3INGINTER2], Understanding and Prediction of Disasters III (p. 78)[WI3INGINTER5]

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**Learning Control / Examinations**

**Conditions**
None.

**Learning Outcomes**

**Content**

**Remarks**
Block course.
For further information see http://www-gpi.physik.uni-karlsruhe.de/
**Course: Umformtechnik [2150681]**

**Coordinators:** Herlan

**Part of the modules:** Specialization in Production Engineering (p. 85) [WI3INGMB22]

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**Learning Control / Examinations**

The assessment consists of an oral exam (20 min) taking place during the recess period (according to Section 4(2), 1 or 2) of the examination regulation.

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

**Conditions**

None.

**Learning Outcomes**

**Content**
Course: Management and Strategy [25900]

**Coordinators:** Hagen Lindstädt

**Part of the modules:** Strategy and Organization (p. 28)

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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.

**Content**
- Corporate management principles
- Strategic management principles
- Strategic analysis
- Competitive strategy: modelling and selection on a divisional level
- Strategies for oligopolies and networks: anticipation of dependencies
- Corporate strategy: modelling and evaluation on a corporate level
- Strategy implementation

**Media**
Slides.

**Literature**

The relevant excerpts and additional sources are made known during the course.
Course: Corporate Planning and Operations Research [25158]

Coordinators: Wolfgang Gaul
Part of the modules: Specialization in Customer Relationship Management (p. 41) [WI3BWLISM5]

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Learning Control / Examinations
See module description.

Conditions
Basics of operations research are assumed.

Learning Outcomes

Content

Literature
Will be announced in the lecture. Further literature references are announced in the script.
Course: Combustion Engines A [21101]

Coordinators: Spicher
Part of the modules: Engine Development (p. 64)[WI3INGMB17], Combustion Engines (p. 63)[WI3INGMB16], Combustion Engines I (p. 81)[WI3INGMB18]

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Learning Control / Examinations
The assessment consists of a written exam (120 min) according to §4 (2), 1 of the examination regulation. The grade of the exam is included in the overall grade of the module with a weighting factor of 6.

Conditions
It is recommended to have basic knowledge of thermodynamics.

Learning Outcomes
Content
Course: Combustion Engines B [21135]

Coordinators: Spicher

Part of the modules: Engine Development (p. 64)[WI3INGMB17], Combustion Engines (p. 63)[WI3INGMB16], Combustion Engines II (p. 82)[WI3INGMB19]

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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 grade of the exam is included in the overall grade of the module with a weighting factor of 5.

Conditions
The course Combustion Engines A [21101] has to be completed beforehand. Knowledge of thermodynamics is recommended.

Learning Outcomes

Content
# Course: Compensation and Motivation [25969]

**Coordinators:** Christine Harbring  
**Part of the modules:** Human Resource Management (p. 45)[WI3BWIAP1]

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**Learning Control / Examinations**  
The examination will be in form of a written exam acc. to §4(2), 1 ER

**Conditions**  
None.

**Learning Outcomes**
**Content**
Course: Basics in Transport Planning and Traffic Engineering [19027]

Coordinators: Peter Vortisch, Bastian Chlond
Part of the modules: Fundamentals of Spatial and Infrastructural Development (p. 73)[WI3INGBGU1]

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Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes
Provision of first insights into methodologies and techniques in the fields of transport planning and traffic engineering.

Content
The course is forming the fundamentals in the field as well the necessary technical knowledge. It is separated into two parts.

In the transport planning part the following basics are considered:
- content of the transport field
- definitions and terminology
- spatial representation
- transport relations in survey areas
- representation of spatial relationships in matrices
- information sources / data for transport demand modelling
- aggregated planning models (assignment)

In the second part the first basics of traffic engineering are considered:
- trajectories of vehicles on sections
- the fundamental diagram
- capacities and traffic loads on roads
- capacity considerations of unsignalized intersections
- fundamentals of traffic signaling and control
Course: Failure of Structural Materials: Fatigue and Creep [21715]

Coordinators: Gruber
Part of the modules: Emphasis Material Science (p. 69)[W13INGMB9]

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Learning Control / Examinations
The assessment consists of an oral exam (30 min) according to Section 4(2), 2 of the examination regulation.

Conditions
None.

Learning Outcomes

- Mechanical Understanding of Load vs Material Strength
- Empirical Material Behavior
- Physical Understanding of Failure Phenomena
- Statistical Description of Failure
- Material Selection and Understanding Alloying Effects

Content

1 Fatigue
1.1 Introduction
1.2 Statistical Aspects
1.3 Lifetime
1.4 Fatigue Mechanisms
1.5 Material Selection
1.6 Thermomechanical Loading
1.7 Notches and Shape Optimization
1.8 Case Study: ICE-Desaster

2 Creep
2.1 Introduction
2.2 High Temperature Plasticity
2.3 Phänomenological Description of Creep
2.4 Creep Mechanisms
2.5 Alloying Effects

Literature

Elective literature:

3. Bruchvorgänge in metallischen Werkstoffen, D. Aurich (Werkstofftechnische Verlagsgesellschaft Karlsruhe), relativ einfach aber dennoch umfassender Überblick für metallische Werkstoffe
Course: Failure of Structural Materials: Deformation and Fracture [21711]

Coordinators: Weygand
Part of the modules: Emphasis Material Science (p. 69)[WI3INGMB9]

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Learning Control / Examinations
The assessment consists of an oral exa (30 min) according to Section 4(2), 2 of the examination regulation.

Conditions
None.

Learning Outcomes

- Mechanical Understanding of Load vs Material Strength
- Empirical Material Behavior
- Physical Understanding of Failure Phenomena

Content
1. Introduction
2. Linear elasticity
3. Classification of stresses
4. Failure due to plasticity
   * Tensile test
   * Dislocations
   * Hardening mechanisms
   * Guidelines for dimensioning
5. Composite materials
6. Fracture mechanics
6.1 Hypotheses for failure
6.2 Linear elastic fracture mechanics
6.3 Crack resistance
6.4 Experimental measurement of fracture toughness
6.5 Defect measurement
6.6 Crack propagation
6.7 Application of fracture mechanics
6.8 Atomistics of fracture

Literature

Elective literature:
3. Bruchvorgänge in metallischen Werkstoffen, D. Aurich (Werkstofftechnische Verlagsgesellschaft Karlsruhe), relativ einfach aber dennoch umfassender Überblick für metallische Werkstoffe
**Course: Verzahntechnik [2149655]**

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**Learning Control / Examinations**

The assessment consists of an oral exam (30 min) taking place during the recess period (according to Section 4(2), 1 or 2) of the examination regulation.

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

**Conditions**

None.

**Learning Outcomes**

The student

- has the knowledge about the presented content,
- understands the within the lecture taught theory of gears and gear cutting as well as the taught basics and characteristics of the covered gear cutting processes,
- is able to transfer the within the lecture learned knowledge about the basics of the gearing geometry and the manufacturing of gears on new problematic issues and
- is able to analyze and to evaluate the applicability of the taught processes and techniques for various problems.

**Content**

This lecture is focused on the demands of the modern manufacturing process of gears on the basis of the gearing geometry and the theory of gears and transmission types. For this purpose the processes for manufacturing various gearing types are covered, which are state of the technology in current operational practice. The subdivision of the processes is made in soft and hard machining, in each case in cutting and non-cutting methods. For the comprehensive understanding of the taught processes initially the description of the kinematics, the machine technology, the tools, the fields of application and the speciality as well as the current trends are made. Subsequent for the evaluation and classification in the fields of application and the capability of the processes finally the sequence of manufacturing of gears in mass production and the manufacturing errors are covered in the lecture.

The content of the lecture will be rounded off by demonstrative example parts and the possibility of the visit of real manufacturing environments within two short excursions to gear manufacturing companies.

Inhaltliche Schwerpunkte der Vorlesung:

1. History of gears
2. Basics of gearing geometry
3. Overview of processes for soft machining of gears (subdivided in cutting and non-cutting, description of particular kinematics, machine tools, tools and trends)
4. Overview of processes for hard machining of gears (subdivided in geometrically defined and geometrically undefined cutting edge, description of the particular kinematics, machine tools, tools and trends)
5. Processes for bevel gear manufacturing
6. Manufacturing errors of gears
7. Sequence of manufacturing in mass production
Course: Economics I: Microeconomics [25012]

**Coordinators:** Siegfried Berninghaus  
**Part of the modules:** Economics (p. 18)[WI1VWL]

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**Learning Control / Examinations**

The assessment consists of a written exam (120 min) following §4, Abs. 2, 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. Particularly, 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 but 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 possibly 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,
- practicing to solve the home work in due time,
- 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 possibly to present own problem solutions,

**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) as well are discussed. In the final part of the course basics of imperfect competition (oligopolistic markets) and of game theory are presented.

**Media**

downloadable from IT server

**Literature**

- Pindyck, Robert S./Rubinfeld, Daniel L., Mikroökonomie, 6. Aufl., Pearson. München, 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 II: Macroeconomics [25014]

Coordinators: Berthold Wigger
Part of the modules: Economics (p. 18) [WI1VWL]

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

Conditions
None.

Learning Outcomes

Content
The lecture deals with the following topics:
Chapter 1: Macroeconomic targets
Chapter 2: Gross domestic product: a classical model
Chapter 3: Economic growth
Chapter 4: Money and inflation
Chapter 5: The open economy
Chapter 6: IS-LM model and business cycles
Chapter 7: Mundell-Fleming Model
Chapter 8: Macroeconomic equilibrium
Chapter 9: Unemployment

Literature
Elective literature:
Course: Economics III: Introduction in Econometrics [25016]

Coordinators: Markus Höchstötter
Part of the modules: Statistical Applications of Financial Risk Management (p. 52) [WI3STAT]

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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: Theory of Economic Growth [25543]

**Coordinators:** Marten Hillebrand

**Part of the modules:** Macroeconomic Theory (p. 50)[WI3VWL8]

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**Learning Control / Examinations**

According to the attendance the assessment consists of a written or an oral exam at the beginning of the recess period (according to Section 4 (2), 1 or 2 of the examination regulation.

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

**Conditions**

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

According the focus of the course quantitativ-mathematical modelling should be in participant’s interest.

**Learning Outcomes**

**Content**
Course: Elective Foreign Languages [HoC3]

Coordinators: House of Competence
Part of the modules: Seminar Module (p. 91) [WI3SEM]

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Learning Control / Examinations

Conditions
Depending on the choice of the language and the level prior knowledge is assumed.
Basic level English language courses can only be attended if English language skills were not acquired in school before.

Learning Outcomes

Content
Course: Elective “Workshops for Competence and Creativity” [HoC2]

Coordinators: House of Competence
Part of the modules: Seminar Module (p. 91) [WI3SEM]

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Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content
Course: Elective “Culture - Policy - Science - Technology” [HoC1]

**Coordinators:** House of Competence

**Part of the modules:** Seminar Module (p. 91)[WI3SEM]

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**Learning Control / Examinations**

**Conditions**

None.

**Learning Outcomes**

**Content**

**Literature**

Will be announced in the respective course.
Course: Elective “Personal Fitness & Emotional Competence” [HoC5]

Coordinators: House of Competence
Part of the modules: Seminar Module (p. 91) [WISSEM]

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Learning Control / Examinations
Conditions
None.

Learning Outcomes

Content

Literature
Will be announced in the respective course.
Course: Elective “Tutor Programmes” [HoC4]

**Coordinators:** House of Competence

**Part of the modules:** Seminar Module (p. 91) [WISEM]

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**Learning Control / Examinations**

**Conditions**
The participation in this program requires that the student has been or will be a tutor for at least two semesters.
The application for this program takes place via the dean's office and in consultation with the corresponding chair.

**Learning Outcomes**

**Content**
Course: Hydraulic Engineering and Water Resource Management I [19055]

Coordinators: Franz Nestmann

Part of the modules: Understanding and Prediction of Disasters II (p. 77)[W3INGINTER2], Understanding and Prediction of Disasters III (p. 78)[W3INGINTER5], Understanding and Prediction of Disasters I (p. 76)[W3INGINTER1]

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Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Remarks
For further information, see http://www.iwk.uni-karlsruhe.de/kurse_grundfachstudium.php
Course: Materials of Lightweight Construction [21574]

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Learning Control / Examinations
The assessment consists of an oral exam (20-30 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation). The re-examination is offered upon agreement.

Conditions
Successful completion of the course Material Science I [21760].
Basic knowledge of natural science and knowledge of the content Material Science II [21782] is recommended.

Learning Outcomes
The students know different lightweight materials, their composition, properties and fields of application and can apply this knowledge effectively and precisely. They master the hardening mechanisms of lightweight materials and can transfer this knowledge to applied problems. The students have a basic understanding of basic mechanical models of composites - mainly polymer matrix composites - and can depict differences in the mechanical properties depending on composition and structure.

Content
- Introduction
- Constructive, production-orientated and material aspects of lightweight construction
- Aluminium-based alloys
- Aluminium wrought alloys
- Aluminium cast alloys
- Magnesium-based alloys
- Magnesium wrought alloys
- Magnesium cast alloys
- Titanium-based alloys
- Titanium wrought alloys
- Titanium cast alloys
- High-strength steels
- High-strength structural steels
- Heat-treatable and hardenable steels
- Composites - mainly PMC
- Matrices
- Reinforcements

Media
Lecture notes are handed out during the lecture.

Literature
Elective literature:
Course: Material Science I [21760]

**Coordinators:** M. J. Hoffmann  
**Part of the modules:** Material Science (p. 22) [WI1ING2]

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**Learning Control / Examinations**

The assessment consists of a written examination (150 min) taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination takes place every semester. Re-examinations are offered at every ordinary examination date. The examination at the end of the summer term is carried out by a written or oral exam.

**Conditions**

None.

**Learning Outcomes**

The student

- knows and understands the correlation between atomic structure, microstructure and related macroscopic properties (e.g. mechanical or electrical behaviour)
- has basic knowledge on materials development and characterization

**Content**

- Atomic structure and interatomic bonding
- Structure of crystalline solids
- Imperfections in solids
- Mechanical behaviour
- Physical properties
- Solidification
- Thermodynamics of heterogeneous systems
- Phase diagrams
- Ferrous alloys

**Literature**

**Elective literature:**

Course: Material Science II for Business Engineers [21782]

**Coordinators:** M. J. Hoffmann

**Part of the modules:** Specialization in Engineering Science (p. 68)[WI3INGMB8]

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**Learning Control / Examinations**
The assessment consists of a written examination (150 min) taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination takes place every semester. Re-examinations are offered at every ordinary examination date. The examination at the end of the winter term is carried out by a written or oral exam.

**Conditions**
The module *Material Science* [WI1ING2] has to be completed beforehand.

**Learning Outcomes**

**Content**

**Literature**

**Elective literature:**

Course: Material Science and Engineering III [21553]

Coordinators: Wanner
Part of the modules: Emphasis Material Science (p. 69)[W3INGMB9]

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Learning Control / Examinations
The assessment consists of an oral exam (30-40 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation). The re-examination is offered upon agreement.

Conditions
The course Material Science I [21760] is a prerequisite. It is recommended to have basic knowledge of natural science and knowledge of the content of the course Material Science II [21782].

Learning Outcomes
The students are familiar with the thermodynamic foundations of phase transformations, the kinetics of phase transformations in the solid states (nucleation and growth phenomena), the mechanisms of microstructure formation and microstructure-property relationships. They can assess the effects of heat treatmens and of alloying on the microstructure and the properties of iron-based materials (steels in particular). They can select steels for structural applications in mechanical engineering and subject them to appropriate heat treatmens.

Content
Properties of pure iron; thermodynamic foundations of single-component and of binary systems; nucleation and growth; diffusion processes in crystalline iron; the phase diagram Fe-Fe3C; effects of alloying on Fe-C-alloys; nonequilibrium microstructures; multicomponent iron-based alloys; heat treatment technology; hardenability and hardenability tests.

Media
Lecture notes and working material will be released within the lecture.

Literature
Elective literature:
1. VDEh: Werkstoffkunde Stahl, Bd. 1: Grundlagen, Springer-Verlag, 1984
## Course: Machine Tools and Industrial Handling I [2149900]

### Coordinators:
Munzinger

### Part of the modules:
- Production Engineering II (p. 66)[WI3INGMB4]
- Specialization in Production Engineering (p. 85)[WI3INGMB22]
- Production Engineering I (p. 65)[WI3INGMB10]
- Production Engineering III (p. 67)[WI3INGMB7]

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### Learning Control / Examinations
**Conditions**
None.

### Learning Outcomes
**Content**
## Course: Machine Tools and Industrial Handling II [2149901]

**Coordinators:** Munzinger

**Part of the modules:** Production Engineering II (p. 66)[WI3INGMB4], Production Engineering I (p. 65)[WI3INGMB10], Production Engineering III (p. 67)[WI3INGMB7]

<table>
<thead>
<tr>
<th>ECTS Credits</th>
<th>Hours per week</th>
<th>Term</th>
<th>Instruction language</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,5</td>
<td>2/1</td>
<td>Winter term</td>
<td>de</td>
</tr>
</tbody>
</table>

### Learning Control / Examinations

**Conditions**
None.

### Learning Outcomes

**Content**

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**Business Engineering (B.Sc.)**
Module Handbook, Date: 23.09.2010
Course: Competition in Networks [26240]

Coordinators: Kay Mitusch

Part of the modules: Applied Game Theory (p. 46)[WI3VWL1], Microeconomic Theory (p. 49)[WI3VWL6], Specialization in Customer Relationship Management (p. 41)[WI3BWLISM5]

<table>
<thead>
<tr>
<th>ECTS Credits</th>
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<th>Term</th>
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</tr>
</thead>
<tbody>
<tr>
<td>4,5</td>
<td>2/1</td>
<td>Winter</td>
<td>de</td>
</tr>
</tbody>
</table>

Learning Control / Examinations

Conditions
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 lecture provides the students with the basic economic understanding of network industries like telecom, utilities, IT and transport sectors. Students are prepared for a possible job in the network industries. The student should get a vivid idea of the special characteristics of network industries concerning planning, competition, competitive distortion and state intervention. He should 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 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.
Course: Seminar Economic Theory [SemWIOR2]

Coordinators: Clemens Puppe
Part of the modules: Seminar Module (p. 91)[WI3SEM]

<table>
<thead>
<tr>
<th>ECTS Credits</th>
<th>Hours per week</th>
<th>Term</th>
<th>Instruction language</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2</td>
<td>Winter / Summer Term</td>
<td>de</td>
</tr>
</tbody>
</table>

Learning Control / Examinations

Conditions
See corresponding module information.
At least one of the courses Game Theory I [25525] and Welfare Economics [25517] should have been attended beforehand.

Learning Outcomes

Content

Literature
Will be announced at the end of the recess period.
Course: Knowledge Management [25740]

Coordinators: Rudi Studer
Part of the modules: Emphasis Informatics (p. 53)[WI3INFO1], Electives in Informatic (p. 54)[WI3INFO2]

<table>
<thead>
<tr>
<th>ECTS Credits</th>
<th>Hours per week</th>
<th>Term</th>
<th>Instruction language</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>2/1</td>
<td>Winter term</td>
<td>de</td>
</tr>
</tbody>
</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
Making students sensitive to the problems of corporate knowledge management, knowledge about the central dimensions of influence as well as of relevant technologies for supporting knowledge management.

Content
In modern companies, knowledge is increasingly important for fulfilling central tasks (such as continuous business process improvement, increasing innovation, increasing customer satisfaction, strategic planning). Therefore, knowledge management has become a critical success factor.

The lecture covers different types of knowledge that play a role in knowledge management, the corresponding knowledge processes (generation, capture, access and usage of knowledge) as well as methodologies for the introduction of knowledge management solutions.

The lecture will emphasize computer-based support for knowledge management, such as:

- Ontology-based Knowledge Management
- Communities of Practice, Collaboration Tools, Social Software
- Business-process Oriented Knowledge Management
- Personal Knowledge Management
- Case Based Reasoning (CBR)

Media
Slides and scientific publications as reading material.

Literature
- C. Beierle, G. Kern-Isberner: Methoden wissensbasierter Systeme, Vieweg, Braunschweig/Wiesbaden, 2. überarb. Auflage, 2005

Elective literature:
Course: Welfare Economics [25517]

**Coordinators:** Clemens Puppe
**Part of the modules:** Microeconomic Theory (p. 49)[W1VWL6]

<table>
<thead>
<tr>
<th>ECTS Credits</th>
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<th>Instruction language</th>
</tr>
</thead>
<tbody>
<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.
The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

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

**Learning Outcomes**

**Content**

**Literature**

**Elective literature:**
Neubekanntmachung der Studien- und Prüfungsordnung der Universität Karlsruhe (TH) für den Bachelorstudiengang Wirtschaftsingenieurwesen

in der Fassung vom 15. August 2008


Der Rektor hat seine Zustimmung am 06. März 2007 erteilt.

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.

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I. Allgemeine Bestimmungen

§ 1 Geltungsbereich, Ziele

(1) Diese Bachelorprüfungsordnung regelt Studienablauf, Prüfungen und den Abschluss des Studiums im Bachelorstudiengang Wirtschaftsingenieurwesen an der Universität Karlsruhe (TH).

(2) Im Bachelorstudium sollen die wissenschaftlichen Grundlagen und die Methodenkompetenz der Fachwissenschaften vermittelt werden. Ziel des Studiums ist die Fähigkeit, das erworben Wissen berufsfeldbezogen anzuwenden sowie einen konsekutiven Masterstudiengang erfolgreich absolvieren zu können.

§ 2 Akademischer Grad

Aufgrund der bestandenen Bachelorprüfung wird der akademische Grad „Bachelor of Science“ (abgekürzt: „B.Sc.”) für den Bachelorstudiengang Wirtschaftsingenieurwesen verliehen.

§ 3 Regelstudienzeit, Studienaufbau, Leistungspunkte

(1) Die Regelstudienzeit beträgt sechs Semester. Sie umfasst ein Betriebspraktikum, Prüfungen und die Bachelorarbeit.

(2) Die im Studium zu absolvierenden Lehrinhalte sind auf Fächer verteilt. Die Fächer sind in Module gegliedert, die jeweils aus einer Lehrveranstaltung oder mehreren thematisch und zeitlich aufeinander bezogenen Lehrveranstaltungen bestehen. Studienplan oder Modulhandbuch beschreiben 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 Leistungspunkte sind in der Regel gleichmäßig auf die Semester zu verteilen.

(6) Lehrveranstaltungen/Prüfungen können auch in englischer Sprache angeboten/abgenommen werden.

§ 4 Aufbau der Prüfungen


(2) Erfolgskontrollen sind:

   1. schriftliche Prüfungen,
   2. mündliche Prüfungen,
   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 Modulhandbuch ausgewiesen sind.
In den Fachprüfungen (nach § 17 Absatz 2 und Absatz 3 Nr. 1 bis 7) sind mindestens 50 vom Hundert einer Modulprüfung in Form von schriftlichen oder mündlichen Prüfungen (Absatz 2 Nr. 1 und 2) abzulegen, die restliche Prüfung erfolgt durch Erfolgskontrollen anderer Art (Absatz 2 Nr. 3).

§ 5 Anmeldung und Zulassung zu den Prüfungen

(1) Die Zulassung zu den Prüfungen nach § 4 Absatz 2 Nr. 1 und 2 sowie zur Bachelorarbeit erfolgt im Studienbüro.

Um zu Prüfungen in einem Modul zugelassen zu werden, muss beim Studienbüro eine bindende Erklärung über die Wahl des betreffenden Moduls und dessen Zuordnung zu einem Fach, wenn diese Wahlmöglichkeit besteht, abgegeben werden.

(2) Die Zulassung darf nur abgelehnt werden, wenn

1. der Studierende in einem mit Wirtschaftsingenieurwesen 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 Erfolgskontrollen (§ 4 Absatz 2 Nr. 1 bis 3) eines Moduls wird im Studienplan oder Modulhandbuch in Bezug auf die Lehrinhalte der betreffenden Lehrveranstaltungen und die Lehrziele des Moduls festgelegt. Die Art der Erfolgskontrollen, ihre Häufigkeit, Reihenfolge und Gewichtung, die Grundsätze zur Bildung der Modulteilprüfungsnoten und der Modulnote sowie Prüfer müssen mindestens sechs Wochen vor Semesterbeginn bekannt gegeben werden. Im Einvernehmen von Prüfer und Studierendem kann die Art der Erfolgskontrolle auch nachträglich geändert werden. Dabei ist jedoch § 4 Absatz 3 zu berücksichtigen.

(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.

Bei Einvernehmen zwischen Prüfer und Kandidat kann der Prüfungsausschuss in begründeten Ausnahmefällen auch kurzfristig die Änderung der Prüfungsform genehmigen.

Wird die Wiederholungsprüfung einer schriftlichen Prüfung in mündlicher Form abgelegt, entfällt die mündliche Nachprüfung nach § 8 Absatz 2.

(4) Macht ein Studierender glaubhaft, dass er wegen länger andauernder oder ständiger körperlicher Behinderung nicht in der Lage ist, die Erfolgskontrollen ganz oder teilweise in der vorgeschriebenen Form abzulegen, entscheidet der Prüfungsausschuss über eine alternative Form der Erfolgskontrollen.

(5) Bei Lehrveranstaltungen in englischer Sprache werden die entsprechenden Erfolgskontrollen in der Regel in englischer Sprache abgenommen.

(7) Mündliche Prüfungen (§ 4 Absatz 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 Studierendem.


(10) Für Erfolgskontrollen anderer Art sind angemessene Bearbeitungsfristen einzuräumen und Abgabetermine festzulegen. Dabei ist durch die Art der Aufgabenstellung und durch entsprechende Dokumentation sicherzustellen, dass die erbrachte Studienleistung dem Studierenden zurechenbar ist.

(11) Schriftliche Arbeiten im Rahmen einer Erfolgskontrolle anderer Art haben dabei die folgende Erklärung zu tragen: „Ich versichere wahrheitsgemäß, die Arbeit selbständig 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.

(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 und die Modulteilprüfungen sind zur differenzierten Bewertung nur folgende Noten zugelassen:

| 1 | 1.0, 1.3 | sehr gut |
| 2 | 1.7, 2.0, 2.3 | gut |
| 3 | 2.7, 3.0, 3.3 | befriedigend |
| 4 | 3.7, 4.0 | ausreichend |
| 5 | 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 die Benotung „bestanden“ (passed) oder „nicht bestanden“ (failed) vergeben werden.

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

(5) Jedes Modul, jede Lehrveranstaltung und jede Erfolgskontrolle darf jeweils nur einmal ange- rechnet 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 oder Modulhandbuch festgelegt.

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


(9) Eine Fachprüfung ist bestanden, wenn die für das Fach erforderliche Anzahl von Leistungspunkten über die im Studienplan oder Modulhandbuch definierten Modulprüfungen nachgewiesen wird.

Die Noten der Module eines Faches gehen in die Fachnote mit einem Gewicht proportional zu den ausgewiesenen Leistungspunkten der Module ein.

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

(11) Innerhalb der Regelstudienzeit, einschließlich der Urlaubssemester für das Studium an einer ausländischen Hochschule (Regelprüfungszeit), können in einem Fach auch mehr Leistungspunkte erworben werden als für das Bestehen der Fachprüfung erforderlich sind. In diesem Fall werden bei der Festlegung der Fachnote nur die Modulnoten berücksichtigt, die unter Abdeckung der erforderlichen Leistungspunkte die beste Fachnote ergeben.

Die in diesem Sinne für eine Fachprüfung nicht gewerteten Erfolgskontrollen und Leistungspunkte können im Rahmen der Zusatzfachprüfung nach § 13 nachträglich geltend gemacht werden.

(12) Die Gesamtnote der Bachelorprüfung, die Fachnoten und die Modulnoten lauten:

<table>
<thead>
<tr>
<th>Note</th>
<th>Bedeutung</th>
</tr>
</thead>
<tbody>
<tr>
<td>bis 1,5</td>
<td>sehr gut</td>
</tr>
<tr>
<td>1.6 bis 2.5</td>
<td>gut</td>
</tr>
<tr>
<td>2.6 bis 3.5</td>
<td>befriedigend</td>
</tr>
<tr>
<td>3.6 bis 4.0</td>
<td>ausreichend</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>
<th>Quote</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10</td>
<td>gehört zu den besten 10 % der Studierenden, die die Erfolgskontrolle bestanden haben</td>
</tr>
<tr>
<td>B</td>
<td>25</td>
<td>gehört zu den nächsten 25 % der Studierenden, die die Erfolgskontrolle bestanden haben</td>
</tr>
<tr>
<td>C</td>
<td>30</td>
<td>gehört zu den nächsten 30 % der Studierenden, die die Erfolgskontrolle bestanden haben</td>
</tr>
<tr>
<td>D</td>
<td>25</td>
<td>gehört zu den nächsten 25 % der Studierenden, die die Erfolgskontrolle bestanden haben</td>
</tr>
<tr>
<td>E</td>
<td>10</td>
<td>gehört zu den letzten 10 % der Studierenden, die die Erfolgskontrolle bestanden haben</td>
</tr>
<tr>
<td>FX</td>
<td>nicht bestanden (failed) – es sind Verbesserungen erforderlich, bevor die Leistungen anerkannt werden</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>nicht bestanden (failed) – es sind erhebliche Verbesserungen erforderlich</td>
<td></td>
</tr>
</tbody>
</table>

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

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

(1) Die Modulteilprüfung Mikroökonomie (VWL I) im Fach Volkswirtschaftslehre (gemäß § 17 Absatz 2 Nr. 2) und die Modulteilprüfung Statistik I im Fach Statistik (gemäß § 17 Absatz 2 Nr. 7) 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 abgelegt hat, verliert den Prüfungsanspruch im Studiengang, es sei denn, dass er die Fristüberschreitung nicht zu vertreten hat, hierüber entscheidet der Prüfungsausschuss auf Antrag des Studierenden. Eine zweite Wiederholung der Orientierungsprüfungen ist ausgeschlossen.

(2) Studierende können eine nicht bestandene schriftliche Prüfung (§ 4 Absatz 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 4.0 (ausreichend) sein.

(3) Studierende können eine nicht bestandene mündliche Prüfung (§ 4 Absatz 2 Nr. 2) einmal wiederholen.


(5) Die Wiederholung einer Erfolgskontrolle anderer Art (§ 4 Absatz 2 Nr. 3) wird im Modulhandbuch geregelt.

Bei nicht bestandener Erfolgskontrolle sind dem Kandidaten Umfang und Frist der Wiederholung in geeigneter Weise bekannt zu machen.

Die Wiederholung einer bestandenen Erfolgskontrolle ist nicht zulässig.

Eine Fachprüfung ist nicht bestanden, wenn mindestens ein Modul des Faches nicht bestanden ist.


Ist gemäß § 34 Absatz 2 Satz 3 LHG die Bachelorprüfung bis zum Beginn der Vorlesungszeit des zehnten Fachsemesters einschließlich etwaiger Wiederholungen nicht vollständig abgelegt, so erlischt der Prüfungsanspruch im Studiengang, es sei denn, dass der Studierende die Fristüberschreitung nicht zu vertreten hat. Die Entscheidung darüber trifft der Prüfungsausschuss.

Der Prüfungsanspruch erlischt endgültig, wenn mindestens einer der folgenden Gründe vorliegt:

1. Der Prüfungsausschuss lehnt einen Antrag auf Fristverlängerung nach Absatz 1 oder Absatz 10 ab.
2. Die Bachelorarbeit ist endgültig nicht bestanden.
3. Eine Erfolgskontrolle nach § 4 Absatz 2 Nr. 1 und 2 ist in einem Fach endgültig nicht bestanden.

Eine Erfolgskontrolle ist dann endgültig nicht bestanden, wenn keine Wiederholungsmöglichkeit im Sinne von Absatz 2 mehr besteht oder gemäß Absatz 6 genehmigt wird. Dies gilt auch sinngemäß für die Bachelorarbeit.

§ 9 Versäumnis, Rücktritt, Täuschung, Ordnungsverstoß


(2) Eine Modulprüfung wird mit „nicht ausreichend“ 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.

Die Anerkennung des Rücktritts ist ausgeschlossen, wenn bis zum Eintritt des Hinderungsgrun-
des bereits Prüfungsleistungen erbracht worden sind und nach deren Ergebnis die Prüfung nicht
bestanden werden kann.

Wird der Grund anerkannt, wird ein neuer Termin anberaumt. Die bereits vorliegenden Prü-
fungsergebnisse sind in diesem Fall anzurechnen.

Bei Modulprüfungen, die aus mehreren Prüfungen bestehen, werden die Prüfungsleistungen
dieses Moduls, die bis zu einem anerkannten Rücktritt bzw. einem anerkannten Versäumnis ei-
er Prüfungsleistung dieses Moduls erbracht worden sind, angerechnet.

(4) Versucht der Studierende das Ergebnis einer Erfolgskontrolle durch Täuschung oder Benut-
zung nicht zugelassener Hilfsmittel zu beeinflussen, gilt die betreffende Erfolgskontrolle als mit
„nicht ausreichend“ (5.0) bewertet.

(5) Ein Studierender, der den ordnungsgemäßen Ablauf der Prüfung stört, kann vom jeweiligen
Prüfer oder der aufsichtsführenden Person von der Fortsetzung der Modulprüfung ausgeschlos-
sen werden. In diesem Fall wird die betreffende Prüfungsleistung mit „nicht ausreichend“ (5.0)
bewertet. In schwerwiegenden Fällen kann der Prüfungsausschuss den Studierenden von der
Erbringung weiterer Prüfungsleistungen ausschließen.

(6) Der Studierende kann innerhalb einer Frist von einem Monat verlangen, dass Entscheidun-
gen gemäß Absatz 4 und Absatz 5 vom Prüfungsausschuss überprüft werden. Belastende Ent-
scheidungen des Prüfungsausschusses sind unverzüglich schriftlich mitzuteilen. Sie sind zu be-
gründen und mit einer Rechtsbehelfsbelehrung zu versehen. Vor einer Entscheidung ist Gele-
genheit zur Äußerung zu geben.

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

§ 10 Mutterschutz, Elternzeit

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

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

§ 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 der ersten drei
Fachsemester laut § 17 Absatz 2 noch nachzuweisen ist.

Vor Zulassung sind Betreuer, Thema und Anmeldedatum dem Prüfungsausschuss bekannt zu
geben und im Falle einer Betreuung außerhalb der Fakultät für Wirtschaftswissenschaften durch
den Prüfungsausschuss zu genehmigen.

(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 Absatz 2 vergeben und betreut werden. Soll die Bachelorarbeit außerhalb der Fakultät angefertigt werden, so bedarf dies der Genehmigung des Prüfungsausschusses gemäß Absatz 1. 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 Prüfungskriterium zu bewertende Beitrag des einzelnen Studierenden aufgrund objektiver Kriterien, die eine eindeutige Abgrenzung ermöglichen, deutlich unterscheidbar ist und die Anforderung nach Absatz 3 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 der wissenschaftlichen 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.


§ 12 Berufspraktikum

(1) Während des Bachelorstudiums ist ein mindestens achtwöchiges Berufspraktikum, welches mit acht Leistungspunkten bewertet wird, abzuleisten.

(2) Der Studierende setzt sich dazu in eigener Verantwortung mit geeigneten Unternehmen in Verbindung. Der Praktikant wird von einem Prüfer nach § 15 Absatz 2 und einem Mitarbeiter des Unternehmens betreut.

(3) Am Ende des Berufspraktikums ist dem Prüfer ein kurzer Bericht abzugeben und eine Kurzpräsentation über die Erfahrungen im Berufspraktikum zu halten.

(4) Das Berufspraktikum ist abgeschlossen, wenn eine mindestens achtwöchige Tätigkeit nachgewiesen wird, der Bericht abgegeben und die Kurzpräsentation gehalten wurde. Die Durchführung des Berufspraktikums ist im Studienplan oder Modulhandbuch zu regeln. Das Berufspraktikum geht nicht in die Gesamtnote ein.
§ 13 Zusatzmodule, Zusatzleistungen

(1) Der Studierende kann sich weiteren Prüfungen in Modulen unterziehen. § 3, § 4 und § 8 Absatz 10 der Prüfungsordnung bleiben davon unberührt.

(2) Maximal zwei Zusatzmodule mit jeweils mindestens neun Leistungspunkten werden auf Antrag des Studierenden in das Bachelorzeugnis aufgenommen und entsprechend gekennzeichnet.

Zusatzmodule müssen nicht im Studienplan oder Modulhandbuch definiert sein. Im Zweifelsfall entscheidet der Prüfungsausschuss.


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

§ 14 Prüfungsausschuss


(2) Der Vorsitzende, sein Stellvertreter, die weiteren Mitglieder des Prüfungsausschusses sowie deren Stellvertreter werden vom Fakultätsrat bestellt, die Mitglieder der Gruppe der wissenschaftlichen Mitarbeiter nach § 10 Absatz 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 sein. Der Vorsitzende des Prüfungsausschusses nimmt die laufenden Geschäfte wahr und wird durch ein Prüfungsekretariat unterstützt.

(3) Der Prüfungsausschuss regelt die Auslegung und die Umsetzung der Prüfungsordnung in die Prüfungspraxis der Fakultät. Er achtet darauf, dass die Bestimmungen der Prüfungsordnung eingehalten werden. Er berichtet regelmäßig dem Fakultätsrat über die Entwicklung der Prüfungen und Studienzeiten sowie über die Verteilung der Fach- und Gesamtnoten und gibt Anregungen zur Reform des Studienplans und der Prüfungsordnung.

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


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


Business Engineering (B.Sc.)
Module Handbook, Date: 23.09.2010
§ 15 Prüfer und Beisitzende
(1) Der Prüfungsausschuss bestellt die Prüfer und die Beisitzenden. Er kann die Bestellung dem Vorsitzenden übertragen.

(2) Prüfer sind Hochschullehrer und habilitierte Mitglieder sowie wissenschaftliche 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 Fakultät ihnen eine diesbezügliche Prüfungsbefugnis erteilt hat.

(4) Zum Beisitzenden darf nur bestellt werden, wer einen dem jeweiligen Prüfungsgegenstand entsprechenden akademischen Abschluss erworben hat.

§ 16 Anrechnung von Studienzeiten, Anerkennung von Studienleistungen und Modulprüfungen

(2) Werden Leistungen angerechnet, so werden die Noten – soweit die Notensysteme vergleichbar sind – übernommen und in die Berechnung der Modulnoten und der Gesamtnote einbezogen. Falls es sich dabei um Leistungen handelt, die im Rahmen eines Auslandsstudiums erbracht werden, während der Studierende an der Universität Karlsruhe (TH) für Wirtschaftsingenieurwesen immatrikuliert ist, kann der Prüfungsausschuss für ausgewählte Sprachen die Dokumentation anerkannter Studienleistungen im Transcript of Records mit ihrer fremdsprachlichen Originalbezeichnung festlegen. Liegen keine Noten vor, wird die Leistung nicht anerkannt. Der Studierende hat die für die Anrechnung erforderlichen Unterlagen vorzulegen.

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

(4) Absatz 1 gilt auch für Studienzeiten, Studienleistungen und Modulprüfungen, die in staatlich anerkannten Fernstudien und an anderen Bildungseinrichtungen, insbesondere an staatlichen oder staatlich anerkannten Berufsakademien erworben wurden.

(5) Die Anerkennung von Teilen der Bachelorprüfung kann versagt werden, wenn in einem Studiengang mehr als die Hälfte aller Erfolgskontrollen und/oder mehr als die Hälfte der erforderlichen Leistungspunkte und/oder die Bachelorarbeit anerkannt werden sollen.

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

§ 17 Umfang und Art der Bachelorprüfung


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

1. Betriebswirtschaftslehre im Umfang von 15 Leistungspunkten,
2. Volkswirtschaftslehre im Umfang von 10 Leistungspunkten,
3. Informatik im Umfang von 15 Leistungspunkten,
4. Operations Research im Umfang von 9 Leistungspunkten,
5. Ingenieurwissenschaften im Umfang von 10 Leistungspunkten,
6. Mathematik im Umfang von 21 Leistungspunkten,
7. Statistik im Umfang von 10 Leistungspunkten.

Die Module, die ihnen zugeordneten Leistungspunkte und die Zuordnung der Module zu den Fächern sind im Studienplan oder Modulhandbuch festgelegt. Zur entsprechenden Modulprüfung kann nur zugelassen werden, wer die Anforderungen nach § 5 erfüllt.

(3) Im vierten bis sechsten Semester sind Fachprüfungen im Umfang von sieben Modulen mit je neun Leistungspunkten abzulegen. Die Module verteilen sich folgendermaßen auf die Fächer:

1. Betriebswirtschaftslehre,
2. Volkswirtschaftslehre,
3. Informatik,
4. Operations Research,
5. Ingenieurwissenschaften,
6. Betriebswirtschaftslehre oder Ingenieurwissenschaften,

Die in den Fächern zur Auswahl stehenden Module sowie die diesen zugeordneten Lehrveranstaltungen werden im Studienplan oder Modulhandbuch bekannt gegeben. Der Studienplan oder das Modulhandbuch kann auch Mehrfachmodule definieren, die aus 18 Leistungspunkten (Doppelmodul) bzw. 27 Leistungspunkten (Dreifachmodul) bestehen und für Fachprüfungen nach 1. bis 7. bei in Summe mindestens gleicher Leistungspunktezahl entsprechend anrechenbar sind. Auch die Mehrfachmodule mit ihren zugeordneten Lehrveranstaltungen, Leistungspunkten und Fächern bzw. Fächerkombinationen sind im Studienplan oder Modulhandbuch geregelt.


(6) Prüfungen nach § 17 Absatz 3 können in einem Fach nur absolviert werden, wenn eine eventuelle Prüfung dieses Fachs nach § 17 Absatz 2 erfolgreich absolviert wurde. Auf Antrag eines Studierenden kann der Prüfungsausschuss hierzu Ausnahmen genehmigen.
§ 18 Leistungsnachweise für die Bachelorprüfung

Voraussetzung für die Anmeldung zur letzten Prüfung der Bachelorprüfung nach § 17 Absatz 1 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 Leistungsnachweises 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 gemäß § 17 Absatz 3 und 4 sowie der Bachelorarbeit jeweils mit dem doppelten Gewicht der Noten gemäß § 17 Absatz 2 berücksichtigt.

(3) Hat der Studierende die Bachelorarbeit mit der Note 1.0 und die Bachelorprüfung mit einem Durchschnitt von 1.1 oder besser abgeschlossen, so wird das Prädikat „mit Auszeichnung“ (with distinction) verliehen.

§ 20 Bachelorzeugnis, Bachelorurkunde, Transcript of Records und Diploma Supplement


(2) Das Zeugnis enthält die in den Fachprüfungen, den zugeordneten Modulprüfungen sowie dem Seminarmodul und der Bachelorarbeit erzielten Noten, deren zugeordnete Leistungspunkte und ECTS-Noten und die Gesamtnote und die ihr entsprechende ECTS-Note. Das Zeugnis ist vom Dekan der Fakultät und vom Vorsitzenden des Prüfungsausschusses zu unterzeichnen.


(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 sowie die zur Prüfung noch fehlenden Prüfungsleistungen enthält und erkennen lässt, dass die Prüfung insgesamt nicht bestanden ist. Dasselbe gilt, wenn der Prüfungsanspruch erloschen ist.

§ 22 Aberkennung des Bachelorgrades

(1) Hat der Studierende bei einer Prüfungsleistung getäuscht und wird diese Tatsache nach der Aushändigung des Zeugnisses bekannt, so können die Noten der Modulprüfungen, bei denen getäuscht wurde, berichtigt werden. Gegebenenfalls kann die Modulprüfung für „nicht ausreichend“ (5.0) und die Bachelorprüfung für „nicht bestanden“ erklärt werden.

(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 erwirkt, so kann die Modulprüfung für „nicht ausreichend“ (5.0) und die Bachelorprüfung für „nicht bestanden“ erklärt werden.

(3) Vor einer Entscheidung ist Gelegenheit zur Äußerung zu geben.

(4) Das unrichtige Zeugnis ist zu entziehen und gegebenenfalls ein neues zu erteilen. Mit dem unrichtigen Zeugnis ist auch die Bachelorurkunde einzuziehen, wenn die Bachelorprüfung auf Grund einer Täuschung für nicht bestanden erklärt wurde.


(6) Die Aberkennung des akademischen Grades richtet sich nach den gesetzlichen Vorschriften.

§ 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.


(3) Prüfungsunterlagen sind mindestens fünf Jahre aufzubewahren.

§ 24 In-Kraft-Treten


Karlsruhe, den 06. März 2007

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