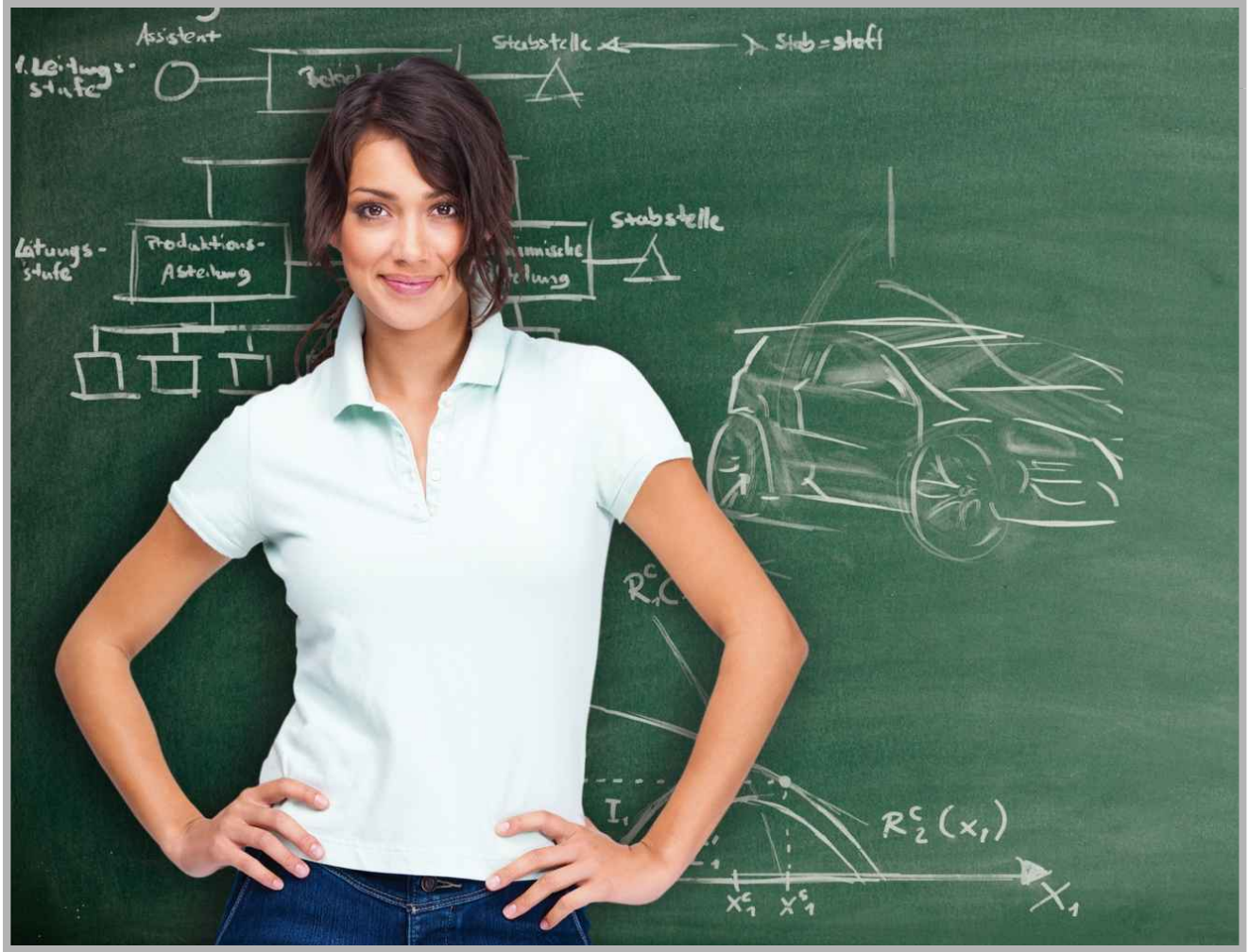
Karlsruhe Institute of Technology

Module Handbook
Business Engineering (M.Sc.)

Winter term 2009/2010
Long version
26.08.2009

Faculty of Economics and Business Engineering



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1 Structure of the Master Programme in Business Engineering (M.Sc.)

The master programme in Business Engineering (M.Sc.) has 4 terms and consists of 120 credits (CP) including Master's thesis. The master programme further deepens or complements the scientific qualifications acquired in the bachelor programme. The students should be made capable of independently applying scientific knowledge and methods and evaluate their implications and scope concerning solutions of complex scientific and social problems. 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.

Business Engineering (M.Sc.)										
Semester	Compulsory								Elective	
1	BA	BA	EC	INFO	OR	ENG	ENG	Seminar + KS	Elective	Elective
2	9 CP	9 CP	9 CP	9 CP	9 CP	9 CP	9 CP	6 + 3 CP	9 CP	9 CP
3										
4	Master Thesis 30 CP									
	120 CP (8 compulsory modules + 2 elective modules + Master Thesis)									

Abbildung 1: Structure of the Master Programme (Recommendation)

Figure 1 shows the structure of the subjects and the credits allocated to the subjects. The student has to choose two elective modules of the following disciplines: Business science, economics, informatics, operations research, engineering science, statistics, law and sociology. In principle, both elective modules are also available in one discipline. Thereby it is it is only allowed to choose either one module in law or in sociology.

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 complete all courses and seminars before beginning the Master's thesis.

2 Key Skills

The master programme Business Engineering (M.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, the seminar courses in the master degree programme contribute significantly to the development of key skills by practicing to elaborate and write scientifically sound papers and presentations about special topics. 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
4. Structured problem solving and communication

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 obligatory courses during the master programme, namely

1. Seminar module
2. Mentoring of the Master's thesis
3. Business science, economics and informatics modules

Figure 2 shows the classification of key skills within the master program 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	Masterstudium				
	BWL	VWL	INFO	Seminar	Materarbeit
Basiskompetenzen (soft skills)					
Teamarbeit, soziale Kommunikation und Kreativitätstechniken			x		
Präsentationserstellung und -techniken				x	
Logisches und systematisches Argumentieren und Schreiben				x	x
Strukturierte Problemlösung und Kommunikation				x	x
Praxisorientierung (enabling skills)					
Handlungskompetenz im beruflichen Kontext					(x)*
Kompetenzen im Projektmanagement					(x)*
Betriebswirtschaftliche Grundkenntnisse	x				
Englisch als Fachsprache	x	x			
Orientierungswissen					
Interdisziplinäres Wissen	x	x	x	x	(x)*
Institutionelles Wissen über Wirtschafts- und Rechtssysteme		x			
Wissen über internationale Organisationen		x			
Medien, Technik und Innovation		x	x		

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

Abbildung 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 hanbook serves as a necessary orientation and as a helpful guide throughout the studies. The module handbook does not replace the **course catalogue**, which provides important information concerning each semester and variable course details (e.g. time and location of the course).

Begin and completion of a module

Every module and every course is allowed to be credited only once. The decision whether the course is assigned to one module or the other (e.g. if a course is selectable in two or more modules) is made by the student at the time of signing in for the corresponding exam. The module is **succeeded**, if the general exam of the module and/or if all of its relevant partial exams have been passed (grade min 4.0). In order to that the minimum requirement of credits of this module have been met.

General exams and partial exams

The module exam can be taken in a general exam or several partial exams. If the module exam is offered as a **general exam**, the entire content of the module will be reviewed in a single exam. If the module exam exists of **partial exams**, the content of each course will be reviewed in corresponding partial exams. The registration for the examinations takes place online via the self-service function for students. The following functions can be accessed on https://studium.kit.edu/meinsemester/Seiten/pruefungsanmeldung.aspx:

- Sign in and sign off exams
- Retrieve examination results
- Print transcript of records

For further and more detailed information also see https://zvwgate.zvw.uni-karlsruhe.de/download/leitfaden_studierende.pdf

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.uni-karlsruhe.de/studium/hinweise/.

Bonus accomplishments and additional accomplishments

Bonus accomplishments can be achieved on the basis of entire modules or within modules, if there are alternatives at choice. Bonus accomplishments can improve the module grade and overall grade by taking into account only the best possible combination of all courses when calculating the grades. The student has to declare a Bonus accomplishment as such at the time of registration for the exams. Exams, which have been registered as Bonus accomplishments, are subject to examination regulations. Therefore, a failed exam has to be repeated. Failing the repeat examination implies the loss of the examination claim.
Additional accomplishments are voluntarily taken exams, which have no impact on the overall grade of the student

and can take place on the level of single courses or on entire modules. It is also mandatory to declare an additional accomplishment as such at the time of registration for an exam. Up to 2 modules with a minimum of 9 CP may appear additionally in the certificate. After the approval of the examination committee, it is also possible to include modules in the certificate, which are not defined in the module handbook. Single additional courses will be recorded in the transcript of records. Courses and modules, which have been declared as bonus accomplishments, can be changed to additional accomplishments.

Further information

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

Used abbreviations

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

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.

Applications of Actuarial Sciences I (BWL) [WI4BWLFBV4] (S. 31)

Anmerkungen

Business & Service Engineering [WI4BWLISM4] (S. 41)

Anmerkungen

The lecture *Special Topics in Information Engineering & Management* [26478] is first offered in the winter term 2009/10.

Information Engineering [WI4BWLISM7] (S. 44)

Anmerkungen

The lecture *Special Topics in Information Engineering & Management* [26478] is first offered in the winter term 2009/10.

Network Economics [WI4VWL4] (S. 54)

Anmerkungen

This module continues the old module *Network Economies* by Prof. Rothengatter.
Dr. Kopp´s lecture *Regulation* [26206] (held for the last time in the WT 09/10) is substituted by the lecture *Regulation Theory and Practice* [26234] by Prof. Mitusch (held for the first time in the ST 10); only one of these lectures can be taken into account
Beginning in the WT 2009/2010, the lecture *Competition in Networks* [26240] will always be held during the winter term.

Mathematical Programming [WI4OR6] (S. 69)

Anmerkungen

The module is offered in winter 2009/10 for the first time.

Special Topics in Optimization [WI4OR7] (S. 70)

Anmerkungen

The module is offered in winter 2009/10 for the first time.

Optimization in Practice [WI4OR2] (S. 71)

Anmerkungen

The module was offered in summer term 2009 for the last time.

Seminar Module [WW4SEM] (S. 129)

Bedingungen

The seminars must be offered by a representative of the School of Economics ande Business Engineering.
Alternativly one of the two compulsory seminars can be asolved at a engineering department or at the Department of Mathematics. The seminar has to be offered by a represantative of the respective departments 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).
A seminar at another Department then the School of Economics and Business Engineering requires an official approval at all and can be applied at the examination office of the School of Economics and Business Engineering. Seminars at the wbk and the IFL will not requiring these offical approval.

Anmerkungen

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 Universität Karlsruhe (TH). 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.

Society, Technics, Ecology [19212] (S. 153)

Anmerkungen

This course is held in the winter term 2009/10 for the last time and will be replaces by “Environmental Communication - Umweltkommunikation”.

Insurance Contract Law [26360] (S. 500)

Anmerkungen

The course is offered extraordinarily in winter term 2009/10.

Special Topics in Information Engineering & Management [26478] (S. 514)

Anmerkungen

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: http://www.im.uni-karlsruhe.de/lehre.
This lecture is first offered in the winter term 2009/10.

5 Modules

5.1 Business Administration

Module: F1 (Finance) Module key: [WI4BWLFBV1]

Subject: Business Administration
Module coordination: Marliese Uhrig-Homburg, Martin E. Ruckes
Credit points (CP): 9

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 seperately.
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.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The student

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

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

Courses in module *F1 (Finance)* [WI4BWLFBV1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26550	Derivatives (S. 527)	2/1	S	4.5	Uhrig-Homburg
25212	Valuation (S. 361)	2/1	W	4.5	Ruckes
26555	Asset Pricing (S. 528)	2/1	S	4.5	Uhrig-Homburg, Ruckes

Module: F2 (Finance) Module key: [WI4BWLFBV2]

Subject: Business Administration
Module coordination: Marliese Uhrig-Homburg, Martin E. Ruckes
Credit points (CP): 9

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 seperately.
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.

Prerequisites
None.

Conditions
It is obligatory to attend the module *F1 (Finance)* [EE4BWLFBV1].
It is not allowed to choose also the module *F2&F3 (Finance)* [WI4BWLFBV3].
The courses *Asset Pricing* [VLAP], *Valuation* [25212] and *Derivatives* [26550] can only be chosen if they have not been chosen in the module *F1 (Finance)* [WI4BWLFBV1] already.

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

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

Courses in module *F2 (Finance)* [WI4BWLFBV2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26560	Fixed Income Securities (S. 529)	2/1	W	4.5	Uhrig-Homburg
25214	Corporate Financial Policy (S. 362)	2/1	S	4.5	Ruckes
25240	Market Microstructure (S. 364)	2/0	W	3	Lüdecke
26565	Credit Risk (S. 530)	2/1	W	4.5	Uhrig-Homburg
25210	Management Accounting (S. 360)	2/1	S	4.5	Lüdecke
26555	Asset Pricing (S. 528)	2/1	S	4.5	Uhrig-Homburg, Ruckes
25212	Valuation (S. 361)	2/1	W	4.5	Ruckes
26550	Derivatives (S. 527)	2/1	S	4.5	Uhrig-Homburg
26570	International Finance (S. 531)	2	S	3	Uhrig-Homburg, Walter
25299	Business Strategies of Banks (S. 367)	2	W	3	Müller
25296	Exchanges (S. 366)	1	S	1.5	Franke
25232	Financial Intermediation (S. 363)	3	W	4.5	Ruckes

Remarks

Module: F2&F3 (Finance) Module key: [WI4BWLFBV3]

Subject: Business Administration
Module coordination: Marliese Uhrig-Homburg, Martin E. Ruckes
Credit points (CP): 18

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 seperately.
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.

Prerequisites
None.

Conditions
It is obligatory to attend the module *F1 (Finance)* [EE4BWLFBV1].
It is not allowed to choose also the module *F2&F3 (Finance)* [WI4BWLFBV3].
The courses *Asset Pricing* [VLAP], *Valuation* [25212] and *Derivatives* [26550] can only be chosen if they have not been chosen in the module *F1 (Finance)* [WI4BWLFBV1] already.

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

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

Courses in module *F2&F3 (Finance)* [WI4BWLFBV3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26555	Asset Pricing (S. 528)	2/1	S	4.5	Uhrig-Homburg, Ruckes
25212	Valuation (S. 361)	2/1	W	4.5	Ruckes
26550	Derivatives (S. 527)	2/1	S	4.5	Uhrig-Homburg
26560	Fixed Income Securities (S. 529)	2/1	W	4.5	Uhrig-Homburg
26565	Credit Risk (S. 530)	2/1	W	4.5	Uhrig-Homburg
25214	Corporate Financial Policy (S. 362)	2/1	S	4.5	Ruckes
25240	Market Microstructure (S. 364)	2/0	W	3	Lüdecke
25210	Management Accounting (S. 360)	2/1	S	4.5	Lüdecke
25232	Financial Intermediation (S. 363)	3	W	4.5	Ruckes
25296	Exchanges (S. 366)	1	S	1.5	Franke
25299	Business Strategies of Banks (S. 367)	2	W	3	Müller
26570	International Finance (S. 531)	2	S	3	Uhrig-Homburg, Walter

Module: Entrepreneurship, Innovation and International Marketing [WI4BWLMAR6]

Module key:

Subject: Business Administration
Module coordination: Wolfgang Gaul
Credit points (CP): 9

Learning Control / Examinations
The assessment consists of a general written exam according to §4 Abs. 2, Nr. 1 of examination regulation. The written exam has a duration of 120 min. and contains topics from at least two of the main lectures [25164], [25165] and [25170] as well as from the chosen lectures. The examination is offered every semester. Re-examinations are offered at every ordinary examination date and has to be absolved within one year.
The overall grade for the module is the average of the grades for each course weighted by the credits of the course.
It is recommended, to attend more lectures than required to fulfill 9 Credit Points as it is possible to examine in these additional lecutres and influence the final grade positively.

Prerequisites
None.

Conditions
At least two courses out of International Marketing [25164], Marketing and Innovation [25165] and Entrepreneurship and Marketing [25170] have to be chosen.

Learning Outcomes

Content

Courses in module *Entrepreneurship, Innovation and International Marketing* [WI4BWLMAR6]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25154	Modern Market Research (S. 343)	2/1	S	4.5	Gaul
25156	Marketing and Operations Research (S. 344)	2/1	S	4.5	Gaul
25158	Corporate Planning and Operations Research (S. 345)	2/1	W	4.5	Gaul
25171	Data Analysis and Operations Research (S. 353)	2/1	W	4.5	Gaul
25160	e-Business & electronic Marketing (S. 346)	1	S	2.5	Gaul
25164	International Marketing (S. 348)	1	S	2.5	Gaul
25165	Marketing and Innovation (S. 349)	1/1	W	2.5	Gaul
25170	Entrepreneurship and Marketing (S. 352)	1/1	W	2.5	Gaul

Module: Marketing Planning — Module key: [WI4BWLMAR1]

Subject: Business Administration
Module coordination: Wolfgang Gaul
Credit points (CP): 9

Learning Control / Examinations
The assessment consists of a general written exam according to §4 Abs. 2, Nr. 1 of examination regulation. The written exam has a duration of 120 min. and contains topics from at least one of the main lectures [25156] und [25158] as well as from the chosen lectures. The examination is offered every semester. Re-examinations are offered at every ordinary examination date and has to be absolved within one year.
The overall grade for the module is the average of the grades for each course weighted by the credits of the course.
It is recommended, to attend more lectures than required to fulfill 9 Credit Points as it is possible to examine in these additional lecutres and influence the final grade positively.

Prerequisites
None.

Conditions
The courses *Marketing and Operations Research* [25156] and *Corporate Planning and Operations Research* [25158] have to be chosen.

Learning Outcomes

Content

Courses in module *Marketing Planning* [WI4BWLMAR1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25156	Marketing and Operations Research (S. 344)	2/1	S	4.5	Gaul
25158	Corporate Planning and Operations Research (S. 345)	2/1	W	4.5	Gaul
25160	e-Business & electronic Marketing (S. 346)	1	S	2.5	Gaul
25164	International Marketing (S. 348)	1	S	2.5	Gaul
25165	Marketing and Innovation (S. 349)	1/1	W	2.5	Gaul
25170	Entrepreneurship and Marketing (S. 352)	1/1	W	2.5	Gaul

Module: Market Research — Module key: [WI4BWLMAR2]

Subject: Business Administration
Module coordination: Wolfgang Gaul
Credit points (CP): 9

Learning Control / Examinations
The assessment consists of a general written exam according to §4 Abs. 2, Nr. 1 of examination regulation. The written exam has a duration of 120 min. and contains topics from at least one of the main lectures [25154] and [25171] as well as from the chosen lectures. The examination is offered every semester. Re-examinations are offered at every ordinary examination date and has to be absolved within one year.
The overall grade for the module is the average of the grades for each course weighted by the credits of the course.
It is recommended, to attend more lectures than required to fulfill 9 Credit Points as it is possible to examine in these additional lecutres and influence the final grade positively.

Prerequisites
None.

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

Learning Outcomes

Content

Courses in module *Market Research* [WI4BWLMAR2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25154	Modern Market Research (S. 343)	2/1	S	4.5	Gaul
25171	Data Analysis and Operations Research (S. 353)	2/1	W	4.5	Gaul
25160	e-Business & electronic Marketing (S. 346)	1	S	2.5	Gaul
25164	International Marketing (S. 348)	1	S	2.5	Gaul
25165	Marketing and Innovation (S. 349)	1/1	W	2.5	Gaul
25170	Entrepreneurship and Marketing (S. 352)	1/1	W	2.5	Gaul

Module: Strategy, Innovation and Data Analysis — Module key: [WI4BWLMAR3]

Subject: Business Administration
Module coordination: Bruno Neibecker
Credit points (CP): 9

Learning Control / Examinations
Assessment consist of a written module exam according to §4(2), 1 SPO. The module exam has a duration of 120 min. and contains topics from the main lecture [25166] as well as from one of the chosen lectures [25154] and [25162].
The final mark for the module is the average of the marks for each course weighted by the credits of the course.

Prerequisites
None.

Conditions
- The lecture *Strategic and Innovative Decision Making in Marketing* [25166] has to be attended.
- From the lectures *Modern Market Research* [25154] and *Information Technology and Business Information* [25162], one must be attended.
- At least 9 CP must be achieved.

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

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

Courses in module *Strategy, Innovation and Data Analysis* [WI4BWLMAR3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25166	Strategic and Innovative Decision Making in Marketing (S. 350)	2/1	S	4.5	Neibecker
25154	Modern Market Research (S. 343)	2/1	S	4.5	Gaul
25162	Information Technology and Business Information (S. 347)	2/1	S	4.5	Neibecker

Module: Behavioral Approaches in Marketing and Data Analysis [WI4BWLMAR4] Module key:

Subject: Business Administration
Module coordination: Bruno Neibecker
Credit points (CP): 9

Learning Control / Examinations
Assessment consist of a written module exam according to §4(2), 1 SPO. The module exam has a duration of 120 min. and contains topics from the main lecture [25167] as well as from one of the chosen lectures [25154] and [25162].
The final mark for the module is the average of the marks for each course weighted by the credits of the course.

Prerequisites
None.

Conditions
- The lecture *Behavioral Approaches in Marketing* [25167] has to be attended.
- From the lectures *Modern Market Research* [25154] and *Information Technology and Business Information* [25162], one must be attended.
- At least 9 CP must be achieved.

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

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

Courses in module *Behavioral Approaches in Marketing and Data Analysis* [WI4BWLMAR4]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25167	Behavioral Approaches in Marketing (S. 351)	2/1	W	4.5	Neibecker
25154	Modern Market Research (S. 343)	2/1	S	4.5	Gaul
25162	Information Technology and Business Information (S. 347)	2/1	S	4.5	Neibecker

Module: Successful Market Orientation — Module key: [WI4BWLMAR5]

Subject: Business Administration
Module coordination: Wolfgang Gaul
Credit points (CP): 18

Learning Control / Examinations
The assessment consists of a general written exam according to §4 Abs. 2, Nr. 1 of examination regulation. The written exam has a duration of 240 min. and contains topics from at least two of four main lectures [25154], [25156], [25158] and [25171] as well as from the chosen lectures. The examination is offered every semester. Re-examinations are offered at every ordinary examination date and has to be absolved within one year.
The overall grade for the module is the average of the grades for each course weighted by the credits of the course.
It is recommended, to attend more lectures than required to fulfill 18 Credit Points as it is possible to examine in these additional lecutres and influence the final grade positively.

Prerequisites
None.

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

Learning Outcomes

Content

Courses in module *Successful Market Orientation* [WI4BWLMAR5]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25154	Modern Market Research (S. 343)	2/1	S	4.5	Gaul
25156	Marketing and Operations Research (S. 344)	2/1	S	4.5	Gaul
25158	Corporate Planning and Operations Research (S. 345)	2/1	W	4.5	Gaul
25171	Data Analysis and Operations Research (S. 353)	2/1	W	4.5	Gaul
25160	e-Business & electronic Marketing (S. 346)	1	S	2.5	Gaul
25164	International Marketing (S. 348)	1	S	2.5	Gaul
25165	Marketing and Innovation (S. 349)	1/1	W	2.5	Gaul
25170	Entrepreneurship and Marketing (S. 352)	1/1	W	2.5	Gaul
25166	Strategic and Innovative Decision Making in Marketing (S. 350)	2/1	S	4.5	Neibecker
25167	Behavioral Approaches in Marketing (S. 351)	2/1	W	4.5	Neibecker
25162	Information Technology and Business Information (S. 347)	2/1	S	4.5	Neibecker

Module: Strategic Corporate Management and Organization Module key: [WI4BWLUO1]

Subject: Business Administration
Module coordination: Hagen Lindstädt
Credit points (CP): 9

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 seperately.
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.

Prerequisites
None.

Conditions
One of the following courses have to be attended: *Managing Organizations* [25902], *Management and Strategy* [25900]

Learning Outcomes

Content

Courses in module *Strategic Corporate Management and Organization* [WI4BWLUO1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25904	Organization Theory (S. 441)	2/1	W	6	Lindstädt
25902	Managing Organizations (S. 440)	2/0	W	4	Lindstädt
25908	Modeling Strategic Decision Making (S. 442)	2/1	S	6	Lindstädt
25912	Value-Based Instruments of Corporate Strategy (S. 443)	2	W	4	Pidun, Wolff
25900	Management and Strategy (S. 439)	2/0	S	4	Lindstädt

Module: Strategic Decision Making and Organization Theory Module key: [WI4BWLUO3]

Subject: Business Administration
Module coordination: Hagen Lindstädt
Credit points (CP): 9

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 seperately.
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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Strategic Decision Making and Organization Theory* [WI4BWLUO3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25904	Organization Theory (S. 441)	2/1	W	6	Lindstädt
25908	Modeling Strategic Decision Making (S. 442)	2/1	S	6	Lindstädt
25912	Value-Based Instruments of Corporate Strategy (S. 443)	2	W	4	Pidun, Wolff

Module: Applications of Actuarial Sciences I (BWL) Module key: [WI4BWLFBV4]

Subject: Business Administration
Module coordination: Christian Hipp
Credit points (CP): 9

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

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

Conditions
Two courses out of *Life and Pensions* [26310], *Reinsurance* [26312], *Insurance Optimisation* [26316] and *Saving Societies* [26340] have to be chosen.

Learning Outcomes

Content

Courses in module *Applications of Actuarial Sciences I (BWL)* [WI4BWLFBV4]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26340	Saving Societies (S. 495)	3/0	S	4,5	Hipp, N.N.
26316	Insurance Optimisation (S. 486)	3	W	4.5	Hipp
26312	Reinsurance (S. 485)	4	S	4.5	Hipp, Stöckbauer
26310	Life and Pensions (S. 484)	3	W	4.5	Hipp, Vogt, Besserer

Remarks

Module: Applications of Actuarial Sciences II (BWL) Module key: [WI4BWLFBV5]

Subject: Business Administration
Module coordination: Christian Hipp
Credit points (CP): 18

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

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

Conditions
All courses of the module have to be attended.

Learning Outcomes

Content

Courses in module *Applications of Actuarial Sciences II (BWL)* [WI4BWLFBV5]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26310	Life and Pensions (S. 484)	3	W	4.5	Hipp, Vogt, Besserer
26312	Reinsurance (S. 485)	4	S	4.5	Hipp, Stöckbauer
26340	Saving Societies (S. 495)	3/0	S	4,5	Hipp, N.N.
26316	Insurance Optimisation (S. 486)	3	W	4.5	Hipp

Remarks

Module: Insurance Statistics

Module key: [WI4BWLFBV8]

Subject: Business Administration
Module coordination: Christian Hipp
Credit points (CP): 9

Learning Control / Examinations

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

Conditions
None.

Learning Outcomes

Content

Courses in module *Insurance Statistics* [WI4BWLFBV8]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26303	Insurance Statistics (S. 483)	4/2	W	9	Hipp

Module: Operational Risk Management I — Module key: [WI4BWLFBV9]

Subject: Business Administration
Module coordination: Ute Werner
Credit points (CP): 9

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 seperately.
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.

Prerequisites
Knowledge in risk management (for example gained in the Bachelor programme) are an advantage.

Conditions
It is only possible to choose the course *Enterprise Risk Management* [26326] if it was not attended in the Bachelor programme.
Good complements to this module are as well the engineering science modules *Understanding and Prediction of Disasters I* [WI4INTER1] and *Safety Science I* [WI4INTER4].

Learning Outcomes

Content

Courses in module *Operational Risk Management I* [WI4BWLFBV9]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26326	Enterprise Risk Management (S. 490)	3/0	W/S	4.5	Werner
26395	Risk Communication (S. 502)	3/0	W/S	4.5	Werner
26353	International Risk Transfer (S. 497)	2/0	S	2,5	Schwehr
26355	Public Sector Risk Management (S. 499)	2/0	W	2,5	Mechler

Remarks
The courses *Enterprise Risk Management* [26326] and *Risk Communication* [26395] are offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de

Module: Operational Risk Management II — Module key: [WI4BWLFBV10]

Subject: Business Administration
Module coordination: Ute Werner
Credit points (CP): 9

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 2 or 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 seperately.
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.

Prerequisites
Interest in interdisciplinary research is assumed.

Knowledge in social science disciplines, GIS or Finance is an advantage.

Conditions
Good complements to this module are as well the engineering science modules *Understanding and Prediction of Disasters I* [WI4INTER1] and *Safety Science I* [WI4INTER4].

Learning Outcomes

Content

Courses in module *Operational Risk Management II* [WI4BWLFBV10]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26355	Public Sector Risk Management (S. 499)	2/0	W	2,5	Mechler
26354	Risk Management of Microfinance and Private Households (S. 498)	3/0	W/S	4.5	Werner
26328	Multidisciplinary Risk Research (S. 492)	3/0	W/S	4.5	Werner
26393	Project Work in Risk Research (S. 501)	3	W/S	4.5	Werner

Remarks
The course *Risk Management of Microfinance and Private Households* [26354] is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de

Module: Insurance Management I — Module key: [WI4BWLFBV6]

Subject: Business Administration
Module coordination: Ute Werner
Credit points (CP): 9

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 seperately.
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.

Prerequisites
Knowledge of the content of the course *Principles of Insurance Management* [25055] (cf. Bachelor module *Risk and Insurance Management* [WW3BWLFBV3] or *Insurance Management* [WW3BWLFBV4] or lecture notes available at http://insurance.fbv.uni-karlsruhe.de/345.php) is assumed.
If the contents were not part of the Bachelor programme and there is no professional experience in the insurance industry so far, the student has to pass a test to proof sufficient prior knowledge in the first third of the term.

Conditions
None.

Learning Outcomes

Content

Courses in module *Insurance Management I* [WI4BWLFBV6]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26323	Insurance Marketing (S. 488)	3/0	W/S	4.5	Werner
26320	Insurance Accounting (S. 487)	3/0	W	4.5	Werner, Ludwig
26324	Insurance Production (S. 489)	3/0	W/S	4.5	Werner
26327	Service Management (S. 491)	3/0	W/S	4.5	Werner
26360	Insurance Contract Law (S. 500)	3/0	S	4.5	Werner, Schwebler

Remarks
The courses *Insurance Marketing* [26323], *Insurance Production* [26324], and *Service Management* [26327] are offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de

Module: Insurance Management II — Module key: [WI4BWLFBV7]

Subject: Business Administration
Module coordination: Ute Werner
Credit points (CP): 9

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 seperately.
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.

Prerequisites
Knowledge of the content of the course *Principles of Insurance Management* [25055] (cf. Bachelor module *Risk and Insurance Management* [WW3BWLFBV3] or *Insurance Management* [WW3BWLFBV4] or lecture notes available at http://insurance.fbv.uni-karlsruhe.de/345.php) is assumed.
If the contents were not part of the Bachelor programme and there is no professional experience in the insurance industry so far, the student has to pass a test to proof sufficient prior knowledge in the first third of the term.

Conditions
None.

Learning Outcomes

Content

Courses in module *Insurance Management II* [WI4BWLFBV7]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25050	Private and Social Insurance (S. 328)	2/0	W	2.5	Werner, Heilmann, Besserer
26360	Insurance Contract Law (S. 500)	3/0	S	4.5	Werner, Schwebler
26350	Current Issues in the Insurance Industry (S. 496)	2/0	S	2.5	Werner, Heilmann
26335	Insurance Risk Management (S. 493)	2/0	S	2.5	Werner, Maser
26336	Risk Controlling in Insurance Groups (S. 494)	1/0	S	2	Werner, Müller

Module: Advanced CRM — Module key: [WI4BWLISM1]

Subject: Business Administration
Module coordination: Andreas Geyer-Schulz
Credit points (CP): 9

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 seperately.
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.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The student

- understand service competition as a sustainable competitive strategy and understand the effects of service competition on the design of markets, products, processes and services,
- develops and realizes personalized services, especially in the field of recommendation services,
- analyzes social networks and knows their application field in CRM,
- works in teams.

Content
Besides the foundations of modern customer oriented and service oriented management, developments of CRM systems are lectured.
On one hand, an overview of general aspects and concepts of personalization and their importance for service provider and customers is given. Then, different categories of recommendation systems are presented: Ranging from explizit recommendation services like reviews to implicit services like the calcuation of recommendations based on the historic data about products and/or customers.
On the other hand, there exist a trend towards viewing economic systems and social systems as networks. This approach allows for the application of different methods from mathematics, economic sciences, sociology and physics. In CRM, net work analyses may provide benefits calculating customer network values.

Courses in module *Advanced CRM* [WI4BWLISM1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26508	Customer Relationship Management (S. 523)	2/1	W	4,5	Geyer-Schulz
26506	Personalization and Recommender Systems (S. 521)	2/1	S	4,5	Geyer-Schulz
26518	Social Network Analysis in CRM (S. 525)	2/1	W/S	4,5	Hoser

Module: Electronic Markets — Module key: [WI4BWLISM2]

Subject: Business Administration
Module coordination: Andreas Geyer-Schulz
Credit points (CP): 9

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 seperately.
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.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The student

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

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

- classification of markets
- auction methods and auction theory
- automated negotiations
- nonlinear pricing
- continuous double auctions
- market-maker, regulation, control

Further topics of the module include the analysis of existing markets, the design for new markets and the implementation of simple auction forms.

Courses in module *Electronic Markets* [WI4BWLISM2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26502	Electronic Markets (Principles) (S. 516)	2/1	W	4,5	Geyer-Schulz
26504	Electronic Markets: Institutions and Market Mechanisms (S. 518)	2/1	S	4,5	Geyer-Schulz
26460	Market Engineering: Information in Institutions (S. 509)	2/1	S	4,5	Weinhardt, Kraemer

Module: Market Engineering — Module key: [WI4BWLISM3]

Subject: Business Administration
Module coordination: Christof Weinhardt
Credit points (CP): 9

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 seperately.
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.

Prerequisites
None.

Conditions
The course *Market Engineering: Information in Institutions* [26460] has to be attended.

Learning Outcomes
The students

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

Content
This module explains the dependencies between the design von markets and their success. Markets are complex interaction of different institution and participants in a market behave strategically according to the market rules. The development and the design of markets or market mechanisms has a strong influence on the behavior of the participants. A systematic approach and a thorough analysis of existing markets is inevitable to design, create and operate a market place successfully. the approaches for a systematic analysis are explained in the mandatory course *Market Engineering* [26460] by discussing theories about mechanism design and institutional economics. The student can deepen his knowledge about markets in a second course.

Courses in module *Market Engineering* [WI4BWLISM3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26460	Market Engineering: Information in Institutions (S. 509)	2/1	S	4,5	Weinhardt, Kraemer
25408	Auction Theory (S. 381)	2/1	W	4.5	Ehrhart, Seifert
26454	eFinance: Information Engineering and Management for Securities Trading (S. 506)	2/1	W	4.5	Weinhardt, Riordan
26458	Computational Economics (S. 508)	2/1	W	5	Branke, van Dinther
25373	Experimental Economics (S. 378)	2/1	S	4,5	Berninghaus, Bleich

Module: Business & Service Engineering — Module key: [WI4BWLISM4]

Subject: Business Administration
Module coordination: Christof Weinhardt, Gerhard Satzger
Credit points (CP): 9

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 seperately.
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.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The student should learn to

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

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

Courses in module *Business & Service Engineering* [WI4BWLISM4]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26456	Business Models in the Internet: Planning and Implementation (S. 507)	2/1	S	4,5	Weinhardt, Holtmann
26478	Special Topics in Information Engineering & Management (S. 514)	3	W/S	4.5	Weinhardt
26506	Personalization and Recommender Systems (S. 521)	2/1	S	4,5	Geyer-Schulz
26468	Service Innovation (S. 512)	2/1	S	5	Satzger, Neus

Remarks
The lecture *Special Topics in Information Engineering & Management* [26478] is first offered in the winter term 2009/10.

Module: Communications & Markets — Module key: [WI4BWLISM5]

Subject: Business Administration
Module coordination: Christof Weinhardt
Credit points (CP): 9

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.

Prerequisites
None.

Conditions
The course *Communications Economics* [26462] has to be attended.

Learning Outcomes
The student is able to

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

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

Courses in module *Communications & Markets* [WI4BWLISM5]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26462	Communications Economics (S. 510)	2/1	S	4,5	Seifert, Kraemer
26460	Market Engineering: Information in Institutions (S. 509)	2/1	S	4,5	Weinhardt, Kraemer
25408	Auction Theory (S. 381)	2/1	W	4.5	Ehrhart, Seifert
26478	Special Topics in Information Engineering & Management (S. 514)	3	W/S	4.5	Weinhardt

Remarks
The lecture *Special Topics in Information Engineering & Management* [26478] is first offered in the winter term 2009/10.

Module: Service Management — Module key: [WI4BWLISM6]

Subject: Business Administration
Module coordination: Gerhard Satzger, Christof Weinhardt
Credit points (CP): 9

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 seperately.
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.

Prerequisites
None.

Conditions
The course *Business and IT Service Management* [26484] is obligatory.
The course *eServices* [26466] can only be choosen, if it was not attended in the Bachelor programme.

Learning Outcomes
The students

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

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

Courses in module *Service Management* [WI4BWLISM6]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26484	Business and IT Service Management (S. 515)	2/1	W	5	Satzger
26452	Management of Business Networks (S. 505)	2/1	W	4.5	Weinhardt, Kraemer
26468	Service Innovation (S. 512)	2/1	S	5	Satzger, Neus
26466	eServices (S. 511)	2/1	S	5	Weinhardt, Satzger

Module: Information Engineering — Module key: [WI4BWLISM7]

Subject: Business Administration
Module coordination: Christof Weinhardt
Credit points (CP): 9

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 seperately.
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.

Prerequisites
None.

Conditions
The course *Principles of Information Engineering and Management* [26450] has to be taken.

Learning Outcomes
The student

- understands and analyzes the central role of information as an economic good, a production factor, and a competitive factor,
- identifies, evaluates, prices, and markets information goods,
- analyze and evaluate existing markets regarding the missing incentives and the optimal solution of a given market mechanism, respectively,
- develop solutions in teams.

Content
In the lecture *Principles of Information Engineering and Management*, a clear distinction of information as a production, competitive, and economic good is introduced. The central role of information is explained through the concept of the “information lifecycle”. The single phases from existence/generation through allocation and evaluation until the distribution and usage of information are analyzed from the business administration perspective and the microeconomic perspective.
In a second course the student can deepen his knowledge on the one hand on the design and operation of markets and on the other hand on the impact of digital goods in network industries regarding the pricing policies, business strategies and regulation issues. If choosen, the course Special Topics in Information Engineering & Management additionally provides an opportunity of practical research in the aforementioned range of subjects.

Courses in module *Information Engineering* [WI4BWLISM7]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26450	Principles of Information Engineering and Management (S. 504)	2/1	W	5	Weinhardt, Kraemer, van Dinther
26462	Communications Economics (S. 510)	2/1	S	4,5	Seifert, Kraemer
26460	Market Engineering: Information in Institutions (S. 509)	2/1	S	4,5	Weinhardt, Kraemer
26478	Special Topics in Information Engineering & Management (S. 514)	3	W/S	4.5	Weinhardt

Remarks
The lecture *Special Topics in Information Engineering & Management* [26478] is first offered in the winter term 2009/10.

Module: Industrial Production II — Module key: [WI4BWLIIP2]

Subject: Business Administration
Module coordination: Frank Schultmann
Credit points (CP): 9

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

Prerequisites
None.

Conditions
The course *Planning and Management of Industrial Plants* [25952] is obligatory. In addition to that one more course has to be chosen.

Learning Outcomes

Content

Courses in module *Industrial Production II* [WI4BWLIIP2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25952	Planning and Management of Industrial Plants (S. 446)	2/2	W	5.5	Schultmann
25962	Exhaust Emissions (VWL), Emissions into the Environment (ING) (S. 450)	2/0	W	3.5	Karl
25995	Material Flow Analysis and Life Cycle Assessment (S. 461)	2/0	W	3.5	Schebek

Module: Industrial Production III

Module key: [WI4BWLIIP6]

Subject: Business Administration
Module coordination: Frank Schultmann
Credit points (CP): 9

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Industrial Production III* [WI4BWLIIP6]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25954	Production and Logistics Management (S. 447)	2/2	S	5.5	Fröhling, Schultmann
25975	Computer-based Planning and Control of Production and Simulation of Processes (S. 459)	2/0	S	3.5	Fröhling, Möst, Schultmann
25963	The Management of R&D Projects with Case Studies (S. 451)	2/2	W/S	3.5	Schmied

Module: Basics of Liberalised Energy Markets — Module key: [WI4BWLIIP4]

Subject: Business Administration
Module coordination: Wolf Fichtner
Credit points (CP): 9

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Basics of Liberalised Energy Markets* [WI4BWLIIP4]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25998	Basics of Liberalised Energy Markets (S. 462)	2/1	W	3.5	Fichtner
26020	Energy Trade and Risk Management (S. 467)	2/1	S	3.5	Hufendiek
25959	Energy Policy (S. 449)	2/0	S	3.5	Wietschel
26022	Gas-Markets (S. 468)	2/0	W	3	Fichtner
26025	Simulation Game in Energy Economics (S. 469)	2/0	W	3	Fichtner
26234	Regulation Theory and Practice (S. 475)	2/1	S	4	Mitusch

Module: Energy Industry and Technology — Module key: [WI4BWLIIP5]

Subject: Business Administration
Module coordination: Wolf Fichtner
Credit points (CP): 9

Learning Control / Examinations

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Energy Industry and Technology* [WI4BWLIIP5]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26003	Energy and Environment (S. 466)	2/1	S	5	Karl, n.n.
25958	Strategical Aspects of Energy Economy (S. 448)	2/0	W	3.5	Ardone
26000	Technological Change in Energy Industry (S. 463)	2/0	W	3	Wietschel
26001	Heat Economy (S. 464)	2/0	S	3	Fichtner
26002	Energy Systems Analysis (S. 465)	2/0	S	3	Möst

Module: Industrial Ergonomics — Module key: [WI4BWLIIP1]

Subject: Business Administration
Module coordination: Peter Knauth
Credit points (CP): 9

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 seperately.
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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Industrial Ergonomics* [WI4BWLIIP1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25988	Changes in th Working World (S. 460)	2	W/S	3	Hornberger
25964	Ergonomics I (S. 452)	2/1	W	3	Knauth
25965	Ergonomics II (S. 453)	2/1	S	3	Karl
25967	Industrial Studies of Time and Motion (S. 454)	2	W	3	Dürrschnabel

Module: Leadership / Change Management — Module key: [WI4BWLIIP3]

Subject: Business Administration
Module coordination: Peter Knauth
Credit points (CP): 9

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 every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module seperately.
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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Leadership / Change Management* [WI4BWLIIP3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25972	Human Resource Management I (S. 457)	2	W	3	Wollert
25973	Human Resource Management II (S. 458)	2	S	3	Wollert
25968	Social Relationships in Organisations (S. 455)	2	S	3	Kraus
25969	Development of Personnal and Organisation (S. 456)	2	W	3	Weisheit

5.2 Economics

Module: Innovation and Technical Change — Module key: [WI4VWL1]

Subject: Economics
Module coordination: Hariolf Grupp, N.N.
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
It is helpful to have attended the course *Innovation* [26274] of the Bachelor programme..

Conditions
None.

Learning Outcomes

Content

Courses in module *Innovation and Technical Change* [WI4VWL1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26272	Economics of Innovation (S. 480)	2/2	W	6	Grupp
26291	Managing New Technologies (S. 482)	2/1	S	5	Reiß

Module: Applied Strategic Decisions — Module key: [WI4VWL2]

Subject: Economics
Module coordination: Siegfried Berninghaus, Clemens Puppe
Credit points (CP): 9

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

Prerequisites
The student should have basic knowledge of game theory.

Conditions
The course *Game Theory II* [25369] is obligatory. Exception: This lecture was completed in the Bachelor study programme.

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

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

Courses in module *Applied Strategic Decisions* [WI4VWL2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25369	Game Theory II (S. 377)	2/2	W	4.5	Berninghaus
25525	Game Theory I (S. 386)	2/2	S	4.5	Berninghaus
25408	Auction Theory (S. 381)	2/1	W	4.5	Ehrhart, Seifert
26460	Market Engineering: Information in Institutions (S. 509)	2/1	S	4,5	Weinhardt, Kraemer
25373	Experimental Economics (S. 378)	2/1	S	4,5	Berninghaus, Bleich

Module: Money and Payment — Module key: [WI4VWL3]

Subject: Economics
Module coordination: Malte Krüger
Credit points (CP): 9

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offerd at every ordinary examination date. The assessment procedures are described for each course of the module seperately.
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".

Prerequisites
Knowledge in the area of Macroecomomics is helpful.

Conditions
None.

Learning Outcomes

Content

Courses in module *Money and Payment* [WI4VWL3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26100	Monetary Theory (S. 470)	2/1	S	5	Krüger
26252	International Economics (S. 477)	2/1	W	5	Kowalski

Module: Network Economics — Module key: [WI4VWL4]

Subject: Economics
Module coordination: Kay Mitusch
Credit points (CP): 9

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.
The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offerd at every ordinary examination date. The assessment procedures are described for each course of the module seperately. 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".

Prerequisites
Basics of microeconomics obtained within the undergraduate programme (B.Sc) of economics are required. Useful, but not necessary, are basic knowledge of industrial economics, prinicpal agent theory, and contract theory.

Conditions
In this module the lecture *Competition in Networks* [26240] (Prof. Mitusch) has to be attended and the test passed.

Learning Outcomes
The student
- recognizes the specific characterizations of Network Economics
- understands the interaction of infrastructures, control systems and users and he/she can simulate exemplary applications
- is able to evaluate actions in networks, e.g. investment, price and regulation politics
- perceives the necessity of regulations of natural monopoles and he/she identifies regulation procedures that are important for networks.

Content
The module is concerned with network or infrastructure industries in the economy, e.g. telecommunication, traffic and energy sectors. These sectors are characterized by close interdependencies of operators and users of infrastructure as well as on states. States intervene in various forms, by the public and regulation authorities, due to the importance of network industries and due to limited abilities of markets to work properly in these industries. The students are supposed to develop a broad knowledge of these sectors and of the political options available.

Courses in module *Network Economics* [WI4VWL4]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26240	Competition in Networks (S. 476)	2/1	W	5	Mitusch
26206	Regulation (S. 472)	2/0	W	4	Kopp
26234	Regulation Theory and Practice (S. 475)	2/1	S	4	Mitusch
26230	Transport Economics (S. 473)	2/1	W	4	Liedtke, Szimba
26232	Telecommunication and Internet Economics (S. 474)	2/1	W	4	Mitusch

Remarks
This module continues the old module *Network Economies* by Prof. Rothengatter.
Dr. Kopp´s lecture *Regulation* [26206] (held for the last time in the WT 09/10) is substituted by the lecture *Regulation Theory and Practice* [26234] by Prof. Mitusch (held for the first time in the ST 10); only one of these lectures can be taken into account
Beginning in the WT 2009/2010, the lecture *Competition in Networks* [26240] will always be held during the winter term.

Module: Environmental Economics — Module key: [WI4VWL5]

Subject: Economics
Module coordination: Hariolf Grupp, N.N.
Credit points (CP): 9

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offerd at every ordinary examination date. The assessment procedures are described for each course of the module seperately.
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".

Prerequisites
Knowledge in the area of microeconomics and of the content of the course *Economics I: Microeconomics* [25012], respectively, is assumed.

Conditions
None.

Learning Outcomes

Content

Courses in module *Environmental Economics* [WI4VWL5]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25547	Environmental Economics and Sustainability (S. 391)	2/1	W	5	Walz
25548	Environmental and Ressource Policy (S. 392)	2/1	S	5	Walz
26003	Energy and Environment (S. 466)	2/1	S	5	Karl, n.n.
24140	Environmental Law (S. 313)	2	W	4	Spiecker genannt Döhmann

Module: Economic Policy — Module key: [WI4VWL6]

Subject: Economics
Module coordination: Jan Kowalski
Credit points (CP): 9

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 offerd at every ordinary examination date. The assessment procedures are described for each course of the module seperately.
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".

Prerequisites
None.

Conditions
None.

Learning Outcomes
The students

- obtain comprehensive knowledge and competence in various aspects of economic policy
- obtain comprehensive knowledge and competence in issues connected with the European economic integration

Content

Courses in module *Economic Policy* [WI4VWL6]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26280	Economic Policy (S. 481)	2/1	S	5	Schaffer
26257	Economic integration in Europe (S. 478)	2	W	4	Kowalski
26272	Economics of Innovation (S. 480)	2/2	W	6	Grupp

Remarks

Module: Allocation and Equilibrium — Module key: [WI4VWL7]

Subject: Economics
Module coordination: Clemens Puppe
Credit points (CP): 9

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 seperately.
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 grade of the term paper can improve the overall grade of the module up to third but at least up to an improvement of one grading scale. 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/).

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

Conditions
None.

Learning Outcomes

Content

Courses in module *Allocation and Equilibrium* [WI4VWL7]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25527	Advanced Microeconomic Theory (S. 387)	2/1	S	4.5	Puppe
25517	Welfare Economics (S. 385)	2/1	S	4.5	Puppe
25549	Theory of Business Cycles (S. 393)	2/1	W	4.5	Hillebrand

Module: Macroeconomic Theory — Module key: [WI4VWL8]

Subject: Economics
Module coordination: Clemens Puppe
Credit points (CP): 9

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 seperately.
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 grade of the term paper can improve the overall grade of the module up to third but at least up to an improvement of one grading scale. 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/).

Prerequisites
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.

Conditions
None.

Learning Outcomes

Content

Courses in module *Macroeconomic Theory* [WI4VWL8]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25543	Theory of Economic Growth (S. 390)	2/1	S	4.5	Hillebrand
25549	Theory of Business Cycles (S. 393)	2/1	W	4.5	Hillebrand

Module: Social Choice Theory — Module key: [WI4VWL9]

Subject: Economics
Module coordination: Clemens Puppe
Credit points (CP): 9

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 seperately.
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 grade of the term paper can improve the overall grade of the module up to third but at least up to an improvement of one grading scale. 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/).

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

Conditions
None.

Learning Outcomes

Content

Courses in module *Social Choice Theory* [WI4VWL9]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25517	Welfare Economics (S. 385)	2/1	S	4.5	Puppe
25525	Game Theory I (S. 386)	2/2	S	4.5	Berninghaus
25537	Decision Theory and Objectives in Applied Politics (S. 388)	2/1	W	4.5	Tangian
25539	Mathematical Theory of Democracy (S. 389)	2/1	S	4.5	Tangian

5.3 Informatics

Module: Informatics — Module key: [WI4INFO1]

Subject: Informatics
Module coordination: Hartmut Schmeck, Andreas Oberweis, Detlef Seese, Wolffried Stucky, Rudi Studer, Stefan Tai
Credit points (CP): 9

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. 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 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.

Prerequisites
None.

Conditions
It is only possible to choose a course if the course or a similar one in an other module has not been attended in the Bachelor or Master programme.
One course has to be chosen from the core courses.
Core courses are: *Algorithms for Internet Applications* [25702], *Applied Informatics I - Modelling* [25070], *Applied Informatics II - IT Systems for e-Commerce* [25033], *Complexity Management* [25760], *Database Systems* [25720], *Software Engineering* [25728], *Service-oriented Computing I* [25770] and *Knowledge Management* [25740].
It is only allowed to choose one lab.

Learning Outcomes
The student

- has the ability to master methods and tools in a complex discipline and to demonstrate innovativness regarding the methods used,
- knows the principles and methods in the context of their application in practice,
- is able to grasp and apply the rapid developments in the field of computer science, which are encountered in work life, quickly and correctly, based on a fundamental understanding of the concepts and methods of computer science,
- is capable of finding and defending arguments for solving problems.

Content
The thematic focus will be based on the choice of courses in the areas of Effiziente Algorithmen, Betriebliche Informations- und Kommunikationssysteme, Wissensmanagement, Komplexitätsmanagement and Software- und Systems Engineering.

Courses in module *Informatics* [WI4INFO1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25702	Algorithms for Internet Applications (S. 404)	2/1	W	5	Schmeck
25070	Applied Informatics I - Modelling (S. 329)	2/1	W	5	Oberweis, Studer, Agarwal
25033	Applied Informatics II - IT Systems for e-Commerce (S. 327)	2/1	S	5	Tai
25760	Complexity Management (S. 421)	2/1	S	5	Seese
25720	Database Systems (S. 408)	2/1	S	5	Oberweis, Dr. D. Sommer
25728	Software Engineering (S. 412)	2/1	W	5	Oberweis, Seese
25770	Service Oriented Computing 1 (S. 427)	2/1	W	5	Tai
25740	Knowledge Management (S. 416)	2/1	W	5	Studer
25776	Cloud Computing (S. 430)	2/1	W	5	Tai, Kunze
25724	Database Systems and XML (S. 410)	2/1	W	5	Oberweis
25735	Document Management and Groupware Systems (S. 414)	2	S	4	Klink
25700	Efficient Algorithms (S. 401)	2/1	S	5	Schmeck
25786	Enterprise Architecture Management (S. 432)	2/1	W	5	Wolf
25762	Intelligent Systems in Finance (S. 423)	2/1	S	5	Seese
25764	IT Complexity in Practice (S. 426)	2/1	W	5	Kreidler
25742	Knowledge Discovery (S. 418)	2/1	W	5	Studer
25784	Management of IT-Projects (S. 431)	2/1	S	5	Schätzle
25736	Business Process Modelling (S. 415)	2/1	W	5	Oberweis, Mevius
25706	Nature-inspired Optimisation (S. 407)	2/1	W	5	Mostaghim, Shukla
25704	Organic Computing (S. 405)	2/1	S	5	Schmeck, Mostaghim
25790	Capability maturity models for software and systems engineering (S. 434)	2	S	4	Kneuper
25748	Semantic Web Technologies I (S. 419)	2/1	W	5	Studer, Rudolph
25750	Semantic Web Technologies II (S. 420)	2/1	S	5	Studer, Agarwal
25772	Service Oriented Computing 2 (S. 428)	2/1	S	5	Tai, Studer
25730	Software Technology: Quality Management (S. 413)	2/1	S	5	Oberweis
25700sp	Special Topics of Efficient Algorithms (S. 403)	2/1	W/S	5	Schmeck
SBI	Special Topics of Enterprise Information Systems (S. 539)	2/1	W/S	5	Oberweis, Stucky
KompMansp	Special Topics of Complexity Management (S. 537)	2/1	W/S	5	Seese
SSEsp	Special Topics of Software- and Systemsengineering (S. 540)	2/1	W/S	5	Oberweis, Seese
25860sem	Special Topics of Knowledge Management (S. 438)	2/1	W/S	5	Studer
25788	Strategic Management of Information Technology (S. 433)	2/1	S	5	Wolf
25722	Distributed Database Systems: Basic Technology for e-Business (S. 409)	2/1	S	5	Oberweis
25774	Web Service Engineering (S. 429)	2/1	S	5	Zirpins
25726	Workflow-Management (S. 411)	2/1	S	5	Oberweis
25810	Practical Seminar Knowledge Discovery (S. 435)	2	S	4	Studer
PraBI	Computing Lab Information Systems (S. 538)	2	W/S	4	Oberweis, Seese, Stucky, Studer
25700p	Advanced Lab in Efficient Algorithms (S. 402)	3	W/S	4	Schmeck
25762p	Computing Lab in Intelligent Systems in Finance (S. 425)	3	W/S	4	Seese
25818	Computing Lab in Complexity Management (S. 436)	3	W/S	4	Seese
25820	Lab Class Web Services (S. 437)	2	W	4	Tai, Studer, Satzger, Zirpins
25740p	Ecxercises in Knowlegde Management (S. 417)	3	W/S	4	Studer

Remarks

Module: Emphasis in Informatics — Module key: [WI4INFO2]

Subject: Informatics
Module coordination: Hartmut Schmeck, Andreas Oberweis, Detlef Seese, Wolffried Stucky, Rudi Studer, Stefan Tai
Credit points (CP): 9

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 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.

Prerequisites
The module *Informatics* [WI4INFO1] has to be completed successfully.

Conditions
It is only possible to choose a course if the course or a similar one in an other module has not been attended in the Bachelor or Master programme.
One course has to be chosen from the core courses.
Core courses are: *Algorithms for Internet Applications* [25702], *Applied Informatics I - Modelling* [25070], *Applied Informatics II - IT Systems for e-Commerce* [25033], *Complexity Management* [25760], *Database Systems* [25720], *Service-oriented Computing I* [25770], *Software Engineering* [25728] and *Knowledge Management* [25740].
It is only allowed to choose one lab.

Learning Outcomes
The student

- has the ability to master methods and tools in a complex discipline and to demonstrate innovativness regarding the methods used,
- knows the principles and methods in the context of their application in practice,
- is able to grasp and apply the rapid developments in the field of computer science, which are encountered in work life, quickly and correctly, based on a fundamental understanding of the concepts and methods of computer science,
- is capable of finding and defending arguments for solving problems.

Content
The thematic focus will be based on the choice of courses in the areas of Effiziente Algorithmen, Betriebliche Informations- und Kommunikationssysteme, Wissensmanagement, Komplexitätsmanagement and Software- und Systems Engineering.

Courses in module *Emphasis in Informatics* [WI4INFO2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25702	Algorithms for Internet Applications (S. 404)	2/1	W	5	Schmeck
25070	Applied Informatics I - Modelling (S. 329)	2/1	W	5	Oberweis, Studer, Agarwal
25033	Applied Informatics II - IT Systems for e-Commerce (S. 327)	2/1	S	5	Tai
25760	Complexity Management (S. 421)	2/1	S	5	Seese
25720	Database Systems (S. 408)	2/1	S	5	Oberweis, Dr. D. Sommer
25770	Service Oriented Computing 1 (S. 427)	2/1	W	5	Tai
25728	Software Engineering (S. 412)	2/1	W	5	Oberweis, Seese
25740	Knowledge Management (S. 416)	2/1	W	5	Studer
25724	Database Systems and XML (S. 410)	2/1	W	5	Oberweis
25735	Document Management and Groupware Systems (S. 414)	2	S	4	Klink
25700	Efficient Algorithms (S. 401)	2/1	S	5	Schmeck
25786	Enterprise Architecture Management (S. 432)	2/1	W	5	Wolf
25762	Intelligent Systems in Finance (S. 423)	2/1	S	5	Seese
25764	IT Complexity in Practice (S. 426)	2/1	W	5	Kreidler
25742	Knowledge Discovery (S. 418)	2/1	W	5	Studer
25784	Management of IT-Projects (S. 431)	2/1	S	5	Schätzle
25736	Business Process Modelling (S. 415)	2/1	W	5	Oberweis, Mevius
25706	Nature-inspired Optimisation (S. 407)	2/1	W	5	Mostaghim, Shukla
25704	Organic Computing (S. 405)	2/1	S	5	Schmeck, Mostaghim
25790	Capability maturity models for software and systems engineering (S. 434)	2	S	4	Kneuper
25748	Semantic Web Technologies I (S. 419)	2/1	W	5	Studer, Rudolph
25750	Semantic Web Technologies II (S. 420)	2/1	S	5	Studer, Agarwal
25772	Service Oriented Computing 2 (S. 428)	2/1	S	5	Tai, Studer
25730	Software Technology: Quality Management (S. 413)	2/1	S	5	Oberweis
SBI	Special Topics of Enterprise Information Systems (S. 539)	2/1	W/S	5	Oberweis, Stucky
25700sp	Special Topics of Efficient Algorithms (S. 403)	2/1	W/S	5	Schmeck
KompMansp	Special Topics of Complexity Management (S. 537)	2/1	W/S	5	Seese
SSEsp	Special Topics of Software- and Systemsengineering (S. 540)	2/1	W/S	5	Oberweis, Seese
25860sem	Special Topics of Knowledge Management (S. 438)	2/1	W/S	5	Studer
25788	Strategic Management of Information Technology (S. 433)	2/1	S	5	Wolf
25722	Distributed Database Systems: Basic Technology for e-Business (S. 409)	2/1	S	5	Oberweis
25774	Web Service Engineering (S. 429)	2/1	S	5	Zirpins
25726	Workflow-Management (S. 411)	2/1	S	5	Oberweis
PraBI	Computing Lab Information Systems (S. 538)	2	W/S	4	Oberweis, Seese, Stucky, Studer
25700p	Advanced Lab in Efficient Algorithms (S. 402)	3	W/S	4	Schmeck
25762p	Computing Lab in Intelligent Systems in Finance (S. 425)	3	W/S	4	Seese
25818	Computing Lab in Complexity Management (S. 436)	3	W/S	4	Seese
25810	Practical Seminar Knowledge Discovery (S. 435)	2	S	4	Studer
25820	Lab Class Web Services (S. 437)	2	W	4	Tai, Studer, Satzger, Zirpins
25740p	Ecxercises in Knowlegde Management (S. 417)	3	W/S	4	Studer
25776	Cloud Computing (S. 430)	2/1	W	5	Tai, Kunze

Module: Electives in Informatic — Module key: [WI4INFO3]

Subject: Informatics
Module coordination: Hartmut Schmeck, Andreas Oberweis, Detlef Seese, Wolffried Stucky, Rudi Studer, Stefan Tai
Credit points (CP): 9

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 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.

Prerequisites
The module *Informatics* [WI4INFO1] has to be completed successfully.
Knowledge of the content of the module *Emphasis in Informatics* [WI4INFO2] is helpful.

Conditions
It is only possible to choose a course if the course or a similar one in an other module has not been attended in the Bachelor or Master programme.
It is only allowed to choose one lab.

Learning Outcomes
The student

- has the ability to master methods and tools in a complex discipline and to demonstrate innovativness regarding the methods used,
- knows the principles and methods in the context of their application in practice,
- is able to grasp and apply the rapid developments in the field of computer science, which are encountered in work life, quickly and correctly, based on a fundamental understanding of the concepts and methods of computer science,
- is capable of finding and defending arguments for solving problems.

Content
The thematic focus will be based on the choice of courses in the areas of Effiziente Algorithmen, Betriebliche Informations- und Kommunikationssysteme, Wissensmanagement, Komplexitätsmanagement and Software- und Systems Engineering.

Courses in module *Electives in Informatic* [WI4INFO3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25702	Algorithms for Internet Applications (S. 404)	2/1	W	5	Schmeck
25070	Applied Informatics I - Modelling (S. 329)	2/1	W	5	Oberweis, Studer, Agarwal
25033	Applied Informatics II - IT Systems for e-Commerce (S. 327)	2/1	S	5	Tai
25760	Complexity Management (S. 421)	2/1	S	5	Seese
25720	Database Systems (S. 408)	2/1	S	5	Oberweis, Dr. D. Sommer
25770	Service Oriented Computing 1 (S. 427)	2/1	W	5	Tai
25728	Software Engineering (S. 412)	2/1	W	5	Oberweis, Seese
25740	Knowledge Management (S. 416)	2/1	W	5	Studer
25724	Database Systems and XML (S. 410)	2/1	W	5	Oberweis
25735	Document Management and Groupware Systems (S. 414)	2	S	4	Klink
25700	Efficient Algorithms (S. 401)	2/1	S	5	Schmeck
25786	Enterprise Architecture Management (S. 432)	2/1	W	5	Wolf
25762	Intelligent Systems in Finance (S. 423)	2/1	S	5	Seese
25764	IT Complexity in Practice (S. 426)	2/1	W	5	Kreidler
25742	Knowledge Discovery (S. 418)	2/1	W	5	Studer
25784	Management of IT-Projects (S. 431)	2/1	S	5	Schätzle
25736	Business Process Modelling (S. 415)	2/1	W	5	Oberweis, Mevius
25706	Nature-inspired Optimisation (S. 407)	2/1	W	5	Mostaghim, Shukla
25704	Organic Computing (S. 405)	2/1	S	5	Schmeck, Mostaghim
25790	Capability maturity models for software and systems engineering (S. 434)	2	S	4	Kneuper
25748	Semantic Web Technologies I (S. 419)	2/1	W	5	Studer, Rudolph
25750	Semantic Web Technologies II (S. 420)	2/1	S	5	Studer, Agarwal
25772	Service Oriented Computing 2 (S. 428)	2/1	S	5	Tai, Studer
25730	Software Technology: Quality Management (S. 413)	2/1	S	5	Oberweis
SBI	Special Topics of Enterprise Information Systems (S. 539)	2/1	W/S	5	Oberweis, Stucky
25700sp	Special Topics of Efficient Algorithms (S. 403)	2/1	W/S	5	Schmeck
KompMansp	Special Topics of Complexity Management (S. 537)	2/1	W/S	5	Seese
SSEsp	Special Topics of Software- and Systemsengineering (S. 540)	2/1	W/S	5	Oberweis, Seese
25860sem	Special Topics of Knowledge Management (S. 438)	2/1	W/S	5	Studer
25788	Strategic Management of Information Technology (S. 433)	2/1	S	5	Wolf
25722	Distributed Database Systems: Basic Technology for e-Business (S. 409)	2/1	S	5	Oberweis
25774	Web Service Engineering (S. 429)	2/1	S	5	Zirpins
25726	Workflow-Management (S. 411)	2/1	S	5	Oberweis
PraBI	Computing Lab Information Systems (S. 538)	2	W/S	4	Oberweis, Seese, Stucky, Studer
25700p	Advanced Lab in Efficient Algorithms (S. 402)	3	W/S	4	Schmeck
25762p	Computing Lab in Intelligent Systems in Finance (S. 425)	3	W/S	4	Seese
25810	Practical Seminar Knowledge Discovery (S. 435)	2	S	4	Studer
25818	Computing Lab in Complexity Management (S. 436)	3	W/S	4	Seese
25820	Lab Class Web Services (S. 437)	2	W	4	Tai, Studer, Satzger, Zirpins
25740p	Ecxercises in Knowlegde Management (S. 417)	3	W/S	4	Studer
25776	Cloud Computing (S. 430)	2/1	W	5	Tai, Kunze

5.4 Operations Research

Module: Quantitative Marketing and OR — Module key: [WI4OR1]

Subject: Operations Research
Module coordination: Wolfgang Gaul
Credit points (CP): 9

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Quantitative Marketing and OR* [WI4OR1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25154	Modern Market Research (S. 343)	2/1	S	4.5	Gaul
25156	Marketing and Operations Research (S. 344)	2/1	S	4.5	Gaul
25158	Corporate Planning and Operations Research (S. 345)	2/1	W	4.5	Gaul
25171	Data Analysis and Operations Research (S. 353)	2/1	W	4.5	Gaul

Module: Operations Research in Supply Chain Management and Health Care Management Module key: [WI4OR5]

Subject: Operations Research
Module coordination: Stefan Nickel
Credit points (CP): 9

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 seperately.
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.

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

Conditions
In agreement with the module coordinator, a course from the modules *Mathematical optimization* [WW4OR6] or *Stochastic Modelling and Optimization* [WW4OR7] or one of the courses *Game Theory I* [25525] and *Game Theory II* [25369] can be acknowledged.

Learning Outcomes
The student

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

Content
Supply Chain Management is concerned with the planning and optimization of the entire, inter-company procurement, production and distribution process for several products taking place between different business partners (suppliers, logistics service providers, dealers). The main goal is to minimize the overall costs while taking into account several constraints including the satisfaction of customer demands.
This module considers several areas of SCM. On the one hand, the determination of optimal locations within a supply chain is addressed. Strategic decisions concerning the location of facilities as production plants, distribution centers or warehouses are of high importance for the rentability of Supply Chains. Thoroughly carried out, location planning tasks allow an efficient flow of materials and lead to lower costs and increased customer service. On the other hand, the planning of material transport in the context of supply chain management represents another focus of this module. By linking transport connections and different facilities, the material source (production plant) is connected with the material sink (customer). For given material flows or shipments, it is considered how to choose the optimal (in terms of minimal costs) distribution and transportation chain from the set of possible logistics chains, which asserts the compliance of delivery times and further constraints. Furthermore, this module offers the possibility to learn about different aspects of the tactical and operational planning level in Suppy Chain Mangement, including methods of scheduling as well as different approaches in procurement and distribution logistics. Finally, issues of warehousing and inventory management will be discussed.
Health Care Management addresses specific Supply Chain Management problems in the health sector. Important applications arise in scheduling and internal logistics of hospitals.

Courses in module [WI4OR5]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25486	Facility Location and Strategic Supply Chain Management (S. 382)	2/1	S	4.5	Nickel
25488	Tactical and Operational Supply Chain Management (S. 383)	2/1	W	4.5	Nickel
n.n.	Operations Research in Supply Chain Management (S. 566)	2/1	S	4.5	Nickel
n.n.	Operations Research in Health Care Management (S. 569)	2/1	S	4.5	Nickel
090428	Enterprise Hospital (S. 231)	2/0	W/S	2	Nickel, Hansis
n.n.	Practical Course: Health Care Management (with Case Studies) (S. 567)	2/1	W/S	7	Nickel
n.n.	Software Laboratory: OR Models II (S. 565)	2/1	S	4.5	Nickel
n.n.	Software Laboratory: Simulation (S. 562)	2/1	S	4.5	Nickel
n.n.	Software Laboratory: SAP APO (S. 563)	2/1	S	4.5	Nickel

Remarks
Some lectures and courses are offered irregularly.
The planned lectures and courses for the next three years are announced online.

Module: Mathematical Programming — Module key: [WI4OR6]

Subject: Operations Research
Module coordination: Oliver Stein
Credit points (CP): 9

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 seperately.
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.

Prerequisites
None.

Conditions
Upon consultation with the module coordinator, alternatively one lecture from the modules *Operations Research in Supply Chain Management and Health Care Management* [WW4OR5] and *Stochastic Modeling and Optimization* [WW4OR7] or one of the lectures *Game Theory I* [25525] and *Game Theory II* [25369] may be accepted.

Learning Outcomes
The student

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

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

Courses in module *Mathematical Programming* [WI4OR6]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25138	Mixed Integer Programming I (S. 341)	2/1	S	4.5	Stein
25140	Mixed Integer Programming II (S. 342)	2/1	W	4.5	Stein
25128	Special Topics in Optimization I (S. 334)	2/1	W/S	4.5	Stein
25126	Special Topics in Optimization II (S. 333)	2/1	W/S	4.5	Stein
n.n.	Location Theory (S. 561)	2/1	W	4.5	Nickel
n.n.	Graph Theory (S. 564)	2/1	W	4.5	Nickel
n.n.	Software Laboratory: OR Models II (S. 565)	2/1	S	4.5	Nickel
25111	Nonlinear Optimization I (S. 331)	2/1	S	4.5	Stein
25113	Nonlinear Optimization II (S. 332)	2/1	S	4.5	Stein
25134	Global Optimization I (S. 337)	2/1	W	4.5	Stein
25136	Global Optimization II (S. 339)	2/1	W	4.5	Stein

Remarks
The module is offered in winter 2009/10 for the first time.
The lectures are partly offered irregularly. The curriculum of the next two years is available online (www.ior.kit.edu).

Module: Special Topics in Optimization — Module key: [WI4OR7]

Subject: Operations Research
Module coordination: Karl-Heinz Waldmann
Credit points (CP): 9

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

Prerequisites
None.

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

Courses in module *Special Topics in Optimization* [WI4OR7]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25679	Markov Decision Models I (S. 398)	2/1/2	W	4.5	Waldmann
25682	Markov Decision Models II (S. 399)	2/1/2	S	4.5	Waldmann
25674	Quality Control I (S. 397)	2/1/2	W	4.5	Waldmann
25659	Quality Control II (S. 394)	2/1/2	S	4.5	Waldmann
25687	Optimization in a Random Environment (S. 400)	2/1/2	W/S	4.5	Waldmann
25662	Simulation I (S. 395)	2/1/2	W	4.5	Waldmann
25665	Simulation II (S. 396)	2/1/2	S	4.5	Waldmann
n.n.	OR-nahe Modellierung und Analyse realer Probleme (Projekt) (S. 568)	2/1	W/S	4.5	Waldmann

Remarks
The module is offered in winter 2009/10 for the first time.

Module: Optimization in Practice — Module key: [WI4OR2]

Subject: Operations Research
Module coordination: Oliver Stein
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Optimization in Practice* [WI4OR2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25111	Non-linear Optimization (S. 330)	4/2/2	S	9	Stein
25134	Global Optimization (S. 338)	4/2/2	W	9	Stein
25138	Mixed-integer Optimization (S. 340)	4/2	S	9	Stein
25128	Combinatorial Optimization (S. 335)	4/2	S	9	N.n.

Remarks
The module was offered in summer term 2009 for the last time.

Module: Stochastic Methods in Economy and Engineering/ Management of Operations Module key: [WI4OR3]

Subject: Operations Research
Module coordination: Karl-Heinz Waldmann
Credit points (CP): 9

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

Prerequisites
None.

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:
Control charts, sampling plans, experimental design.
Reliability theory, maintenance.

Courses in module [WI4OR3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25674	Quality Control I (S. 397)	2/1/2	W	4.5	Waldmann
25659	Quality Control II (S. 394)	2/1/2	S	4.5	Waldmann
25687	Optimization in a Random Environment (S. 400)	2/1/2	W/S	4.5	Waldmann

Remarks
The lectures of the module are offered irregularly. The curriculum of the next two years is available online.

Module: Stochastic Modelling and Optimization — Module key: [WI4OR4]

Subject: Operations Research
Module coordination: Karl-Heinz Waldmann
Credit points (CP): 9

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

Prerequisites
None.

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:
Markov Chains, Poisson Processes, Markov Chains in Continuous Time, Queuing Systems.
Markov decision processes.
Discrete event simulation, generation of random numbers, generating discrete and continuous random variables, statistical analysis of simulated data, variance reduction techniques, case studies.
Game Theory.

Courses in module *Stochastic Modelling and Optimization* [WI4OR4]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25662	Simulation I (S. 395)	2/1/2	W	4.5	Waldmann
25665	Simulation II (S. 396)	2/1/2	S	4.5	Waldmann
25369	Game Theory II (S. 377)	2/2	W	4.5	Berninghaus
25679	Markov Decision Models I (S. 398)	2/1/2	W	4.5	Waldmann
25682	Markov Decision Models II (S. 399)	2/1/2	S	4.5	Waldmann

Remarks
The lectures *Markov Decision Models II, Simulation I* [25662], and *Simulation II* [25665] are offered irregularly. The curriculum of the next two years is available online.
Credit from the voluntary computer lab in *Markov Decision Models I, Markov Decision Models II, Simulation I* [25662], and *Simulation II* [25665] is accounted for in the overall grade raising the exam grade by 1/3 each.

5.5 Statistics

Module: Econometrics and Risk Management in Finance — Module key: [WI4STAT]

Subject: Statistics
Module coordination: Svetlozar Rachev
Credit points (CP): 9

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 seperately.
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.

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

Conditions
None.

Learning Outcomes

Content

Courses in module *Econometrics and Risk Management in Finance* [WI4STAT]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25331	Stochastic Calculus and Finance (S. 369)	2/1	W	4,5	Rachev
25353	Statistical Methods in Financial Risk Management (S. 373)	2/1	W	4,5	Rachev
25357	Portfolio and Asset Liability Management (S. 375)	2/1	S	5	Rachev
25359	Financial Time Series and Econometrics (S. 376)	2/1	W	5	Rachev
25381	Advanced Econometrics of Financial Markets (S. 380)	2/1	S	5	Rachev

Module: Mathematical and Empirical Finance — Module key: [WI4STAT1]

Subject: Statistics
Module coordination: Svetlozar Rachev
Credit points (CP): 9

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 seperately.
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.

Prerequisites
None.

Conditions
The lecture *Stochastic Calculus and Finance* [25331] is mandatory.

Learning Outcomes

Content

Courses in module *Mathematical and Empirical Finance* [WI4STAT1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25331	Stochastic Calculus and Finance (S. 369)	2/1	W	4,5	Rachev
25359	Financial Time Series and Econometrics (S. 376)	2/1	W	5	Rachev
25381	Advanced Econometrics of Financial Markets (S. 380)	2/1	S	5	Rachev
25357	Portfolio and Asset Liability Management (S. 375)	2/1	S	5	Rachev
25350/1	Finance and Banking (S. 372)	2/2	W	5	Vollmer
25355	Bank Management and Financial Markets, Applied Econometrics (S. 374)	2/2	S	5	Vollmer

Module: Statistical Methods in Risk Management — Module key: [WI4STAT2]

Subject: Statistics
Module coordination: Svetlozar Rachev
Credit points (CP): 9

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 seperately.
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.

Prerequisites
None.

Conditions
The lecture *Statistical Methods in Financial Risk Management* [25353] is mandatory.

Learning Outcomes

Content

Courses in module *Statistical Methods in Risk Management* [WI4STAT2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25353	Statistical Methods in Financial Risk Management (S. 373)	2/1	W	4,5	Rachev
25337	Stochastic and Econometric Models in Credit Risk Management (S. 370)	2/2	S	5	Rachev
25357	Portfolio and Asset Liability Management (S. 375)	2/1	S	5	Rachev
25342	Operational Risk and Extreme Value Theory (S. 371)	2/2	W/S	5	Rachev
25375	Data Mining (S. 379)	2	W	5	Nakhaeizadeh
25317	Multivariate Methods (S. 368)	2/2	S	5	Heller

Module: Risk Management and Econometrics in Finance — Module key: [WI4STAT3]

Subject: Statistics
Module coordination: Svetlozar Rachev
Credit points (CP): 9

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 seperately.
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.

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

Conditions
None.

Learning Outcomes

Content

Courses in module *Risk Management and Econometrics in Finance* [WI4STAT3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25353	Statistical Methods in Financial Risk Management (S. 373)	2/1	W	4,5	Rachev
25359	Financial Time Series and Econometrics (S. 376)	2/1	W	5	Rachev
25381	Advanced Econometrics of Financial Markets (S. 380)	2/1	S	5	Rachev

5.6 Engineering Sciences

Module: Analysing and Simulation Methods for Mechanical Systems Module key: [WI4INGMB19]

Subject: Engineering Science
Module coordination: Carsten Proppe
Credit points (CP): 9

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 seperately.
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.

Prerequisites
The courses *Engineering Mechanics I* [21208] and *Engineering Mechanics II* [22642] have to be completed successfully.

Conditions
None.

Learning Outcomes

Content

Courses in module *Analysing and Simulation Methods for Mechanical Systems* [WI4INGMB19]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
21282	Introduction to the Finite-Element-Method (S. 223)	3/1	S	6	Böhlke
21235	Introduction to Multibody System Dynamics (S. 217)	2	S	3	Seemann
21254	Mathematical Methods in Strength of Materials (S. 221)	2/1	W	4.5	Böhlke
21241	Mathematical Practices in Vibrations (S. 219)	2/1	S	4.5	Wauer
21236	Simulation of Dynamical Systems (S. 218)	2/2	S	6	Proppe
21241p	Practical Training in Measurement of Vibrations (S. 220)	2	W/S	3	Wauer

Module: Selected Topics in Production Technology I — Module key: [WI4INGMB1]

Subject: Engineering Science
Module coordination: Volker Schulze
Credit points (CP): 9

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 seperately.
The overall grade of the module is the grade of the written exam.

Prerequisites
None.

Conditions
It is recommended to attend at least one, at best all three basic courses of production technology in the modules *Production Technology I* [WI3INGMB10], *Production Technology II* [WI3NGMB4], *Production Technology III* [WI3INGMB7].

Learning Outcomes

Content

Courses in module *Selected Topics in Production Technology I* [WI4INGMB1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
21657	Manufacturing Technology (S. 241)	4/2	W	9	Schulze
21660	Integrated Production Planning (S. 242)	4/2	S	9	Lanza
21652	Machine Tools (S. 240)	4/2	W	9	Munzinger
21692	International Production and Logistics (S. 247)	2	S	3	Lanza
21669	Materials and Processes in Automotive Lightweight Construction (S. 244)	2	W	4.5	Haepp
21667	Quality Management (S. 243)	2	W	4.5	Lanza
21690	Production system and technology in powertrain production (S. 245)	2	S	4.5	Stauch
21690sem	Seminar Industrial Engineering (S. 246)	2	W/S	4.5	Schulze, Lanza, Munzinger

Module: Selected Topics in Production Technology II — Module key: [WI4INGMB2]

Subject: Engineering Science
Module coordination: Volker Schulze
Credit points (CP): 18

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 seperately.
The overall grade of the module is the grade of the written exam.

Prerequisites
None.

Conditions
It is recommended to attend at least one, at best all three basic courses of production technology in the modules *Production Technology I* [WI3INGMB10], *Production Technology II* [WI3NGMB4], *Production Technology III* [WI3INGMB7].

Learning Outcomes

Content

Courses in module *Selected Topics in Production Technology II* [WI4INGMB2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
21657	Manufacturing Technology (S. 241)	4/2	W	9	Schulze
21660	Integrated Production Planning (S. 242)	4/2	S	9	Lanza
21652	Machine Tools (S. 240)	4/2	W	9	Munzinger
21692	International Production and Logistics (S. 247)	2	S	3	Lanza
21669	Materials and Processes in Automotive Lightweight Construction (S. 244)	2	W	4.5	Haepp
21667	Quality Management (S. 243)	2	W	4.5	Lanza
21690	Production system and technology in powertrain production (S. 245)	2	S	4.5	Stauch
21690sem	Seminar Industrial Engineering (S. 246)	2	W/S	4.5	Schulze, Lanza, Munzinger

Module: Selected Topics in Production Technology III — Module key: [WI4INGMB3]

Subject: Engineering Science
Module coordination: Volker Schulze
Credit points (CP): 27

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 seperately.
The overall grade of the module is the grade of the written exam.

Prerequisites
None.

Conditions
It is recommended to attend at least one, at best all three basic courses of production technology in the modules *Production Technology I* [WI3INGMB10], *Production Technology II* [WI3NGMB4], *Production Technology III* [WI3INGMB7].

Learning Outcomes

Content

Courses in module *Selected Topics in Production Technology III* [WI4INGMB3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
21657	Manufacturing Technology (S. 241)	4/2	W	9	Schulze
21660	Integrated Production Planning (S. 242)	4/2	S	9	Lanza
21652	Machine Tools (S. 240)	4/2	W	9	Munzinger
21692	International Production and Logistics (S. 247)	2	S	3	Lanza
21669	Materials and Processes in Automotive Lightweight Construction (S. 244)	2	W	4.5	Haepp
21667	Quality Management (S. 243)	2	W	4.5	Lanza
21690	Production system and technology in powertrain production (S. 245)	2	S	4.5	Stauch
21690sem	Seminar Industrial Engineering (S. 246)	2	W/S	4.5	Schulze, Lanza, Munzinger

Module: Introduction to Logistics — Module key: [WI4INGMB20]

Subject: Engineering Science
Module coordination: Kai Furmans
Credit points (CP): 9

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 seperately.
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.

Prerequisites
None.

Conditions
It is obligatory to choose one of the following courses: *Materialflow* [21051] *Fundamentals of Technical Logistics* [21081] or *Quantitative Risk Management of Logistic Systems* [21075]. Apart from that one additional course has to be chosen from the remaining courses.

Learning Outcomes

Content

Courses in module *Introduction to Logistics* [WI4INGMB20]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
21081	Fundamentals of Technical Logistics (S. 200)	3/1	S	6	Mittwollen
21051	Materialflow (S. 190)	3/1	W	6	Furmans
21075	Quantitative Risk Management of Logistic Systems (S. 198)	3/1	S	6	Cardeneo
21083	Informationstechnik für Logistiksysteme (S. 202)	3/1	S	3	Thomas
21086	Warehouse and Distribution Systems (S. 204)	2	S	3	Wisser
21056	Airport Logistics (S. 191)	2	W	3	Brendlin
21061	Safety Engineering (S. 193)	2	W	4	Kany
21064	Industrial Application of Technological Logistics instancing Crane Systems (S. 195)	2	W	3	Golder
21089	Industrial Application of Material Handling Systems in Sorting and Distribution Systems (S. 205)	2	S	3	Föller
21692	International Production and Logistics (S. 247)	2	S	3	Lanza
21085	Autotmative Logistics (S. 203)	2	S	3	Furmans
21074	Informationssysteme in Logistik und Supply Chain Management (S. 197)	2/0	S	3	Kilger

Module: Technical Logistics and Logistic Systems — Module key: [WI4INGMB11]

Subject: Engineering Science
Module coordination: Kai Furmans
Credit points (CP): 18

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 seperately.
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 graing scale (0.3) there might be taken an optional term paper in the field of the IFL.

Prerequisites
None.

Conditions
It is obligatory to choose two of the following courses: *Logistics* [21078], *Materialflow* [21051], *Fundamentals of Technical Logistics* [21081], *Analytical Models for Material Flow* [21060], *IT for Intralogistics Systems* [21083], Supply Chain Management [21062] and *Quantitative Risk Management of Logistic Systems* [21075].

Learning Outcomes

Content

Courses in module *Technical Logistics and Logistic Systems* [WI4INGMB11]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
21081	Fundamentals of Technical Logistics (S. 200)	3/1	S	6	Mittwollen
21078	Logistics (S. 199)	3/1	S	6	Furmans
21051	Materialflow (S. 190)	3/1	W	6	Furmans
21060	Analytical Models for Material Flow (S. 192)	3/1	W	6	Furmans
21083	IT for Intralogistics Systems (S. 201)	3/1	S	6	Thomas
21062	Supply Chain Management (S. 194)	3/1	W	6	Alicke
21075	Quantitative Risk Management of Logistic Systems (S. 198)	3/1	S	6	Cardeneo
21086	Warehouse and Distribution Systems (S. 204)	2	S	3	Wisser
21056	Airport Logistics (S. 191)	2	W	3	Brendlin
21085	Autotmative Logistics (S. 203)	2	S	3	Furmans
21692	International Production and Logistics (S. 247)	2	S	3	Lanza
21061	Safety Engineering (S. 193)	2	W	4	Kany
21064	Industrial Application of Technological Logistics instancing Crane Systems (S. 195)	2	W	3	Golder
21089	Industrial Application of Material Handling Systems in Sorting and Distribution Systems (S. 205)	2	S	3	Föller
21074	Informationssysteme in Logistik und Supply Chain Management (S. 197)	2/0	S	3	Kilger

Module: Handling Characteristics of Motor Vehicles Module key: [WI4INGMB6]

Subject: Engineering Science
Module coordination: Frank Gauterin
Credit points (CP): 9

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 seperately.
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.

Prerequisites
Knowledge of the content of the courses *Engineering Mechanics I* [21208], *Engineering Mechanics II* [22642] and *Basics of Automotive Engineering I* [21805], *Basics of Automotive Engineering II* [21835] is helpful.

Conditions
None.

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

Courses in module *Handling Characteristics of Motor Vehicles* [WI4INGMB6]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
21806	Vehicle Comfort and Acoustics I (S. 252)	2	W	3	Gauterin
21825	Vehicle Comfort and Acoustics II (S. 258)	2	S	3	Gauterin
21807	Handling Characteristics of Motor Vehicles I (S. 253)	2	W	3	Unrau
21838	Handling Characteristics of Motor Vehicles II (S. 260)	2	S	3	Gauterin
21845	Project Workshop-Automative Engineering (S. 265)	3	W/S	4.5	Gauterin
21816	Vehicle Mechatronics I (S. 257)	2	W	3	Ammon
21850	Driving Dynamics Evaluation within the Global Vehicle Simulation (S. 266)	2/0	S	3	Schick

Module: Vehicle Development — Module key: [WI4INGMB14]

Subject: Engineering Science
Module coordination: Frank Gauterin
Credit points (CP): 9

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 seperately.
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.

Prerequisites
Knowledge of the content of the courses *Engineering Mechanics I* [21208], *Engineering Mechanics II* [22642] and *Basics of Automotive Engineering I* [21805], *Basics of Automotive Engineering II* [21835] is helpful.

Conditions
None.

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

Courses in module *Vehicle Development* [WI4INGMB14]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
21845	Project Workshop-Automative Engineering (S. 265)	3	W/S	4.5	Gauterin
21816	Vehicle Mechatronics I (S. 257)	2	W	3	Ammon
21812	Fundamentals in the Development of Commercial Vehicles I (S. 255)	1	W	1.5	Zürn
21844	Fundamentals in the Development of Commercial Vehicles II (S. 264)	1	S	1.5	Zürn
21810	Fundamentals in the Development of Passenger Vehicles I (S. 254)	1	W	1.5	Frech
21842	Fundamentals in the Development of Passenger Vehicles II (S. 262)	1	S	1.5	Frech
21843	Basics and Methods for Integration of Tires and Vehicles (S. 263)	2	S	3	Leister
21095	Simulation of coupled systems (S. 208)	2	S	3	Geimer

Module: Automotive Engineering — Module key: [WI4INGMB5]

Subject: Engineering Science
Module coordination: Frank Gauterin
Credit points (CP): 9

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 seperately.
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.

Prerequisites
Knowledge of the content of the courses *Engineering Mechanics I* [21208], *Engineering Mechanics II* [22642] and *Basics of Automotive Engineering I* [21805], *Basics of Automotive Engineering II* [21835] is helpful.

Conditions
None.

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

Courses in module *Automotive Engineering* [WI4INGMB5]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
21805	Basics of Automotive Engineering I (S. 251)	4	W	6	Gauterin, Unrau
21835	Basics of Automotive Engineering II (S. 259)	2	S	3	Gauterin, Unrau
21845	Project Workshop-Automative Engineering (S. 265)	3	W/S	4.5	Gauterin
21814	Fundamentals for Design of Motor-Vehicle Bodies I (S. 256)	1	W	1.5	Bardehle
21840	Fundamentals for Design of Motor-Vehicle Bodies II (S. 261)	1	S	1.5	Bardehle
21093	Fluid Power Systems (S. 207)	2	S	3	Geimer
21092	CAN-Bus Release Control (S. 206)	2	S	3	Geimer

Module: Mobile Machines — Module key: [WI4INGMB15]

Subject: Engineering Science
Module coordination: Marcus Geimer
Credit points (CP): 9

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 seperately.

Prerequisites
None.

Conditions
None.

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* [WI4INGMB15] 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.

Courses in module *Mobile Machines* [WI4INGMB15]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
21093	Fluid Power Systems (S. 207)	2	S	3	Geimer
21095	Simulation of coupled systems (S. 208)	2	S	3	Geimer
21092	CAN-Bus Release Control (S. 206)	2	S	3	Geimer
21073	Mobile Machines (S. 196)	4	W	6	Geimer
21812	Fundamentals in the Development of Commercial Vehicles I (S. 255)	1	W	1.5	Zürn
21844	Fundamentals in the Development of Commercial Vehicles II (S. 264)	1	S	1.5	Zürn

Module: Engine Development — Module key: [WI4INGMB17]

Subject: Engineering Science
Module coordination: Heiko Kubach
Credit points (CP): 18

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 seperately.
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

Prerequisites
Knowledge in the area of thermodynamics is helpful.

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

Learning Outcomes

Content

Courses in module *Engine Development* [WI4INGMB17]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
21101	Combustion Engines A (S. 209)	4/2	W	8	Spicher
21135	Combustion Engines B (S. 214)	2/1	S	4	Spicher
21112	Supercharging of Internal Combustion Engines (S. 211)	2	S	4	Golloch
21114	Simulation of Spray and Mixture Formation in Internal Combustion Engines (S. 212)	2	W	4	Baumgarten
21134	Methods in Analyzing Internal Combustion (S. 213)	2	S	4	Wagner
21109	Motor Fuels for Combustion Engines and their Verifications (S. 210)	2	W	4	Volz
21138	Internal Combustion Engines and Exhaust Gas Aftertreatment Technology (S. 216)	2	S	4	Lox
21137	Engine Measurement Technologies (S. 215)	2	S	4	Bernhardt

Module: Specific Topics in Material Science — Module key: [WI4INGMB18]

Subject: Engineering Science
Module coordination: M. J. Hoffmann
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
Knowledge, comparable to the content of the module *Emphasis Material Science* [WI3INGMB9], is highly recommended. Natural science basic knowledge is assumed.

Conditions
It is only possible to choose either the course *Physical Basics of Laser Technology* [21612] or the course *Laser Application in Automotive Engineering* [21642].

Learning Outcomes

Content

Courses in module *Specific Topics in Material Science* [WI4INGMB18]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
21562s	Failure Analysis (S. 232)	2/2	W	3	Kerscher
21754	Principles of Ceramic and Powder Metallurgy Processing (S. 249)	2	W	3	Oberacker
21775	Structural and Functional Ceramics (S. 250)	2	S	3	Hoffmann
21618	Superhard Thin Film Materials (S. 238)	2	W	3	Ulrich
21612	Physical Basics of Laser Technology (S. 237)	2/1	W	3	Schneider
21642	Laser Application in Automotive Engineering (S. 239)	2	S	3	Schneider
21575	Foundry Technology (S. 235)	2	S	3	Wilhelm
21565/21570	Welding Technology I/II (S. 233)	2	W/S	3	Spies
21560	Experimental Lab Class in Welding Technology, in Groups (S. 229)	3	W	0	Schulze
21751	Practical Course in Engineering Ceramics (S. 248)	2	W	0	Porz
21601	Constitution and Properties of Protective Coatings (S. 236)	2	W	3	Ulrich

Module: Combustion Engines — Module key: [WI4INGMB16]

Subject: Engineering Science
Module coordination: Heiko Kubach
Credit points (CP): 9

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 seperately.
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

Prerequisites
Knowledge in the area of thermodynamics is helpful.

Conditions
The course *Combustion Engines A [21101]* is obligatory.

Learning Outcomes

Content

Courses in module *Combustion Engines* [WI4INGMB16]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
21101	Combustion Engines A (S. 209)	4/2	W	8	Spicher
21135	Combustion Engines B (S. 214)	2/1	S	4	Spicher
21137	Engine Measurement Technologies (S. 215)	2	S	4	Bernhardt
21112	Supercharging of Internal Combustion Engines (S. 211)	2	S	4	Golloch
21114	Simulation of Spray and Mixture Formation in Internal Combustion Engines (S. 212)	2	W	4	Baumgarten
21134	Methods in Analyzing Internal Combustion (S. 213)	2	S	4	Wagner
21109	Motor Fuels for Combustion Engines and their Verifications (S. 210)	2	W	4	Volz

Module: Virtual Engineering — Module key: [WI4INGMB22]

Subject: Engineering Science
Module coordination: Jivka Ovtcharova
Credit points (CP): 18

Learning Control / Examinations
The assessment of the module is carried out by an oral examination about the lectures *Virtual Engineering I und II* and an oral exam (ca. 30 min) about another lecture (according to Section 4(2), 2 of the examination regulation).
The overall grade of the module is the weighted average of the grade of the exam about *Virtual Engineering I und II* (78 percent) and the other exam (22 percent).

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Virtual Engineering* [WI4INGMB22]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
21352	Virtual Engineering I (S. 224)	4/3	W	10.5	Ovtcharova
21378	Virtual Engineering II (S. 227)	2/1	S	4.5	
21360	Virtual Engineering for Mechatronic Products (S. 225)	2/0	W	3	Ovtcharova, Rude
21364	Product, Process and Ressource Integration in the Automotive Development (S. 226)	2/1	W/S	4.5	Mbang
21264	Simulation Methods in the Product Creation Process (S. 222)	2/1	W	4.5	Ovtcharova, Albers, Böhlke
21387	Computer Integrated Planning of New Products (S. 228)	2/0	S	3	Kläger

Module: Public Transportation Operations — Module key: [WI4INGBGU4]

Subject: Engineering Science
Module coordination: Friedrich Schedel
Credit points (CP): 9

Learning Control / Examinations
The assessment mix of each course of this module is defined for each course separately. The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.
The exams are offered each semester. The re-examinations are offered upon prior agreement with the interested participants and not later than the next regular examination date.

Prerequisites
The module *Foundations of Guided Systems* [WW3INGBGU2] or *Logistics and Management of Guided Systems* [WI4INGBGU7] will be assumed.

Conditions
The courses *Railway Logistics, Management and Operating - Part II* [19321] and *Operating Models in Railway Engineering* [19327] are obligatory and have to be attended.
The course *Construction and Maintenance of Railway Infrastructure* [19307] is not eligible if the module *Guided Systems Engineering* [WI4INGBGU6] is attended at the same time.

Learning Outcomes

Content

Courses in module *Public Transportation Operations* [WI4INGBGU4]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19321	Railway Logistics, Management and Operating - Part II (S. 178)	2	S	3	Hohnecker
19327w	Operating Models in Railway Engineering (S. 186)	1	W	1.5	Hohnecker
19327s	Public Transit in Cities and Regions (S. 185)	2	S	3	Hohnecker
19320	Customer Orientation in Public Transport (S. 177)	1	S	1.5	Hohnecker
19307s	Construction and Maintenance of Railway Infrastructure (S. 168)	1	S	1.5	Honecker, Müller
19325	Law in Public Transport (S. 183)	1	W	1.5	Hohnecker

Module: Design, Construction, Operation and Maintenance Highways [WI4INGBGU1] Module key:

Subject: Engineering Science
Module coordination: Ralf Roos
Credit points (CP): 9

Learning Control / Examinations
The assessment of the module consists of a written exam about the lecture *Design Basics in Highway Engineering* [19026] (according to §4(2), 1 of the examination regulation) and a conjointed oral exam about the lectures *Design and Construction Highways* [19065] and *Operation and Maintenance Highways* [19301s].
The exams are offered in each semester and may be resited to any ordinary ecxamination date.
The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None.

Conditions
The participation in the project Integrated Planning within the branch Highway Engineering or writing a student research paper is obligatory.
The course *Design Basics in Highway Engineering* [19026] is a prerequisite for all other courses of this module.

Learning Outcomes

Content

Courses in module *Design, Construction, Operation and Maintenance Highways* [WI4INGBGU1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19026	Design Basics in Highway Engineering (S. 139)	1/1	S	3	Roos
19065	Design and Construction Highways (S. 147)	1/1	S	3	Roos
19301s	Operation and Maintenance Highways (S. 162)	2	S	3	Roos

Module: Logistics and Management of Guided Systems Module key: [WI4INGBGU7]

Subject: Engineering Science
Module coordination: Friedrich Schedel
Credit points (CP): 9

Learning Control / Examinations
The assessment is carried out as a general written exam according to §4 Abs. 2, Nr. 1 of the examination regulation. The exam takes place in every semester. The re-examination is offered upon prior agreement with the interested participants and not later than the next regular examination date.
The module grade is the grade for the exam.

Prerequisites
None.

Conditions
The module cannot be chosen if the module *Foundations of Guided Systems* [WW3INGBGU2] of the Bachelor programme has been chosen.

Learning Outcomes

Content

Courses in module *Logistics and Management of Guided Systems* [WI4INGBGU7]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19066	Basics of Ground Born Guided Systems (S. 148)	3/1	S	6	Schedel, Hohnecker
19307w	Station and Rail Transport Facilities (S. 169)	2/1	W	3	Hohnecker

Module: Safety, Computing and Law in Highway Engineering Module key: [WI4INGBGU3]

Subject: Engineering Science
Module coordination: Ralf Roos
Credit points (CP): 9

Learning Control / Examinations
The assessment is carried out as a general oral exam (according to §4(2), 2 SPO) on the selected courses of the module and a presentation within the *Seminar in Highway Engineering - Mitigation of an accident black spot* [19314]. Single parts of the oral examination is based on the contact hours of each course (1 contact hour = 15 min). The examination will take place on appointment. Re-examinations are offered as needed.
The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.

Prerequisites
The successful completion of the course *Design Basics in Highway Engineering* [19026] is assumed.

Conditions
None.

Learning Outcomes

Content

Courses in module *Safety, Computing and Law in Highway Engineering* [WI4INGBGU3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19316	EDV in Highway Engineering (S. 176)	1/1	W	3	Zimmermann
19315	Safety Management in Highway Engineering (S. 175)	1	W	2	Zimmermann
19314	Seminar in Highway Engineering - Mitigation of an accident black spot (S. 173)	2	S	1.5	Zimmermann
VLBGU	Laws concerning Traffic and Roads (S. 560)	2	S	3	Kuder

Module: Highway Engineering — Module key: [WI4INGBGU2]

Subject: Engineering Science
Module coordination: Ralf Roos
Credit points (CP): 9

Learning Control / Examinations
The assessment is a conjoint oral examination (according to §4(2), 2 SPO) on the selected courses of the module. Single parts of the oral examination is based on the contact hours of each course (1 contact hour = 15 min).

The examination will take place on appointment. Resits are offered as needed.
The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.

Prerequisites
The successful completion of the course *Design Basics in Highway Engineering* [19026] is assumed.

Conditions
The participation in the project Integrated Planning within the branch Highway Engineering or writing a student research paper is obligatory.

Learning Outcomes

Content

Courses in module *Highway Engineering* [WI4INGBGU2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19065	Design and Construction Highways (S. 147)	1/1	S	3	Roos
19301s	Operation and Maintenance Highways (S. 162)	2	S	3	Roos
19302	Environmental Impact of Roads (S. 164)	1	S	1.5	Roos
19303s	Special Topics in Highway Engineering (S. 165)	1	S	1.5	Roos

Module: Guided Systems Engineering — Module key: [WI4INGBGU6]

Subject: Engineering Science
Module coordination: Friedrich Schedel
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
The completion of the module *Foundations of Guided Systems* [WW3INGBGU2] or *Logistic and Management of Guided Systems* [WI4INGBGU7] is assumed.

Conditions
The course *Station and Rail Transport Facilities* [19307w] is not eligible if the module *Logistics and Management of Guided Systems* [WI4INGBGU7] is attended at the same time.
The course *Electrical Rail Vehicles* [23346], *Mechanical Models in Railway Engineering* [19322] and *Development and Aspects of Guided Sytems* [19326] are obligatory and have to be attended.

Learning Outcomes

Content

Courses in module *Guided Systems Engineering* [WI4INGBGU6]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
23346	Electrical Rail Vehicles (S. 299)	2	S	3	Clos
19322	Mechanical Models in Railway Engineering (S. 179)	1	S	1.5	Hohnecker
19307s	Construction and Maintenance of Railway Infrastructure (S. 168)	1	S	1.5	Honecker, Müller
19307w	Station and Rail Transport Facilities (S. 169)	2/1	W	3	Hohnecker
19308	Freight Transport (S. 170)	1	W	1.5	Chlond
19326	Development and Concept of Track-Led Systems (S. 184)	1	W	1,5	Hohnecker

Module: Environmental Management — Module key: [WI4INGBGU12]

Subject: Engineering Science
Module coordination: Erhard Hoffmann
Credit points (CP): 9

Learning Control / Examinations
Depending on the choice of courses the assessment of this module is a conjoint oral exam (according to §4(2), 2 of the examination regulation) or written examinations for each course seperately (according to §4(2), 1 and 2 of the examination regulation).

- *Analysing and Managing Material Currents in Water Resources Management* [19245]: written exam (40 min)
- all the rest: general oral exam about the chosen courses (60 min.)

A certificate of performance in the *Field Course in Freshwater Ecology* [19243] is required for admission to examination.
The final mark for the module is the average of the marks for each course weighted by the credits of the course.

Prerequisites
Basic knowledge of biology, physics and chemistry taught at the upper secondary level is helpful.

Conditions
The course *Urban Water Resource Management and Ecological Engineering* [19057/19058] is a prerequisite for the *Seminar in Freshwater Ecology* [19057/19058].
The *Seminar in Freshwater Ecology* [19057/19058] is a prerequisite for the *Field Course in Freshwater Ecology* [19243].
The course *Foundations of Bioengineering* [19058] is a prerequisite for the course *Reaction Mechanism in Different Ecosystems* [19241].

Learning Outcomes

Content

Courses in module *Environmental Management* [WI4INGBGU12]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19245	Material Flux Analyses - River Basin Management (S. 157)	2	W	3	Fuchs
19058	Principles of Bioengineering (S. 144)	1/1	S	3	Winter
19241	Reaction Mechanisms in Different Ecosystems (S. 155)	2	S	3	Winter
19260	Legislation of Water, Soil and Waste (S. 161)	2	S	3	Wolf
19246	Environment and Hygiene (S. 158)	1	S	1.5	Würdemann
19057/58	Seminar in Freshwater Ecology (S. 135)	2	S	1.5	Fuchs
19243	Field Course in Freshwater Ecology (S. 156)	2	S	1.5	Fuchs

Module: Project in Public Transportation — Module key: [WI4INGBGU5]

Subject: Engineering Science
Module coordination: Friedrich Schedel
Credit points (CP): 9

Learning Control / Examinations
The assessment mix of each course of this module is defined for each course separately. The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.
The exams are offered each semester. The re-examinations are offered upon prior agreement with the interested participants and not later than the next regular examination date.

Prerequisites
The completion of the module *Foundations of Guided Systems* [WW3INGBGU2] or *Logistic and Management of Guided Systems* [WI4INGBGU7] is assumed.

Conditions
The courses *Project in Public Transportation I* [19323] and *Project in Public Transportation II [19324]* are obligatory and have to be attended.

Learning Outcomes

Content

Courses in module *Project in Public Transportation* [WI4INGBGU5]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19323	Project in Public Transportation I (S. 180)	4	S	4	Hohnecker
19324	Project in Public Transportation II (S. 182)	2	W	2	Hohnecker
19324	Economics in Public Transport (S. 181)	1	W	1	Hohnecker
19314	Transport Policy (S. 174)	2	W/S	2	Zemlin
19313	Planning and Operation of Public Transport Systems (S. 172)	2	S	2	Weißkopf

Module: Transport Systems — Module key: [WI4INGBGU8]

Subject: Engineering Science
Module coordination: Dirk Zumkeller
Credit points (CP): 9

Learning Control / Examinations
The assessment of the module is a oral examination (ca. 40 minutes) according to §4(2), 1 of the examination regulation. The assessment takes place at the date fixed.
The overall grade ist the grade of the oral exam.
The module grade can be improved by assessments about complementary courses from the curriculum of the Institute or related disciplines. Overall, a submission of up to 4 credit points is possible. In this case, the overall grade of the moduleis the average of the marks for each exam weighted by the credits and truncated after the first decimal.

Prerequisites
None.

Conditions
The lecture *Basics in Transport Planning and Traffic Engineering* [19027] has to be chosen in the module.
If the Module *Fundamentals of Spatial and Infrastructural Development* [WW3INGBGU1] was already chosen in the Bachelor programme, the course *Transport Planning Methods* [19301] has to be chosen.

Learning Outcomes

Content

Courses in module *Transport Systems* [WI4INGBGU8]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19027	Basics in Transport Planning and Traffic Engineering (S. 140)	1/1	S	3	Zumkeller, Chlond
19301w	Transport Planning Methods (S. 163)	1/1	W	3	Zumkeller
19062	Transport System Planning (S. 146)	2/1	S	4.5	Zumkeller
19308	Freight Transport (S. 170)	1	W	1.5	Chlond

Module: Transport Ia — Module key: [WI4INGBGU9]

Subject: Engineering Science
Module coordination: Dirk Zumkeller
Credit points (CP): 9

Learning Control / Examinations
The assessment of the module is a oral examination (ca. 40 minutes) according to §4(2), 1 of the examination regulation. The assessment takes place at the date fixed.
The overall grade ist the grade of the oral exam.
The module grade can be improved by assessments about complementary courses from the curriculum of the Institute or related disciplines. Overall, a submission of up to 4 credit points is possible. In this case, the overall grade of the module is the average of the marks for each exam weighted by the credits and truncated after the first decimal.

Prerequisites
None.

Conditions
It is assumed that the students did not choose the module *Fundamentals of Spatial and Infrastructural Development* [WW3INGBGU1] of the Bachelor programme. In this case the module *Transport Ib* [WI4INGBGU10] has to be chosen.

Learning Outcomes

Content

Courses in module *Transport Ia* [WI4INGBGU9]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19027	Basics in Transport Planning and Traffic Engineering (S. 140)	1/1	S	3	Zumkeller, Chlond
19301w	Transport Planning Methods (S. 163)	1/1	W	3	Zumkeller
19303w	Traffic Engineering and Traffic Telematics (S. 166)	1/1	W	3	Chlond

Module: Transport Ib

Module key: [WI4INGBGU10]

Subject: Engineering Science
Module coordination: Dirk Zumkeller
Credit points (CP): 9

Learning Control / Examinations
The assessment of the module is a oral examination (ca. 40 minutes) according to §4(2), 1 of the examination regulation. The assessment takes place at the date fixed.
The overall grade ist the grade of the oral exam.
The module grade can be improved by assessments about complementary courses from the curriculum of the Institute or related disciplines. Overall, a submission of up to 4 credit points is possible. In this case, the overall grade of the moduleis the average of the marks for each exam weighted by the credits and truncated after the first decimal.

Prerequisites
To choose this module the content of the module *Fundamentals of Spatial and Infrastructural Development* [WW3INGBGU1] of the Bachelor programme is a prerequisite. Otherwise it is to choose module *Transport Ia* [WI4INGBGU9].

Conditions
None.

Learning Outcomes

Content

Courses in module *Transport Ib* [WI4INGBGU10]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19301w	Transport Planning Methods (S. 163)	1/1	W	3	Zumkeller
19062	Transport System Planning (S. 146)	2/1	S	4.5	Zumkeller
19303w	Traffic Engineering and Traffic Telematics (S. 166)	1/1	W	3	Chlond

Module: Transport II — Module key: [WI4INGBGU11]

Subject: Engineering Science
Module coordination: Dirk Zumkeller
Credit points (CP): 9

Learning Control / Examinations
The assessment of the module is a oral examination (ca. 40 minutes) according to §4(2), 1 of the examination regulation. The assessment takes place at the date fixed.
The overall grade ist the grade of the oral exam.
The module grade can be improved by assessments about complementary courses from the curriculum of the Institute or related disciplines. Overall, a submission of up to 4 credit points is possible. In this case, the overall grade of the moduleis the average of the marks for each exam weighted by the credits and truncated after the first decimal.

Prerequisites
The choice of either the module *Transport Ia* [WI4INGBGU9] or *Transport Ib* [WI4INGBGU10] is a prerequisite.
For the course *Planning and Operation of Public Transport Systems* [19313] the course *Transport* [19027] is assumed.

Conditions
Courses has to be chosen in consultation with the institute so that they match a certain profile (e.g. transport planner, transport engineer, specialist in public transport systems) but have not been part of other modules.
Besiedes the courses of the Institute of Transport Studies other courses of useful and direct or fact-related disciplines (e.g. urban contruction and spatial planning, highway or railroad engineering) may be chosen.
Therefor the examination schedule has to be composed in accord with the Institut für Verkehrswesen.

Learning Outcomes

Content

Courses in module *Transport II* [WI4INGBGU11]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19308	Freight Transport (S. 170)	1	W	1.5	Chlond
19062	Transport System Planning (S. 146)	2/1	S	4.5	Zumkeller
19313	Planning and Operation of Public Transport Systems (S. 172)	2	S	2	Weißkopf
19305	Simulation Methods for Transport Modelling (S. 167)	1	W	1.5	Schnittger
19309	Application of Simulation Tools (S. 171)	0/1	S	1.5	Hilbertz

Module: Water Supply and Sanitation — Module key: [WI4INGBGU13]

Subject: Engineering Science
Module coordination: Erhard Hoffmann
Credit points (CP): 9

Learning Control / Examinations
Depending on the choice of courses the assessment of this module is a conjoint oral exam (according to §4(2), 2 of the examination regulation) or written examinations for each course seperately (according to §4(2), 1 and 2 of the examination regulation).

- *Urban Water Ressource Management and Ecological Engineering* [19057/58]: written exam (40 min)
- all the rest: conjoint oral exam about the chosen courses (60 min.)

A certificate of performance in the *Laboratory - Process Engineering in Water Quality Management* [19054] is required for admission to examination.
The final mark for the module is the average of the marks for each course weighted by the credits of the course.

Prerequisites
Basic knowledge of physics and chemistry taught at the upper secondary level is helpful.

Conditions
None.

Learning Outcomes

Content

Courses in module *Water Supply and Sanitation* [WI4INGBGU13]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19057/58	Urban Water Resource Management and Ecological Engineering (S. 134)	2/1	W	4.5	Fuchs, Winter
19054	Process Engineering in Water Quality Management (S. 141)	2	S	3	Hoffmann
19243/44	Design of Wastewater Treatment Plants and Biosolids Reclaiming Systems (Design of Urban Water and Wastewater Management Systems) (S. 136)	1/1	W	3	Hoffmann
19248	Design and Planning of Urban Drainage Systems (S. 159)	1	S	1.5	Fuchs
19249	Semi- and Decentral Systems (S. 160)	1	S	1.5	Hoffmann, Fuchs
19054	Laboratory - Process Engineering in Water Quality Management (S. 142)	2	S	1.5	Hoffmann
19059	Process Engineering in Waste Management (S. 145)	2	S	3	Winter

Module: Control Engineering I — Module key: [WI4INGETIT1]

Subject: Engineering Science
Module coordination: Mathias Kluwe
Credit points (CP): 9

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 seperately.
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.

Prerequisites
Knowledge about integral transformations is assumed. This knowledge can be acquired in the course *Complex Analysis* and *Integral Transformations* or via private study (see references of the course *System Dynamics and Control Engineering* [23155]). A proof of performance about this is not necessary.

Conditions
This module cannot be chosen if the module *Control Engineering* [WI3INGETIT2] has been chosen in the Bachelor programme.
The course *System Dynamics and Control Engineering* [23155] has to be attented before the course *Optimisation of Dynamic Systems* [23180].

Learning Outcomes
The students

- get familiar with the basic concepts of cotrol 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 design of optimal controllers for 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 anlisys and design of dynamic systems are considered.
Above that, the students learn the basic principles and methods for the design of optimal controllers for dynamic systems.

Courses in module *Control Engineering I* [WI4INGETIT1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
23155	System Dynamics and Control Engineering (S. 290)	3/1	W	6	N.n.
23180	Optimisation of Dynamic Systems (S. 293)	2/1	W	4.5	N.n.

Remarks

Module: Control Engineering II — Module key: [WI4INGETIT2]

Subject: Engineering Science
Module coordination: Mathias Kluwe
Credit points (CP): 9

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 seperately.
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.

Prerequisites
It is only possible to choose this module, if the module *Control Engineering I* [WI4INGETIT1] is attended as well or the module *Control Engineering* [WI3INGETIT2] was chosen in the Bachelor programme.
The course *System Dynamics and Control Engineering* [23155] has to be completed successfully beforehand.

Conditions
None.

Learning Outcomes
The students

- have deeper knowledge in the field of conrol theory and system dynamics,
- are able to analyze time-discrete and multivariable systems and are familiar with adequate methods for the control design,
- know the basics of modelling, simulation, analyses and control of discrete-event and hybrid systems.

Content
This module broadens the basic knowledge of system dynamics of the students to the multivariable case. Both time continious and time discrete modells are considered and methods for the analysis and the control design with different goals (decoupling, ronustness) and constraints (disturbances ,sensor failures) are presented. Above that, the basics of modelling, simulation, analysis and control of discrete-event and hybrid systems are discussed.

Courses in module *Control Engineering II* [WI4INGETIT2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
23177	Control of Linear Multivariable Systems (S. 292)	3/1	W	6	Kluwe
23160	Automation of Discrete Event and Hybrid Systems (S. 291)	2/0	S	3	Kluwe

Module: Sensor Technology I — Module key: [WI4INGETIT3]

Subject: Engineering Science
Module coordination: Wolfgang Menesklou
Credit points (CP): 9

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 seperately.
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.

Prerequisites
It is recommended to have attended the courses *Electrical Engineering II* [23224] and *Material Science II* [21553] beforehand.

Conditions
The course *Sensor Technology* [23231] is obligatory and has to be attended. The elected courses must not be credited in teh module *Sensorik II* [WI4INGETIT5] or other modules.
Before *Experimental Laboratories in Sensors and Actuators* [23232] the course *Sensor Technology* [23231] has to be completed successfully.

Learning Outcomes

Content

Courses in module *Sensor Technology I* [WI4INGETIT3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
23231	Sensors (S. 295)	2	W	3	Menesklou
23232	Experimental Laboratories in Sensors and Actuators (S. 296)	4	S	6	Menesklou
23209	Systematic Product Development in Sensor Technology (S. 294)	1/1	W	3	Ivers-Tiffée, Riegel
23240	Integrated Sensor Actuator Systems (S. 298)	2	S	3	Wersing
23233/23234	Seminar: Selected Chapters of Passive Components (S. 297)	2	W/S	3	Menesklou
21881	Micro-Actuators (S. 267)	2	S	3	Kohl

Module: Sensor Technology II

Module key: [WI4INGETIT5]

Subject: Engineering Science
Module coordination: Wolfgang Menesklou
Credit points (CP): 9

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 seperately.
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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Sensor Technology II* [WI4INGETIT5]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
23232	Experimental Laboratories in Sensors and Actuators (S. 296)	4	S	6	Menesklou
23209	Systematic Product Development in Sensor Technology (S. 294)	1/1	W	3	Ivers-Tiffée, Riegel
23240	Integrated Sensor Actuator Systems (S. 298)	2	S	3	Wersing
23233/23234	Seminar: Selected Chapters of Passive Components (S. 297)	2	W/S	3	Menesklou
21881	Micro-Actuators (S. 267)	2	S	3	Kohl

Module: Electrical Power Engineering — Module key: [WI4INGETIT4]

Subject: Engineering Science
Module coordination: Bernd Hoferer, Thomas Leibfried
Credit points (CP): 18

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

Prerequisites
None.

Conditions
The course *Electric Power System Engineering II* [23372] is obligatory.

Learning Outcomes
The student

- has wide knowledge of electrcal power engineering,
- is capable to analyse and develope electrical power engineering systems.

Content
The module deals with wide knowledge about the electrical power engineering. This ranges from the electric power equipment networks in terms of function, structure and interpretation on the calculation of electrical power networks to special areas such as the FACTS elements or power transformers.

Courses in module *Electrical Power Engineering* [WI4INGETIT4]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
23372/23374	Electric Power System Engineering II: Power Transmission and Power Network Control (S. 302)	2/2	S	6	Leibfried
23381	Windpower (S. 304)	2/0	W	3	Lewald
23385	Lectures on HVDC and FACTS – Benefits of Power Electronics for Security and Sustainability of Power Supply (S. 305)	2/0	W	3	Retzmann
23380	Photovoltaic Systems Technology (S. 303)	2/0	S	3	Schmidt
23360/23362	High-Voltage Technology I (S. 300)	2/1	S	4.5	Badent
23361/23363	High-Voltage Technology II (S. 301)	2/1	W	4.5	Badent
23392/23394	High-Voltage Test Technique (S. 307)	2/1	W	4.5	Badent

Module: Fuels, Environment and Global Development — Module key: [WI4INGCV2]

Subject: Engineering Science
Module coordination: Georg Schaub
Credit points (CP): 18

Learning Control / Examinations
The assessment is carried out as partial assessments (according to §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 final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.
The assessment procedures are described for each course of the module seperately.

Prerequisites
It is helpful to have attended courses in the area of chemical engineering and thermodynamics.

Conditions
None.

Learning Outcomes

Content

Courses in module *Fuels, Environment and Global Development* [WI4INGCV2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
22305	Fuels I: Fundamentals, Liquid Fuels, Petroleum Processing, Bio Fuels (S. 276)	2/1	W	6	Schaub
22303	Fuels II: Gases and Solids (S. 275)	2/1	S	6	Reimert
22501	Combustion Technology 1 (Basics) (S. 280)	2/1	S	6	Bockhorn
22507	Combustion Related Environmental Protection (S. 281)	2	S	4	Bockhorn
22319	Cycles and Global Development (S. 278)	2/0	W	4	Schaub

Module: Principles of Food Process Engineering — Module key: [WI4INGCV3]

Subject: Engineering Science
Module coordination: Volker Gaukel
Credit points (CP): 9

Learning Control / Examinations
The assessment is carried out by a general oral exam of the selected courses of this module, whose sum of credits must meet the minimum requirement of credits of this module (according to §4(2), 2 of the examination regulation).
The exam is offered upon agreement with the office of the section Food Process Engineering. Re-examination takes place at least 4 weeks after the last examination date.
The overal grade of the module is the gradeof the general oral exam.

Prerequisites
None.

Conditions
The courses *Principles of Process Engineering referring to Food I* [22213] and *Principles of Process Engineering referring to Food II* [22214] are obligatory and have to be attended.
It has to be chosen an other course, if *Principles of Process Engineering referring to Food I* [22213] has already been attended in the Bachelor programme.

Learning Outcomes

Content

Courses in module *Principles of Food Process Engineering* [WI4INGCV3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
22213	Principles of Process Engineering referring to Food I (S. 271)	2/0	W	4	Gaukel
22214	Principles of Process Engineering referring to Food II (S. 272)	2	S	4	Gaukel
22205	Quality Management of Food Processing (S. 268)	1/1	S	3	Schuchmann
22207	Food Science and Functionality (S. 269)	2	W	3	Watzl

Module: Specialization in Food Process Engineering Module key: [WI4INGCV4]

Subject: Engineering Science
Module coordination: Volker Gaukel
Credit points (CP): 9

Learning Control / Examinations
The assessment is carried out by a general oral exam of the selected courses of this module, whose sum of credits must meet the minimum requirement of credits of this module (according to §4(2), 2 of the examination regulation).
The exam is offered upon agreement with the office of the section Food Process Engineering. Re-examination takes place at least 4 weeks after the last examination date.
The overal grade of the module is the gradeof the general oral exam.

Prerequisites
It is only possible to choose this module in combination with the module *Principles of Food Process Engineering* [WI4INGCV3].

Conditions
The course *Quality Management of Food Processing* [22205] is obligatory and has to attended. Has it already been attended in the Bachelor programme, an other course has to be chosen instead.

Learning Outcomes

Content

Courses in module *Specialization in Food Process Engineering* [WI4INGCV4]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
22205	Quality Management of Food Processing (S. 268)	1/1	S	3	Schuchmann
22207	Food Science and Functionality (S. 269)	2	W	3	Watzl
22209	Microbiology of Food (S. 270)	2	W	4	Franz
22215	Product Design (S. 273)	2	S	4	Schuchmann
22218	Modern Measurement Techniques for Process Optimization (S. 274)	2	S	4	Regier
22417	Scale up in Biology and Engineering (S. 279)	2	W	4	Hausmann
6602	Fundamentals of Food Chemistry (S. 137)	2	W/S	4	Loske

Module: Water Chemistry — Module key: [WI4INGCV5]

Subject: Engineering Science
Module coordination: F.H. Frimmel
Credit points (CP): 18

Learning Control / Examinations
The assessment is a general oral exam according to §4 Abs. 2, Nr. 2 of the examination regulation about the chosen courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.
The successful completion of the *Excercises in Water Chemistry* [22664] ist prerequisited for admission to examination.
The exam is offered on appointment, but at least 4 times per year in the first and last week of the summer and winter term.
The overall grade of the module is taken as the average from the individual grades of the oral examination and the grade of the Excercises weighted by credit points.

Prerequisites
None.

Conditions
The courses *Chemical Technology of Water* [22601] and *Excercises in Aqueos Chemical Engineering* [22602] are obligatory and have to be attended.
They cannot be attended, if the course *Chemical Technology of Water* [22601] has already been attended in the Bachelor programme.

Learning Outcomes

Content

Courses in module *Water Chemistry* [WI4INGCV5]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
22601	Chemical Technology of Water (S. 282)	2/0	W	4	Frimmel
22602	Excercises in Aqueos Chemical Engineering (S. 283)	1	W	2	Frimmel
22603	Natural Scientific Basics for Anlysis and Assessment of Aquatic Systems (S. 284)	2	W	4	Frimmel
22618	Fundamentals of Waste Water Treatment (S. 288)	2	S	4	Zwiener
22612	Oxidative Drinking Water Treatment (S. 287)	2	S	4	Frimmel, Zwiener
22611	Sorption-Processes in Water Disinfection (S. 286)	2	S	4	Höll
22605	Water Treatment with Membrane Technology (S. 285)	1	W	2	Frimmel
22664	Excercises in Water Chemistry (S. 289)	2	W	4	Frimmel, Abbt-Braun

Module: Understanding and Prediction of Disasters I Module key: [WI4INGINTER1]

Subject: Engineering Science
Module coordination: Ute Werner
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
'Hydraulic Engineering and Water Ressource Management'[19055] can onle be chosen within this module, if it has not been taken before (e.g., in the modules for bachelor students on Understanding and Prediction of Disasters).

Learning Outcomes

Content

Courses in module *Understanding and Prediction of Disasters I* [WI4INGINTER1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
04055	Engineering Seismology (S. 133)	3/1	S	5	Wenzel/Sokolov
19055	Hydraulic Engineering and Water Ressource Management I (S. 143)	2/2	W	6	Nestmann et al.
19207	Wasserbauliches Versuchswesen (S. 152)	2/1	S	4.5	Lehmann
19207	River Engineering and Ecology I (S. 151)	2	W	3	Bernhardt/Dister
19213	River Engineering and Ecology II (S. 154)	1/1	S	3	Dister
19203	Morphodynamics of Rivers and Streams (S. 150)	1/1	W	3	Nestmann/Lehmann
19201	Foundations of Hydrological Planning (S. 149)	3/1	W	6	Ihringer
19212	Society, Technics, Ecology (S. 153)	2/1	W	3	Kämpf

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 Module key: [WI4INGINTER2]

Subject: Engineering Science
Module coordination: Ute Werner
Credit points (CP): 18

Learning Control / Examinations

Prerequisites
None.

Conditions
Hydraulic Engineering and Water Ressource Management'[19055] can onle be chosen within this module, if it has not been taken before (e.g., in the modules for bachelor students on Understanding and Prediction of Disasters).

Learning Outcomes

Content

Courses in module *Understanding and Prediction of Disasters II* [WI4INGINTER2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
04055	Engineering Seismology (S. 133)	3/1	S	5	Wenzel/Sokolov
19055	Hydraulic Engineering and Water Ressource Management I (S. 143)	2/2	W	6	Nestmann et al.
19207	Wasserbauliches Versuchswesen (S. 152)	2/1	S	4.5	Lehmann
19207	River Engineering and Ecology I (S. 151)	2	W	3	Bernhardt/Dister
19213	River Engineering and Ecology II (S. 154)	1/1	S	3	Dister
19203	Morphodynamics of Rivers and Streams (S. 150)	1/1	W	3	Nestmann/Lehmann
19201	Foundations of Hydrological Planning (S. 149)	3/1	W	6	Ihringer
19212	Society, Technics, Ecology (S. 153)	2/1	W	3	Kämpf

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 III Module key: [WI4INGINTER3]

Subject: Engineering Science
Module coordination: Ute Werner
Credit points (CP): 27

Learning Control / Examinations

Prerequisites
None.

Conditions
Hydraulic Engineering and Water Ressource Management'[19055] can onle be chosen within this module, if it has not been taken before (e.g., in the modules for bachelor students on Understanding and Prediction of Disasters).

Learning Outcomes

Content

Courses in module *Understanding and Prediction of Disasters III* [WI4INGINTER3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
04055	Engineering Seismology (S. 133)	3/1	S	5	Wenzel/Sokolov
19055	Hydraulic Engineering and Water Ressource Management I (S. 143)	2/2	W	6	Nestmann et al.
19207	Wasserbauliches Versuchswesen (S. 152)	2/1	S	4.5	Lehmann
19207	River Engineering and Ecology I (S. 151)	2	W	3	Bernhardt/Dister
19213	River Engineering and Ecology II (S. 154)	1/1	S	3	Dister
19203	Morphodynamics of Rivers and Streams (S. 150)	1/1	W	3	Nestmann/Lehmann
19201	Foundations of Hydrological Planning (S. 149)	3/1	W	6	Ihringer
19212	Society, Technics, Ecology (S. 153)	2/1	W	3	Kämpf

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

Module: Safety Science I

Module key: [WI4INGINTER4]

Subject: Engineering Science
Module coordination: Ute Werner
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Safety Science I* [WI4INGINTER4]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25962	Exhaust Emissions (VWL), Emissions into the Environment (ING) (S. 450)	2/0	W	3.5	Karl
19523	Contaminated Land Investigation, Evaluation and Remediation (S. 188)	2	W	4	Bieberstein et al.
09031	Design and Construction of Landfills for Municipal and Special Waste (S. 138)	2	W	4	Egloffstein
19621	Assessment of Development Planning (S. 189)	1/1	S	3	Kämpf
19404	Safety in Construction (S. 187)	2	S	1.5	Hirschberger, Sittinger
21562	Failure Analysis (S. 230)	2	W	4	Poser-Keppler
22308	Introduction to Process Safety in the Chemical Industry (S. 277)	2	S	4	Schmidt
21075	Quantitative Risk Management of Logistic Systems (S. 198)	3/1	S	6	Cardeneo

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

Module: Safety Science II

Module key: [WI4INGINTER5]

Subject: Engineering Science
Module coordination: Ute Werner
Credit points (CP): 18

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Safety Science II* [WI4INGINTER5]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25962	Exhaust Emissions (VWL), Emissions into the Environment (ING) (S. 450)	2/0	W	3.5	Karl
19523	Contaminated Land Investigation, Evaluation and Remediation (S. 188)	2	W	4	Bieberstein et al.
09031	Design and Construction of Landfills for Municipal and Special Waste (S. 138)	2	W	4	Egloffstein
19621	Assessment of Development Planning (S. 189)	1/1	S	3	Kämpf
19404	Safety in Construction (S. 187)	2	S	1.5	Hirschberger, Sittinger
21562	Failure Analysis (S. 230)	2	W	4	Poser-Keppler
22308	Introduction to Process Safety in the Chemical Industry (S. 277)	2	S	4	Schmidt
21075	Quantitative Risk Management of Logistic Systems (S. 198)	3/1	S	6	Cardeneo

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

Module: Safety Science III

Module key: [WI4INGINTER6]

Subject: Engineering Science
Module coordination: Ute Werner
Credit points (CP): 27

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Safety Science III* [WI4INGINTER6]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25962	Exhaust Emissions (VWL), Emissions into the Environment (ING) (S. 450)	2/0	W	3.5	Karl
19523	Contaminated Land Investigation, Evaluation and Remediation (S. 188)	2	W	4	Bieberstein et al.
09031	Design and Construction of Landfills for Municipal and Special Waste (S. 138)	2	W	4	Egloffstein
19621	Assessment of Development Planning (S. 189)	1/1	S	3	Kämpf
19404	Safety in Construction (S. 187)	2	S	1.5	Hirschberger, Sittinger
21562	Failure Analysis (S. 230)	2	W	4	Poser-Keppler
22308	Introduction to Process Safety in the Chemical Industry (S. 277)	2	S	4	Schmidt
21075	Quantitative Risk Management of Logistic Systems (S. 198)	3/1	S	6	Cardeneo

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

Module: Unscheduled Engineering Module — Module key: [WI4INGAPL]

Subject: Engineering Science
Module coordination: Prüfer einer Ingenieurwissenschaftlichen Fakultät
Credit points (CP): 9

Learning Control / Examinations
The assessment of the module is determined by the respective module corrdinator. It can either be in the form of a general exam or partial exams, and must be contain at least 9 credit points. 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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

5.7 Law

Module: Labor and Tax Law — Module key: [WI4JURA1]

Subject: Law
Module coordination: Thomas Dreier
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
Prior knowledge in the area of law totalling at least 9 credit points.

Conditions
Only one module can be chosen from the subjects law and sociology.
Three of the four courses have to be chosen.

Learning Outcomes

Content

Courses in module *Labor and Tax Law* [WI4JURA1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24167	Employment Law I (S. 314)	2	W	3	Hoff
24668	Employment Law II (S. 325)	2	S	3	Hoff
24168	Tax Law I (S. 315)	2/0	W	3	Dietrich
24646	Tax Law II (S. 321)	2/0	S	3	Dietrich

Module: IT-Law

Module key: [WI4JURA2_08]

Subject: Law
Module coordination: Thomas Dreier
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
Prior knowledge in the area of law totalling at least 9 credit points.

Conditions
Only one module can be chosen from the subjects law and sociology.
Three of the four courses have to be chosen.

Learning Outcomes

Content

Courses in module *IT-Law* [WI4JURA2_08]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24121	Copyright (S. 311)	2/0	W	3	Dreier
24018	Data Protection Law (S. 309)	2/0	W	3	Spiecker genannt Döhmann
24612	Computer Contract Law (S. 319)	2/0	S	3	Bartsch
24501	Internet Law (S. 316)	2/0	S	3	Dreier

Module: Civil Law

Module key: [WI4JURA3]

Subject: Law
Module coordination: Thomas Dreier
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
Prior knowledge in the area of law totalling at least 9 credit points.

Conditions
Only one module can be chosen from the subjects law and sociology.

Learning Outcomes

Content

Courses in module *Civil Law* [WI4JURA3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24504	Advanced Civil Law (S. 317)	2/0	S	3	Dreier, Sester
24011	Commercial and Corporate Law (S. 308)	2/0	W	3	Sester
24506/24017	Exercises in Civil Law (S. 318)	2/0	W/S	3	Sester, Dreier

Module: Commercial Law

Module key: [WI4JURA2]

Subject: Law
Module coordination: Peter Sester
Credit points (CP): 9

Learning Control / Examinations
The assessment of this module consists of a written examination according to § 4(2), 1 of the examination regulation for the courses Civil Law for Beginners, Advanced Civil Law, and Commercial and Corporation Law.
The grade of the module is the grade for the written examination.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Commercial Law* [WI4JURA2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24504	Advanced Civil Law (S. 317)	2/0	S	3	Dreier, Sester
24011	Commercial and Corporate Law (S. 308)	2/0	W	3	Sester
24506/24017	Exercises in Civil Law (S. 318)	2/0	W/S	3	Sester, Dreier

Module: Intellectual Property Law — Module key: [WI4JURA4]

Subject: Law
Module coordination: Thomas Dreier
Credit points (CP): 9

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

Prerequisites
Keine.

Conditions
None.

Learning Outcomes

Content

Courses in module *Intellectual Property Law* [WI4JURA4]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24501	Internet Law (S. 316)	2/0	S	3	Dreier
24121	Copyright (S. 311)	2/0	W	3	Dreier
24661	Patent Law (S. 323)	2/0	S	3	Geissler
24136/24609	Trademark and Unfair Competition Law (S. 312)	2/0	W/S	3	Matz, Sester
24612	Computer Contract Law (S. 319)	2/0	S	3	Bartsch

Module: Private Business Law — Module key: [WI4JURA5]

Subject: Law
Module coordination: Peter Sester
Credit points (CP): 9

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

Prerequisites
For the courses

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

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

Conditions
None.

Learning Outcomes

Content

Courses in module *Private Business Law* [WI4JURA5]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24650	Civil Law for Advanced (S. 322)	2/0	S	3	Sester
24671	Law of Contracts (S. 326)	2/0	S	3	Sester
24167	Employment Law I (S. 314)	2	W	3	Hoff
24668	Employment Law II (S. 325)	2	S	3	Hoff
24168	Tax Law I (S. 315)	2/0	W	3	Dietrich
24646	Tax Law II (S. 321)	2/0	S	3	Dietrich

Module: Public Business Law — Module key: [WI4JURA6]

Subject: Law
Module coordination: Indra Spiecker genannt Döhmann
Credit points (CP): 9

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Public Business Law* [WI4JURA6]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24632	Telecommunications Law (S. 320)	2/0	S	3	Spiecker genannt Döhmann
24082	Public Media Law (S. 310)	2	W	3	Kirchberg
24666	European and International Law (S. 324)	2/0	S	3	Spiecker genannt Döhmann
24140	Environmental Law (S. 313)	2	W	4	Spiecker genannt Döhmann
24018	Data Protection Law (S. 309)	2/0	W	3	Spiecker genannt Döhmann

5.8 Sociology

Module: Sociology — Module key: [WI4SOZ1]

Subject: Sociology
Module coordination: Gerd Nollmann
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Sociology* [WI4SOZ1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
thSoz	Theoretical Sociology (S. 571)	2	W/S	2	Nollmann, Pfadenhauer, Pfaff, Haupt, Grenz, Eisewicht
spezSoz	Special Sociology (S. 570)	2/0	W/S	4	Nollmann, Pfadenhauer, Pfaff, Haupt, Grenz, Eisewicht, Kunz
SozSem	Projectseminar (S. 559)	2	W/S	4	Bernart, Kunz, Pfaff, Haupt, Grenz, Eisewicht

5.9 General Modules

Module: Seminar Module — Module key: [WW4SEM]

Module coordination: Marliese Uhrig-Homburg, Studiendekan (Fak. f. Wirtschaftswissenschaften)
Credit points (CP): 9

Learning Control / Examinations
The modul examination consists of two seminars with at least 3 credit points each (according to §4 (3), 3 of the examintaion regulation).
Usualy a seminar is completed with the following assessments:

- active participation,
- term paper (workload of at least 80 hrs.) and
- presentation.

Furthermore there has to be completed “key qualification” of at least 3 credit points by one or more course units. These courses can be selected from the course catalogue of the House of Competence (HoC). The exermination perfomance has to be documented with a grade or at least “with success”.
A detailed description of every singled assessment is given in the specific course characerization.
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 “key qualifications” are not included to the final mark.

Prerequisites
The coursespecific preconditions must be observed.

Conditions
The seminars must be offered by a representative of the School of Economics ande Business Engineering.
Alternativly one of the two compulsory seminars can be asolved at a engineering department or at the Department of Mathematics. The seminar has to be offered by a represantative of the respective departments 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).
A seminar at another Department then the School of Economics and Business Engineering requires an official approval at all and can be applied at the examination office of the School of Economics and Business Engineering. Seminars at the wbk and the IFL will not requiring these offical approval.

Learning Outcomes
The student

- investigates with a selected topic in a special subject,
- analyses and discusses topically 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.

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 detailled description o these qualifications is given in the section „Key Qualifications“ of the module handbook.

Content
The module consists of two seminar courses and courses with additional key qualifications.
A detailed list of admitted courses is given in the college catalogue of the Universität Karlsruhe (TH) (https://zvwgate.zvw.uni-karlsruhe.de/lsf/). More detailled information about the programme of additional key qualifications can be found on http://www.hoc.kit.edu/sq-wahlbereiche.

Courses in module *Seminar Module* [WW4SEM]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
SemAIFB1	Seminar in Enterprise Information Systems (S. 541)	2	W/S	3	Studer, Oberweis, Stucky, Wolf, Kneuper
SemAIFB2	Seminar Efficient Algorithms (S. 542)	2	W/S	3	Schmeck
SemAIFB3	Seminar Complexity Management (S. 543)	2	W/S	3	Seese
SemAIFB4	Seminar Knowledge Management (S. 544)	2	W	3	Studer
26470	Seminar Service Science, Management & Engineering (S. 513)	2	W/S	3	Tai, Weinhardt, Satzger, Studer
25293	Seminar in Finance (S. 365)	2	W/S	3	Uhrig-Homburg, Ruckes
SemFBV1	Seminar in Insurance Management (S. 545)	2	W/S	3	Werner
SemFBV2	Seminar in Operational Risk Management (S. 546)	2	W/S	3	Werner
SemFBV3	Seminar in Risk Theory and Actuarial Science (S. 547)	2	W/S	3	Hipp
25915	Seminar: Management and Organization (S. 444)	2	S	3	Lindstädt
25916	Seminar: Management and Organization (S. 445)	2	W	3	Lindstädt
25195	Master-Seminar Marketing Plannning (S. 357)	2	W/S	3	Gaul
25192	Master Seminar in Marketing (S. 354)	2	W/S	3	Gaul
25197	Master-Seminar zum strategischen u. verhaltenswissenschaftlichen Marketing (S. 359)	2	W	3	Neibecker
25194	Master Seminar in Quantitative Marketing and OR (S. 356)	2	W/S	3	Gaul
25193	Master Seminar zu Marktforschung (S. 355)	2	W/S	3	Gaul
25196	Master Seminar in Entrepreneurship, Innovation and International Marketing (S. 358)	2	W/S	3	Gaul
SemIIP	Seminar in Ergonomics (S. 548)	2	W/S	3	Knauth, Karl
SemIIP2	Seminar in Industrial Production (S. 549)	2	W/S	3	Schultmann, Fröhling, Hiete
26510	Master Seminar in Information Engineering and Management (S. 524)	2	W	3	Geyer-Schulz
SemIW	Seminar Information Engineering and Management (S. 551)	2	W/S	3	Weinhardt
26420	Topics of Sustainable Management of Housing and Real Estate (S. 503)	2	W/S	3	Lützkendorf
SemWIOR4	Seminar in Game and Decision Theory (S. 558)	2	W/S	3	Berninghaus
SemWIOR3	Seminar in Experimental Economics (S. 557)	2	W/S	3	Berninghaus
SemWIOR2	Seminar Economic Theory (S. 556)	2	W/S	3	Puppe
SemIWW	Seminar in System Dynamics and Innovation (S. 552)	2	W/S	3	Grupp, N.N.
SemIWW2	Seminar in International Economy (S. 553)	2/0	W/S	3	Kowalski
26130	Seminar Public Finance (S. 471)	2	W/S	3	Wigger
26263	Seminar on Network Economics (S. 479)	2	W/S	3	Mitusch
25491	Seminar in Discrete Optimization (S. 384)	2	W/S	3	Nickel
25131	Seminar in Continous Optimization (S. 336)	2	W/S	3	Stein
SemWIOR1	Seminar Stochastic Models (S. 555)	2	W/S	3	Waldmann
SemING	Seminar in Engineering Science (S. 550)	2	W/S	3	Fachvertreter ingenieurwissenschaftlicher Fakultäten
SemMath	Seminar in Mathematics (S. 554)	2	W/S	3	Fachvertreter der Fakultät für Mathematik
HoC1	Elective „Culture - Policy - Science - Technology” (S. 532)	meist 2	W/S	3	House of Competence
HoC2	Elective „Workshops for Competence and Creativity” (S. 533)	meist 2	W/S	3	House of Competence
HoC3	Elective Foreig Languages (S. 534)	2-4	W/S	2-4	House of Competence
HoC4	Elective „Tutor Programmes” (S. 535)	k.A.	W/S	3	House of Competence
HoC5	Elective „Personal Fitness & Emotional Competence” (S. 536)	k.A.	W/S	2-3	House of Competence

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 Universität Karlsruhe (TH). 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: Master Thesis — Module key: [WI4THESIS]

Subject: nicht kategorisiert
Module coordination: Der Vorsitzende des Prüfungsausschusses
Credit points (CP): 30

Learning Control / Examinations
The Master Thesis is a written exam which shows that the student can autonomously investigate a scientific problem in Business Enginieering. The Master 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 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 on month. If the Master Thesis is not completed in time, this exam is “failed”, unless the student is not being responsible (eg maternity leave).
With consent of the examinor 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 Master 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 module grade is the grade for the Master Thesis.

Prerequisites
Prerequisite for admission to the Bachelor thesis is that 50 percent of the credit points has to be completed.
A written confirmation of the examinor about supervising the Bachelor’s Thesis is required.

Conditions
Please pay regard to the institute specific rules for supervising a Master Thesis.

The Master 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 Master Thesis will not be accepted.

Learning Outcomes

Content
The Master Thesis is a major scientific work. The topic of the Master Thesis will be chosen by the student themselves and adjusted with the examinor. The topic has to be related to Business and Engineering and has to refer to subject-specific or interdisciplinary problems.

6 Courses

6.1 All Courses

Course: Engineering Seismology — Course key: [04055]

Lecturers: Wenzel/Sokolov
Credit points (CP): 5 **Hours per week:** 3/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Understanding and Prediction of Disasters I [WI4INGINTER1] (S. 114), Understanding and Prediction of Disasters II [WI4INGINTER2] (S. 115), Understanding and Prediction of Disasters III [WI4INGINTER3] (S. 116)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Remarks
For further information, see http://www-gpi.physik.uni-karlsruhe.de/

Course: Urban Water Resource Management and Ecological Engineering Course key: [19057/58]

Lecturers: Fuchs, Winter
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Water Supply and Sanitation [WI4INGBGU13] (S. 104)

Learning Control / Examinations
See module description.

Prerequisites
It is recommended to attend the course *Principles of Bioengineering* [19058] beforehand.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Teil Siedlungswasserwirtschaft:
Skriptum zum Vorlesungsteil Siedlungswasserwirtschaft;
Gujer, W.: Siedlungswasserwirtschaft, Springer, Berlin (3. Aufl., 2007)
Teil Ingenieurökologie:
Begob/Harper/Townsend Ökologie (K.P.Sauer Herausgeber, Spektrum Akademischer Verlag Heidelberg 1998. Kohler/Mathes/Breckling Bodenökologie interdisziplinär, Springer Verlag Berlin 1999, u.a.

Course: Seminar in Freshwater Ecology — Course key: [19057/58]

Lecturers: Fuchs
Credit points (CP): 1.5 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Environmental Management [WI4INGBGU12] (S. 98)

Learning Control / Examinations
See module description.

Prerequisites
Prior attendance of the course *Urban Water Ressource Management and Ecological Engineering* [19057/19058].

Conditions
None.

Learning Outcomes

Content

Complementary literature
Schwörbel , J.: Einführung in die Limnologie, 7. Aufl., UTB-Verlag Gustav Fischer (1993)
Lampert, W., Sommer, U.: Limnoökologie, Thieme Verlag (1993)

Course: Design of Wastewater Treatment Plants and Biosolids Reclaiming Systems (Design of Urban Water and Wastewater Management Systems) Course key: [19243/44]

Lecturers: Erhard Hoffmann
Credit points (CP): 3 **Hours per week:** 1/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Water Supply and Sanitation [WI4INGBGU13] (S. 104)

Learning Control / Examinations
See module description.

Prerequisites
The prior attendance of the course *Urban Water Resource Management and Ecological Engineering* [19057/19058] is assumed.
It is recommended to attend the course *Process Engineering in Water Quality Management* [19054] beforehand.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Lehr- und Handbuch der Abwassertechnik, Bände 1-5 (1995 und folgende)
Gujer, W.: Siedlungswasserwirtschaft, Springer, Berlin (3. Aufl., 2007)
Pöpel, F.: Lehrbuch für Abwassertechnik und Gewässerschutz, Deutscher Fachschriftenverlag, Wiesbaden (1979)

Course: Fundamentals of Food Chemistry — Course key: [6602]

Lecturers: Loske
Credit points (CP): 4 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Specialization in Food Process Engineering [WI4INGCV4] (S. 112)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Design and Construction of Landfills for Municipal and Special WasteCourse key: [09031]

Lecturers: Egloffstein
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Safety Science I [WI4INGINTER4] (S. 117), Safety Science II [WI4INGINTER5] (S. 118), Safety Science III [WI4INGINTER6] (S. 119)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Remarks
For further information, see http://www.agk.uni-karlsruhe.de/index.php and http://www2.agk.uni-karlsruhe.de/mitarbeiter/mitarbeiter.html#ehem

Course: Design Basics in Highway Engineering Course key: [19026]

Lecturers: Ralf Roos
Credit points (CP): 3 **Hours per week:** 1/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Design, Construction, Operation and Maintenance Highways [WI4INGBGU1] (S. 93)

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 re-examination. 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 periode. 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.

Prerequisites
None.

Conditions
See corresponding module information.

Learning Outcomes

Content

Course: Basics in Transport Planning and Traffic Engineering Course key: [19027]

Lecturers: Dirk Zumkeller, Chlond
Credit points (CP): 3 **Hours per week:** 1/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Transport Systems [WI4INGBGU8] (S. 100), Transport Ia [WI4INGBGU9] (S. 101)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Process Engineering in Water Quality Management — Course key: [19054]

Lecturers: Erhard Hoffmann
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Water Supply and Sanitation [WI4INGBGU13] (S. 104)

Learning Control / Examinations
See module description.

Prerequisites
Prior attendance of the course *Urban Water Resource Management and Ecological Engineering* [19057/19058].

Conditions
None.

Learning Outcomes

Content

Complementary literature
Imhoff, K. und K.R.: Taschenbuch der Stadtentwässerung, Oldenbourg, München (2006)
Weber, W.J.Jr.: Physicochemical Processes for Water Quality Control, Wiley Interscience, New York (1972)
Lehr- und Handbuch der Abwassertechnik, Bände 1-5 (1995 und folgende)
Kittner, H., Starke, W., Wissel, D.: Wasserversorgung, VEB Verlag für Bauwesen (1988)
Benfield, L., Judkins, J., Weand, B.: Process Chemistry for Water and Wastewater Treatment, Prentice Hall, Englewood Cliffs (1982)

Course: Laboratory - Process Engineering in Water Quality Management Course key: [19054]

Lecturers: Erhard Hoffmann
Credit points (CP): 1.5 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Water Supply and Sanitation [WI4INGBGU13] (S. 104)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Hydraulic Engineering and Water Ressource Management I Course key: [19055]

Lecturers: Nestmann et al.
Credit points (CP): 6 **Hours per week:** 2/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Understanding and Prediction of Disasters I [WI4INGINTER1] (S. 114), Understanding and Prediction of Disasters II [WI4INGINTER2] (S. 115), Understanding and Prediction of Disasters III [WI4INGINTER3] (S. 116)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Remarks
For further information, see http://www.iwk.uni-karlsruhe.de/kurse_grundfachstudium.php

Course: Principles of Bioengineering — Course key: [19058]

Lecturers: Winter
Credit points (CP): 3 **Hours per week:** 1/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Environmental Management [WI4INGBGU12] (S. 98)

Learning Control / Examinations
See module description.

Prerequisites
Good biological knowledge (secondary school level)

Conditions
None.

Learning Outcomes

Content

Complementary literature
e.g. Hartmann, Biologische Abwasserreinigung, Springer-Verlag.
Mudrack/Kunst, Biologie der Abwasserreinigung, Gustav-Fischer-Verlag.
Fuchs/Schlegel, Allgemeine Mikrobiologie, Thieme-Verlag. Goebel, Brock-Mikrobiologie, Spektrum Akademischer Verlag G. Fischer.
Einsele/Finn/Samhaber, Mikrobiologische und biochemische Verfahrenstechnik, VCH-Verlag.
Stanbury/Whitaker, Principles of Fermentation Technology, Pergamon Press
Further literature will be announced every semester.

Course: Process Engineering in Waste Management — Course key: [19059]

Lecturers: Winter
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Water Supply and Sanitation [WI4INGBGU13] (S. 104)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Transport System Planning — Course key: [19062]

Lecturers: Dirk Zumkeller
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Transport Systems [WI4INGBGU8] (S. 100), Transport Ib [WI4INGBGU10] (S. 102), Transport II [WI4INGBGU11] (S. 103)

Learning Control / Examinations
See module description.

Prerequisites
As a basis the Bachelor module *Fundamentals of Spatial and Infrastructural Development* [WW3INGBGU1] or the course *Basics in Transport Planning and Traffic Engineering* [19027] is recommended.

Conditions
None.

Learning Outcomes

Content

Course: Design and Construction Highways — Course key: [19065]

Lecturers: Ralf Roos
Credit points (CP): 3 **Hours per week:** 1/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Design, Construction, Operation and Maintenance Highways [WI4INGBGU1] (S. 93), Highway Engineering [WI4INGBGU2] (S. 96)

Learning Control / Examinations
See module description.

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes

Content

Course: Basics of Ground Born Guided Systems — Course key: [19066]

Lecturers: Friedrich Schedel, Hohnecker
Credit points (CP): 6 **Hours per week:** 3/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Logistics and Management of Guided Systems [WI4INGBGU7] (S. 94)

Learning Control / Examinations
See module description.

Prerequisites
See module description.

Conditions
Siehe Modulbeschreibung.

Learning Outcomes

Content
definitions; basics in operation; track; layout of lines; dynamics; vehicles

Complementary literature
Zilch,Diederichs,Katzenbach (Hrsg): Handbuch für Bauingenieure, Springer-Verlag 2001

Course: Foundations of Hydrological Planning — Course key: [19201]

Lecturers: Ihringer
Credit points (CP): 6 **Hours per week:** 3/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Understanding and Prediction of Disasters I [WI4INGINTER1] (S. 114), Understanding and Prediction of Disasters II [WI4INGINTER2] (S. 115), Understanding and Prediction of Disasters III [WI4INGINTER3] (S. 116)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Remarks
For further information, see http://www.iwk.uni-karlsruhe.de/kurse_vertiefungsstudium.php

Course: Morphodynamics of Rivers and Streams — Course key: [19203]

Lecturers: Nestmann/Lehmann
Credit points (CP): 3 **Hours per week:** 1/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Understanding and Prediction of Disasters I [WI4INGINTER1] (S. 114), Understanding and Prediction of Disasters II [WI4INGINTER2] (S. 115), Understanding and Prediction of Disasters III [WI4INGINTER3] (S. 116)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Remarks
For further information, see http://www.iwk.uni-karlsruhe.de/kurse_vertiefungsstudium.php

Course: River Engineering and Ecology I — Course key: [19207]

Lecturers: Bernhardt/Dister
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Understanding and Prediction of Disasters I [WI4INGINTER1] (S. 114), Understanding and Prediction of Disasters II [WI4INGINTER2] (S. 115), Understanding and Prediction of Disasters III [WI4INGINTER3] (S. 116)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Remarks
For further information, see http://www.iwk.uni-karlsruhe.de/kurse_vertiefungsstudium.php and http://www.auen.uni-karlsruhe.de/489.php

Course: Wasserbauliches Versuchswesen Course key: [19207]

Lecturers: Lehmann
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Understanding and Prediction of Disasters I [WI4INGINTER1] (S. 114), Understanding and Prediction of Disasters II [WI4INGINTER2] (S. 115), Understanding and Prediction of Disasters III [WI4INGINTER3] (S. 116)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Remarks
For further information, see http://www.iwk.uni-karlsruhe.de/kurse_vertiefungsstudium.php

Course: Society, Technics, Ecology — Course key: [19212]

Lecturers: Kämpf
Credit points (CP): 3 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Understanding and Prediction of Disasters I [WI4INGINTER1] (S. 114), Understanding and Prediction of Disasters II [WI4INGINTER2] (S. 115), Understanding and Prediction of Disasters III [WI4INGINTER3] (S. 116)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Remarks
This course is held in the winter term 2009/10 for the last time and will be replaces by “Environmental Communication - Umweltkommunikation”.
For further information, see http://www.iwk.uni-karlsruhe.de/kurse_vertiefungsstudium.php

Course: River Engineering and Ecology II — Course key: [19213]

Lecturers: Dister
Credit points (CP): 3 **Hours per week:** 1/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Understanding and Prediction of Disasters I [WI4INGINTER1] (S. 114), Understanding and Prediction of Disasters II [WI4INGINTER2] (S. 115), Understanding and Prediction of Disasters III [WI4INGINTER3] (S. 116)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Remarks
For further information, see http://www.iwk.uni-karlsruhe.de/kurse_vertiefungsstudium.php and http://www.auen.uni-karlsruhe.de/489.php

Course: Reaction Mechanisms in Different Ecosystems Course key: [19241]

Lecturers: Winter
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Environmental Management [WI4INGBGU12] (S. 98)

Learning Control / Examinations
See module description.

Prerequisites
It is recommended to attend the course *Principles of Bioengineering* [19058] beforehand.
Basic knowledge of microbiology is assumed.

Conditions
None.

Learning Outcomes

Content

Complementary literature
See bioengineering and further literature, e.g. Henze/ Harremoes/ la Cour Jansen/ Arvin, Wastewater Treatment, Springer Verlag, Berlin

Course: Field Course in Freshwater Ecology — Course key: [19243]

Lecturers: Fuchs
Credit points (CP): 1.5 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Environmental Management [WI4INGBGU12] (S. 98)

Learning Control / Examinations
See module description.

Prerequisites
It is recommended to attend the course *Principles of Bioengineering* [19058] beforehand.
Basic knowledge of microbiology is assumed.
It is recommended to attend the *Seminar in Freshwater Ecology* [19057/19058].
Prior attendance of the course *Urban Water Ressource Management and Ecological Engineering* [19057/19058].

Conditions
None.

Learning Outcomes

Content

Complementary literature
Schwörbel , J.: Einführung in die Limnologie, 7. Aufl., UTB-Verlag Gustav Fischer (1993)
Lampert, W., Sommer, U.: Limnoökologie, Thieme Verlag (1993)
Schwörbel, J.: Methoden der Hydrobiologie, Süßwasserbiologie, 3. Aufl., UTB-Verlag Gustav Fischer (1986)

Course: Material Flux Analyses - River Basin Management Course key: [19245]

Lecturers: Fuchs
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Environmental Management [WI4INGBGU12] (S. 98)

Learning Control / Examinations
See module description.

Prerequisites
Prior attendance of the course *Urban Water Ressource Management and Ecological Engineering* [19057/19058] is recommended.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Lehn, H., Steiner, M., Mohr, H.: Wasser – die elementare Ressource; Leitlinien einer nachhaltigen Nutzung, Springer Verlag, Berlin, (1999)

Course: Environment and Hygiene

Course key: [19246]

Lecturers: Würdemann
Credit points (CP): 1.5 **Hours per week:** 1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Environmental Management [WI4INGBGU12] (S. 98)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Design and Planning of Urban Drainage Systems Course key: [19248]

Lecturers: Fuchs
Credit points (CP): 1.5 **Hours per week:** 1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Water Supply and Sanitation [WI4INGBGU13] (S. 104)

Learning Control / Examinations
See module description.

Prerequisites
Prior attendance of the course *Urban Water Ressource Management and Ecological Engineering* [19057/19058].

Conditions
None.

Learning Outcomes

Content

Complementary literature
DWA-Regelwerke: A118, A128, A138, M178
ATV-Handbuch: Planung der Kanalisation, Ernst, Berlin, 1995
Gujer, W.: Siedlungswasserwirtschaft, Springer, Berlin (3. Aufl., 2007)

Course: Semi- and Decentral Systems — Course key: [19249]

Lecturers: Erhard Hoffmann, Fuchs
Credit points (CP): 1.5 **Hours per week:** 1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Water Supply and Sanitation [WI4INGBGU13] (S. 104)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Lange. J., Otterpohl, R.: „ Abwasser: Handbuch zu einer zukunftsfähigen Wasserwirtschaft, Mall-Beton-Verlag, Donaueschingen_Pfohren (1997)

Course: Legislation of Water, Soil and Waste — Course key: [19260]

Lecturers: Wolf
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Environmental Management [WI4INGBGU12] (S. 98)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature
Legal texts (WHG, Krw-/AbfG, BBodSchG)

Complementary literature
Erbguth, Wilfried, Umweltrecht
Klöpfer, Michael, Umweltrecht

Course: Operation and Maintenance Highways — Course key: [19301s]

Lecturers: Ralf Roos
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Design, Construction, Operation and Maintenance Highways [WI4INGBGU1] (S. 93), Highway Engineering [WI4INGBGU2] (S. 96)

Learning Control / Examinations
See module description.

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes

Content

Course: Transport Planning Methods — Course key: [19301w]

Lecturers: Dirk Zumkeller
Credit points (CP): 3 **Hours per week:** 1/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Transport Systems [WI4INGBGU8] (S. 100), Transport Ia [WI4INGBGU9] (S. 101), Transport Ib [WI4INGBGU10] (S. 102)

Learning Control / Examinations
See module description.

Prerequisites
As a basis the Bachelor module *Fundamentals of Spatial and Infrastructural Development* [WW3INGBGU1] or the course *Basics in Transport Planning and Traffic Engineering* [19027] is recommended.

Conditions
None.

Learning Outcomes

Content

Course: Environmental Impact of Roads

Course key: [19302]

Lecturers: Ralf Roos
Credit points (CP): 1.5 **Hours per week:** 1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Highway Engineering [WI4INGBGU2] (S. 96)

Learning Control / Examinations
See module description.

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes

Content

Course: Special Topics in Highway Engineering — Course key: [19303s]

Lecturers: Ralf Roos
Credit points (CP): 1.5 **Hours per week:** 1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Highway Engineering [WI4INGBGU2] (S. 96)

Learning Control / Examinations
See module description.

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes

Content

Course: Traffic Engineering and Traffic Telematics — Course key: [19303w]

Lecturers: Chlond
Credit points (CP): 3 **Hours per week:** 1/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Transport Ia [WI4INGBGU9] (S. 101), Transport Ib [WI4INGBGU10] (S. 102)

Learning Control / Examinations
See module description.

Prerequisites
As a basis the Bachelor module *Fundamentals of Spatial and Infrastructural Development* [WW3INGBGU1] or the course *Basics in Transport Planning and Traffic Engineering* [19027] is recommended.

Conditions
None.

Learning Outcomes

Content

Course: Simulation Methods for Transport Modelling — Course key: [19305]

Lecturers: Schnittger
Credit points (CP): 1.5 **Hours per week:** 1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Transport II [WI4INGBGU11] (S. 103)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Construction and Maintenance of Railway Infrastructure Course key: [19307s]

Lecturers: Honecker, Müller
Credit points (CP): 1.5 **Hours per week:** 1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Public Transportation Operations [WI4INGBGU4] (S. 92), Guided Systems Engineering [WI4INGBGU6] (S. 97)

Learning Control / Examinations
The assessment will consist of a oral exam (20 min) according to §4 (2), 1 of the examination regulation.
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.

Prerequisites
See module description.

Conditions
See module description.

Learning Outcomes

Content
methods of construction; strategies for maintenance; construction and operation

Course: Station and Rail Transport Facilities — Course key: [19307w]

Lecturers: Hohnecker
Credit points (CP): 3 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Logistics and Management of Guided Systems [WI4INGBGU7] (S. 94), Guided Systems Engineering [WI4INGBGU6] (S. 97)

Learning Control / Examinations
See module description.

Prerequisites
See module description.

Conditions
See module description.

Learning Outcomes

Content
stations and terminals for passengers and freight

Course: Freight Transport — Course key: [19308]

Lecturers: Chlond
Credit points (CP): 1.5 **Hours per week:** 1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Guided Systems Engineering [WI4INGBGU6] (S. 97), Transport Systems [WI4INGBGU8] (S. 100), Transport II [WI4INGBGU11] (S. 103)

Learning Control / Examinations
See module description.

Prerequisites
See module description.

Conditions
See module description.

Learning Outcomes

Content

Course: Application of Simulation Tools — Course key: [19309]

Lecturers: Hilbertz
Credit points (CP): 1.5 **Hours per week:** 0/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Transport II [WI4INGBGU11] (S. 103)

Learning Control / Examinations
The assessment is a not graded certificate of attendence (according to §4(2), 3 of the examination regulation).

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Planning and Operation of Public Transport Systems Course key: [19313]

Lecturers: Weißkopf
Credit points (CP): 2 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Project in Public Transportation [WI4INGBGU5] (S. 99), Transport II [WI4INGBGU11] (S. 103)

Learning Control / Examinations
See module description.

Prerequisites
See module description.

Conditions
None.

Learning Outcomes

Content

Course: Seminar in Highway Engineering - Mitigation of an accident black spot Course key: [19314]

Lecturers: Zimmermann
Credit points (CP): 1.5 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Safety, Computing and Law in Highway Engineering [WI4INGBGU3] (S. 95)

Learning Control / Examinations
See module description.

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Lecture materials “Sicherheitsmanagement im Straßenwesen”

Course: Transport Policy

Course key: [19314]

Lecturers: Zemlin
Credit points (CP): 2 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Project in Public Transportation [WI4INGBGU5] (S. 99)

Learning Control / Examinations
The assessment will consist of a oral exam (20 min) according to §4 (2), 1 of the examination regulation.
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.

Prerequisites
See module descrition.

Conditions
None.

Learning Outcomes

Content

Course: Safety Management in Highway Engineering — Course key: [19315]

Lecturers: Zimmermann
Credit points (CP): 2 **Hours per week:** 1
Term: Wintersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Safety, Computing and Law in Highway Engineering [WI4INGBGU3] (S. 95)

Learning Control / Examinations
See module description.

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes

Content

Remarks
For further information, see http://www.ise.uni-karlsruhe.de/16.php

Course: EDV in Highway Engineering — Course key: [19316]

Lecturers: Zimmermann
Credit points (CP): 3 **Hours per week:** 1/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Safety, Computing and Law in Highway Engineering [WI4INGBGU3] (S. 95)

Learning Control / Examinations
See module description.

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes

Content

Course: Customer Orientation in Public Transport — Course key: [19320]

Lecturers: Hohnecker
Credit points (CP): 1.5 **Hours per week:** 1
Term: Sommersemester **Level:** ???
Teaching language: Deutsch
Part of the modules: Public Transportation Operations [WI4INGBGU4] (S. 92)

Learning Control / Examinations
The assessment will consist of a oral exam (20 min) according to §4 (2), 1 of the examination regulation.
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.

Prerequisites
See module description.

Conditions
None.

Learning Outcomes

Content
quality and customer satisfaction; tilting train; physiology; dynamics of vehicles

Course: Railway Logistics, Management and Operating - Part II Course key: [19321]

Lecturers: Hohnecker
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Public Transportation Operations [WI4INGBGU4] (S. 92)

Learning Control / Examinations
The assessment will consist of a oral exam (20 min) according to §4 (2), 1 of the examination regulation.
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.

Prerequisites
See module description.

Conditions
None.

Learning Outcomes

Content
operation modi in europe and america; international signalling systems;

Complementary literature
Pachl: Systemtechnik des Schienenverkehrs, Teubner-Verlag, Stuttgart

Course: Mechanical Models in Railway Engineering Course key: [19322]

Lecturers: Hohnecker
Credit points (CP): 1.5 **Hours per week:** 1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Guided Systems Engineering [WI4INGBGU6] (S. 97)

Learning Control / Examinations
The assessment will consist of a oral exam (20 min) according to §4 (2), 1 of the examination regulation.
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.

Prerequisites
See module description.

Conditions
See module description.

Learning Outcomes

Content
calculation of Zimmermann; wheelset-running

Course: Project in Public Transportation I — Course key: [19323]

Lecturers: Hohnecker
Credit points (CP): 4 **Hours per week:** 4
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Project in Public Transportation [WI4INGBGU5] (S. 99)

Learning Control / Examinations
The conjoined assessment of the lectures *Project in Public Transportation I* [19323] an *Project in Public Transportation II* [19324] consists of a oral presentation and a written paper according §4(2), 3 of the examination regulation.
The mark consist of both parts of the assessment (66% of the mark of the presentation and 34% of the written paper).
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.

Prerequisites
See module description.

Conditions
The lecture is oligator in the module *Project in Public Transportation* [WI4INGBGU5].

Learning Outcomes

Content
practise: urban traffic project: Planing and line-layouting

Course: Economics in Public Transport — Course key: [19324]

Lecturers: Hohnecker
Credit points (CP): 1 **Hours per week:** 1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Project in Public Transportation [WI4INGBGU5] (S. 99)

Learning Control / Examinations
The assessment will consist of a oral exam (20 min) according to §4 (2), 1 of the examination regulation.
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.

Prerequisites
See module description.

Conditions
None.

Learning Outcomes

Content
basics of economy; evaluation of planing; the transportation services as entrepreneur

Course: Project in Public Transportation II — Course key: [19324]

Lecturers: Hohnecker
Credit points (CP): 2 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Project in Public Transportation [WI4INGBGU5] (S. 99)

Learning Control / Examinations
The conjoined assessment of the lectures *Project in Public Transportation I* [19323] an *Project in Public Transportation II* [19324] consists of a oral presentation and a written paper according §4(2), 3 of the examination regulation.
The mark consist of both parts of the assessment (66% of the mark of the presentation and 34% of the written paper).
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.

Prerequisites
See module description.

Conditions
The lecture is oligator in the module *Project in Public Transportation* [WI4INGBGU5].

Learning Outcomes

Content
practise: urban traffic project: economic evaluation

Course: Law in Public Transport — Course key: [19325]

Lecturers: Hohnecker
Credit points (CP): 1.5 **Hours per week:** 1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Public Transportation Operations [WI4INGBGU4] (S. 92)

Learning Control / Examinations
The assessment will consist of a oral exam (20 min) according to §4 (2), 1 of the examination regulation.
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.

Prerequisites
See module description.

Conditions
None.

Learning Outcomes

Content
law in public transport; european and national law; rail privatisation

Complementary literature
Kunz (Hrsg): Eisenbahnrecht, Nomos-Verlag, Baden-Baden

Course: Development and Concept of Track-Led Systems Course key: [19326]

Lecturers: Hohnecker
Credit points (CP): 1,5 **Hours per week:** 1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Guided Systems Engineering [WI4INGBGU6] (S. 97)

Learning Control / Examinations
The assessment will consist of a oral exam (20 min) according to §4 (2), 1 of the examination regulation.
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.

Prerequisites
See module description.

Conditions
See module description.

Learning Outcomes

Content
elcetrical infrastructure; new and innovative guided systems; topical themes from our research

Course: Public Transit in Cities and Regions — Course key: [19327s]

Lecturers: Hohnecker
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Public Transportation Operations [WI4INGBGU4] (S. 92)

Learning Control / Examinations
The assessment will consist of a oral exam (20 min) according to §4 (2), 1 of the examination regulation.
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.

Prerequisites
See module description.

Conditions
None.

Learning Outcomes

Content
queuing theory; timetabling; max-plus-algebra; advanced dynamics

Course: Operating Models in Railway Engineering — Course key: [19327w]

Lecturers: Hohnecker
Credit points (CP): 1.5 **Hours per week:** 1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Public Transportation Operations [WI4INGBGU4] (S. 92)

Learning Control / Examinations
The assessment will consist of a oral exam (20 min) according to §4 (2), 1 of the examination regulation.
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.

Prerequisites
See module description.

Conditions
None.

Learning Outcomes

Content

Course: Safety in Construction — Course key: [19404]

Lecturers: Hirschberger, Sittinger
Credit points (CP): 1.5 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Safety Science I [WI4INGINTER4] (S. 117), Safety Science II [WI4INGINTER5] (S. 118), Safety Science III [WI4INGINTER6] (S. 119)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Remarks
Block course. For further information, see http://www.tmb.uni-karlsruhe.de/676.php

Course: Contaminated Land Investigation, Evaluation and Remediation Course key: [19523]

Lecturers: Bieberstein et al.
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Safety Science I [WI4INGINTER4] (S. 117), Safety Science II [WI4INGINTER5] (S. 118), Safety Science III [WI4INGINTER6] (S. 119)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Remarks
For further information, see http://www.ibf.uni-karlsruhe.de/vorlesungen/v_altlasten.html

Course: Assessment of Development Planning — Course key: [19621]

Lecturers: Kämpf
Credit points (CP): 3 **Hours per week:** 1/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Safety Science I [WI4INGINTER4] (S. 117), Safety Science II [WI4INGINTER5] (S. 118), Safety Science III [WI4INGINTER6] (S. 119)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Materialflow

Course key: [21051]

Lecturers: Kai Furmans
Credit points (CP): 6 **Hours per week:** 3/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Introduction to Logistics [WI4INGMB20] (S. 82), Technical Logistics and Logistic Systems [WI4INGMB11] (S. 83)

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 exercises.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Arnold, Dieter; Furmans, Kai: Materialfluss in Logistiksystemen, Springer, 2005 (VDI)

Course: Airport Logistics — Course key: [21056]

Lecturers: Brendlin
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Introduction to Logistics [WI4INGMB20] (S. 82), Technical Logistics and Logistic Systems [WI4INGMB11] (S. 83)

Learning Control / Examinations
The assessment consists of an oral exam according to §4 (2), 2 of the examination regulation.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Analytical Models for Material Flow — Course key: [21060]

Lecturers: Kai Furmans
Credit points (CP): 6 **Hours per week:** 3/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Technical Logistics and Logistic Systems [WI4INGMB11] (S. 83)

Learning Control / Examinations
The assessment consists of an oral exam according to §4 (2), 2 of the examination regulation.

Prerequisites
The content of the course “stochastics” is assumed.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Furmans, Kai: Bedientheoretische Methoden als Hilfsmittel der Materialflussplanung; Wissenschaftliche Berichte des Instituts für Fördertechnik und Logistiksysteme der Universität Karlsruhe (TH); Bd. 52, Karlsruhe, 2000

Course: Safety Engineering — Course key: [21061]

Lecturers: Kany
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Introduction to Logistics [WI4INGMB20] (S. 82), Technical Logistics and Logistic Systems [WI4INGMB11] (S. 83)

Learning Control / Examinations
The assessment will consist of a written exam (120 min) taking place in 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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Remarks
For further information, see http://www.ise.uni-karlsruhe.de/16.php

Course: Supply Chain Management

Course key: [21062]

Lecturers: Alicke
Credit points (CP): 6 **Hours per week:** 3/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Technical Logistics and Logistic Systems [WI4INGMB11] (S. 83)

Learning Control / Examinations
The assessment consists of an oral exam according to §4 (2), 2 of the examination regulation.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Industrial Application of Technological Logistics instancing Crane Systems Course key: [21064]

Lecturers: Golder
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Introduction to Logistics [WI4INGMB20] (S. 82), Technical Logistics and Logistic Systems [WI4INGMB11] (S. 83)

Learning Control / Examinations
The assessment consists of an oral exam according to §4 (2), 2 of the examination regulation.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Mobile Machines

Course key: [21073]

Lecturers: Marcus Geimer
Credit points (CP): 6 **Hours per week:** 4
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mobile Machines [WI4INGMB15] (S. 87)

Learning Control / Examinations
See modul description.

Prerequisites
It is recommended to attend the course *Fluid Power Systems* [21093] beforehand.

Conditions
None.

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: Informationssysteme in Logistik und Supply Chain Management Course key: [21074]

Lecturers: Kilger
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Introduction to Logistics [WI4INGMB20] (S. 82), Technical Logistics and Logistic Systems [WI4INGMB11] (S. 83)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Quantitative Risk Management of Logistic Systems Course key: [21075]

Lecturers: Cardeneo
Credit points (CP): 6 **Hours per week:** 3/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Introduction to Logistics [WI4INGMB20] (S. 82), Technical Logistics and Logistic Systems [WI4INGMB11] (S. 83), Safety Science I [WI4INGINTER4] (S. 117), Safety Science II [WI4INGINTER5] (S. 118), Safety Science III [WI4INGINTER6] (S. 119)

Learning Control / Examinations
The assessment consists of an oral exam (30-45 min) according to §4 (2), 2 of the examination regulation.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced in the lecture.

Course: Logistics — Course key: [21078]

Lecturers: Kai Furmans
Credit points (CP): 6 **Hours per week:** 3/1
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Technical Logistics and Logistic Systems [WI4INGMB11] (S. 83)

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 exercises.

Prerequisites
Requied are lectures on “Linear Algebra” and “Stochastic”.

Conditions
None.

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 Managament
- information flow
- transportation organization
- controlling and development of a logistics system
- co-operation mechanisms
- Lean SCM
- SCOR model

Identification Technologies

Media
Blackboard, Beramer, In Excercises also PCs

Complementary 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
- Gudehus. Logistik, Springer Verlag, 2007
- Neumann-Morlock. Operations-Research, Hanser-Verlag, 1993
- Tempelmeier. Bestandsmanagement in Supply Chains, Books on Demand 2006
- Schönsleben. Integrales Logistikmanagement, Springer, 1998

Course: Fundamentals of Technical Logistics — Course key: [21081]

Lecturers: Mittwollen
Credit points (CP): 6 **Hours per week:** 3/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Introduction to Logistics [WI4INGMB20] (S. 82), Technical Logistics and Logistic Systems [WI4INGMB11] (S. 83)

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

Prerequisites
Technical understanding is recommended.

Conditions
None.

Learning Outcomes

Content

Course: IT for Intralogistics Systems — Course key: [21083]

Lecturers: Thomas
Credit points (CP): 6 **Hours per week:** 3/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Technical Logistics and Logistic Systems [WI4INGMB11] (S. 83)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Informationstechnik für Logistiksysteme — Course key: [21083]

Lecturers: Thomas
Credit points (CP): 3 **Hours per week:** 3/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Introduction to Logistics [WI4INGMB20] (S. 82)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Autotmative Logistics — Course key: [21085]

Lecturers: Kai Furmans
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Introduction to Logistics [WI4INGMB20] (S. 82), Technical Logistics and Logistic Systems [WI4INGMB11] (S. 83)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Warehouse and Distribution Systems — Course key: [21086]

Lecturers: Wisser
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Introduction to Logistics [WI4INGMB20] (S. 82), Technical Logistics and Logistic Systems [WI4INGMB11] (S. 83)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Industrial Application of Material Handling Systems in Sorting and Distribution Systems
Course key: [21089]

Lecturers: Föller
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Introduction to Logistics [WI4INGMB20] (S. 82), Technical Logistics and Logistic Systems [WI4INGMB11] (S. 83)

Learning Control / Examinations
The assessment will consist of an oral exam according to §4 (2), 2 of the examination regulation.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: CAN-Bus Release Control — Course key: [21092]

Lecturers: Marcus Geimer
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Automotive Engineering [WI4INGMB5] (S. 86), Mobile Machines [WI4INGMB15] (S. 87)

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.

Prerequisites
Basic knowledge of electrical engineering is recommended. Programming skills are also helpful.

Conditions
None.

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)

Complementary literature
- Etschberger, K.: Controller Area Network, Grundlagen, Protokolle, Bausteine, Anwendungen; München, Wien: Carl Hanser Verlag, 2002.
- Engels, H.: CAN-Bus - CAN-Bus-Technik einfach, anschaulich und praxisnah dargestellt; Poing: Franzis Verlag, 2002.

Remarks
The course will be replenished by interesting lectures of professionals.

Course: Fluid Power Systems — Course key: [21093]

Lecturers: Marcus Geimer
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Automotive Engineering [WI4INGMB5] (S. 86), Mobile Machines [WI4INGMB15] (S. 87)

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.

Prerequisites
It is recommended to understand the mechanical and fluid mechanical basics.

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

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: Simulation of coupled systems — Course key: [21095]

Lecturers: Marcus Geimer
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Vehicle Development [WI4INGMB14] (S. 85), Mobile Machines [WI4INGMB15] (S. 87)

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.

Prerequisites
It is recommended to have:

- Knowledge of ProE (ideally Wildfire 2.0)
- Basic knowledge of Matlab/Simulink
- Basic knowledge of dynamics of machines
- Basic knowledge of hydraulics

Conditions
None.

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

Complementary literature

- miscellaneous guides according the software-tools pdf-shaped
- information to the wheel-type loader

Course: Combustion Engines A — Course key: [21101]

Lecturers: Spicher
Credit points (CP): 8 **Hours per week:** 4/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Engine Development [WI4INGMB17] (S. 88), Combustion Engines [WI4INGMB16] (S. 90)

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.

Prerequisites
It is recommended to have basic knowledge of thermodynamics.

Conditions
None.

Learning Outcomes

Content

Course: Motor Fuels for Combustion Engines and their Verifications Course key: [21109]

Lecturers: Volz
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Engine Development [WI4INGMB17] (S. 88), Combustion Engines [WI4INGMB16] (S. 90)

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.

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

Conditions
None.

Learning Outcomes

Content

Course: Supercharging of Internal Combustion Engines Course key: [21112]

Lecturers: Golloch
Credit points (CP): 4 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Engine Development [WI4INGMB17] (S. 88), Combustion Engines [WI4INGMB16] (S. 90)

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.

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

Conditions
None.

Learning Outcomes

Content

Course: Simulation of Spray and Mixture Formation in Internal Combustion EnginesCourse key: [21114]

Lecturers: Baumgarten
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Engine Development [WI4INGMB17] (S. 88), Combustion Engines [WI4INGMB16] (S. 90)

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.

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

Conditions
None.

Learning Outcomes

Content

Course: Methods in Analyzing Internal Combustion — Course key: [21134]

Lecturers: Wagner
Credit points (CP): 4 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Engine Development [WI4INGMB17] (S. 88), Combustion Engines [WI4INGMB16] (S. 90)

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.

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

Conditions
None.

Learning Outcomes

Content

Course: Combustion Engines B — Course key: [21135]

Lecturers: Spicher
Credit points (CP): 4 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Engine Development [WI4INGMB17] (S. 88), Combustion Engines [WI4INGMB16] (S. 90)

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 4.

Prerequisites
The course *Combustion Engines A* [21101] has to be completed beforehand.
Knowledge of thermodynamics is recommended.

Conditions
None.

Learning Outcomes

Content

Course: Engine Measurement Technologies — Course key: [21137]

Lecturers: Bernhardt
Credit points (CP): 4 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Engine Development [WI4INGMB17] (S. 88), Combustion Engines [WI4INGMB16] (S. 90)

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.

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

Conditions
None.

Learning Outcomes

Content

Course: Internal Combustion Engines and Exhaust Gas Aftertreatment TechnologyCourse key: [21138]

Lecturers: Lox
Credit points (CP): 4 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Engine Development [WI4INGMB17] (S. 88)

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.

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

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced in the lecture.

Course: Introduction to Multibody System Dynamics Course key: [21235]

Lecturers: Seemann
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Analysing and Simulation Methods for Mechanical Systems [WI4INGMB19] (S. 78)

Learning Control / Examinations
The assessment consists of an oral exam (30 min) according to Section 4(2), 2 of the examination regulation. The examination is offered every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
The courses *Engineering Mechanics I* [21208] and *Engineering Mechanics II* [22642] have to be completed successfully.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Kane, T.: Dynamics

Course: Simulation of Dynamical Systems — Course key: [21236]

Lecturers: Carsten Proppe
Credit points (CP): 6 **Hours per week:** 2/2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Analysing and Simulation Methods for Mechanical Systems [WI4INGMB19] (S. 78)

Learning Control / Examinations
The assessment consists of an oral exam (30 min) according to Section 4(2), 2 of the examination regulation. The examination is offered every semester. Re-examinations are offered at every ordinary examination date.
The successful completion of the individual experiments in the colloquium are prerequisited for taking the exam.

Prerequisites
The courses *Engineering Mechanics I* [21208] and *Engineering Mechanics II* [22642] have to be completed successfully.

Conditions
None.

Learning Outcomes

Content

Course: Mathematical Practices in Vibrations — Course key: [21241]

Lecturers: Wauer
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Analysing and Simulation Methods for Mechanical Systems [WI4INGMB19] (S. 78)

Learning Control / Examinations
The assessment consists of an oral exam (30 min) according to Section 4(2), 2 of the examination regulation. The examination is offered every semester. Re-examinations are offered at every ordinary examination date.
Optional, the assessment may be taken as a written exam (180 min) taking place in the recess period (according to Section 4(2), 1 of the examination regulation).

Prerequisites
The courses *Engineering Mechanics I* [21208] and *Engineering Mechanics II* [22642] have to be completed successfully.

Conditions
None.

Learning Outcomes

Content

Basic literature
Textbuch: Mathemat. Methoden d. Schwingungslehre

Course: Practical Training in Measurement of Vibrations Course key: [21241p]

Lecturers: Wauer
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Analysing and Simulation Methods for Mechanical Systems [WI4INGMB19] (S. 78)

Learning Control / Examinations
The assessment consists of an oral exam (30 min) according to Section 4(2), 2 of the examination regulation. The examination is offered every semester. Re-examinations are offered at every ordinary examination date.
The successful completion of the individual experiments in the colloquium are prerequisited for taking the exam.

Prerequisites
The courses *Engineering Mechanics I* [21208] and *Engineering Mechanics II* [22642] have to be completed successfully.
It is recommended to attend more courses in the area of dynamics.

Conditions
None.

Learning Outcomes

Content

Complementary literature
experiment description

Course: Mathematical Methods in Strength of Materials Course key: [21254]

Lecturers: Böhlke
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Analysing and Simulation Methods for Mechanical Systems [WI4INGMB19] (S. 78)

Learning Control / Examinations
The assessment consists of a written exam (180 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.

Prerequisites
The courses *Engineering Mechanics I* [21208] and *Engineering Mechanics II* [22642] have to be completed successfully.

Conditions
None.

Learning Outcomes

Content

Course: Simulation Methods in the Product Creation Process Course key: [21264]

Lecturers: Jivka Ovtcharova, Albert Albers, Thomas Böhlke
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Virtual Engineering [WI4INGMB22] (S. 91)

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Introduction to the Finite-Element-Method Course key: [21282]

Lecturers: Böhlke
Credit points (CP): 6 **Hours per week:** 3/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Analysing and Simulation Methods for Mechanical Systems [WI4INGMB19] (S. 78)

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

Prerequisites
The courses *Engineering Mechanics I* [21208] and *Engineering Mechanics II* [22642] have to be completed successfully.
It is recommended to attend the courses *Advanced Course on strength of materials* [21252] and *Mathematical Methods in Strength of Materials* [21254] .

Conditions
None.

Learning Outcomes

Content

Course: Virtual Engineering I

Course key: [21352]

Lecturers: Jivka Ovtcharova
Credit points (CP): 10.5 **Hours per week:** 4/3
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Virtual Engineering [WI4INGMB22] (S. 91)

Learning Control / **Examinations**
The assessment consists of an oral exam (40 min) about the contents of the lectures *Virtual Engineering I* [21352] und *Virtual Engineering II* [21378].
The oral exam may be taken about the lecture *Virtual Engineering I* [21352] as well. In thios case the exam takes 20 min.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Virtual Engineering for Mechatronic Products — Course key: [21360]

Lecturers: Jivka Ovtcharova, Stefan Rude
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Virtual Engineering [WI4INGMB22] (S. 91)

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Product, Process and Ressource Integration in the Automotive Development Course key: [21364]

Lecturers: Sama Mbang
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Virtual Engineering [WI4INGMB22] (S. 91)

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Virtual Engineering II — Course key: [21378]

Lecturers:
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Virtual Engineering [WI4INGMB22] (S. 91)

Learning Control / Examinations
The assessment consists of an oral exam (40 min) about the contents of the lectures *Virtual Engineering I* [21352] und *Virtual Engineering II* [21378].
The oral exam may be taken about the lecture *Virtual Engineering II* [21378] as well. In thios case the exam takes 20 min.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Computer Integrated Planning of New Products — Course key: [21387]

Lecturers: Roland Kläger
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Virtual Engineering [WI4INGMB22] (S. 91)

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Experimental Lab Class in Welding Technology, in Groups Course key: [21560]

Lecturers: Volker Schulze
Credit points (CP): 0 **Hours per week:** 3
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Specific Topics in Material Science [WI4INGMB18] (S. 89)

Learning Control / Examinations
The assessment consists of a written report at the end of the experimental lab (according to Section 4(2), 3 of the examination regulation). The assessment won't be graded.

Prerequisites
The participation in the course *Welding Technology I/II* [21565/21570] is assumed.

Conditions
None.

Learning Outcomes
During the lab class a survey of current welding processes and their suitability for joining different materials is given. An important goal of the lab class is to understand and to evaluate the advantages and disadvantages of the individual procedures.

Content

- Gas welding of steels with different weld geometries
- Gas welding of cast iron, nonferrous metals
- Brazing of aluminum
- Electric arc welding with different weld geometries
- Gas welding according to the TIG, MIG and MAG procedures

Media
Distributed during the lab attendance.

Complementary literature
Distributed during the lab attendance.

Course: Failure Analysis — Course key: [21562]

Lecturers: Poser-Keppler
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Safety Science I [WI4INGINTER4] (S. 117), Safety Science II [WI4INGINTER5] (S. 118), Safety Science III [WI4INGINTER6] (S. 119)

Learning Control / Examinations
The assessment consists of an oral exam (20-30 min) according to Section 4 (2), 2 of the examination regulation.
The exam takes place in the recess period.

Prerequisites
Basic knowledge in materials science (e.g. lecture materials science I and II).

Conditions
None.

Learning Outcomes
The students are able to discuss damage evaluation and to perform damage investigations. They know the common necessary investigation methods and can regard failures considering load and material resistance. Furthermore they can describe and discuss the most important types of failure and damage appearance.

Content
- Aim, procedure and content of examining failure
- Examination methods
- Types of failure:
  Failure due to mechanical loads
  Failure due to corrosion in electrolytes
  Failure due to thermal loads
  Failure due to tribological loads
- Damage systematics

Remarks
For further information, see http://www.iwk1.uni-karlsruhe.de/index.php?id=310

Course: Enterprise Hospital — Course key: [090428]

Lecturers: Stefan Nickel, Hansis
Credit points (CP): 2 **Hours per week:** 2/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operations Research in Supply Chain Management and Health Care Management [WI4OR5] (S. 67)

Learning Control / Examinations
The assessment is an oral examination (according to §4(2), 1 of the examination regulation).
The examination is held in the term of the lecture and the following lecture.

Prerequisites
None.

Conditions
None.

Learning Outcomes
Students gain insight into fundamental work flows in hospitals. They learn that the application of Operations Research methods can also be useful in so-called non-profit-organisations. In addition, the most important application areas for mathematical models, e.g. personnel planning or quality management, will be discussed.

Content
The lecture „Enterprise hospital“ presents internal organization structures, work conditions and work environments at the example of hospitals und relates this to common and expected conditions of other service industries.
Covered topics include normative environment, intra-organizational structure, personnel management, quality, external networking and market appearance. Students have the possibility to participate in a final exam.

Remarks
The lecture is held in every semester.
The planned lectures and courses for the next three years are announced online.

Course: Failure Analysis

Course key: [21562s]

Lecturers: Kerscher
Credit points (CP): 3 **Hours per week:** 2/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Specific Topics in Material Science [WI4INGMB18] (S. 89)

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

Prerequisites
The module *Emphasis Material Science* [WI3INGMB9] has to be completed successfully.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- Lange: Systematische Beurteilung technischer Schadensfälle, ISBN 3-527-30417-7
- Grosch: Schadenskunde im Maschinenbau, ISBN 3-8169-2179-5
- Kieselbach: Schäden an Bauteilen aus Metall - ingenieurmässig analysiert, UB 2000 E 627
- Broichhausen: Schadenskunde: Analyse u. Vermeidung von Schäden in Konstruktion, Fertigung u. Betrieb, ISBN 3-446-13409-3

Course: Welding Technology I/II — Course key: [21565/21570]

Lecturers: Spies
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Specific Topics in Material Science [WI4INGMB18] (S. 89)

Learning Control / Examinations
The assessment consists of an oral exam (40 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation).

Prerequisites
The module *Emphasis Material Science* [WI3INGMB9] has to be completed successfully beforehand.
basics of material science (iron- and non-iron alloys), of electrical engineering, of production processes.

Conditions
None.

Learning Outcomes
- knowledge and understanding of the most important welding processes and its industrial application.
- recognition, understanding and handling of problems occuring during the application of different welding processes relating to design, material and production.
- classification and importance of welding technonolgy within the scope of connecting processes (advantages/disadvantages, alternatives).
- recognition, understanding and handling of problems occuring during the application of different welding processes relating to design, material and production.
- consolidation of knowledge of material behaviour during welding
- design and properties of welded constructions
- quality assurance for welding processes

Content
Welding Technologies I
- definition, application and differentiation: welding, welding processes, alternative connecting technologies.
- history of welding technology
- sources of energy for welding processes
- Survey: fusion welding, pressure welding.
- seam preparation/design
- welding positions
- weldability
- gas welding, thermal cutting
- manual metal-arc welding
- submerged arc welding
- IV characteristics: arc/sources of energy
- gas-shielded metal-arc welding

Welding Technologies II
- narrow gap welding
- TIG-welding
- plasma arc welding
- electron beam welding
- laser welding
- spot welding / projection welding
- heat flow at welding
- welding of low-alloy steel / time-temperature-transformation curve.
- welding of high-alloy steel / austenite / Schaefflerdiagramm
- low temperature steels
- welding of cast iron
- heat treatment for welding
- welding of aluminium alloys
- residual welding stress
- methods of testing

- design of welded constructions

Complementary literature

- Ruge: Handbuch der Schweißtechnik, Springer-Verlag, 1985
- Dilthey: Schweißtechnische Fertigungsverfahren I, Augustinus, Aachen, 1991
- Fachbände des Deutschen Verlags für Schweißtechnik

Course: Foundry Technology — Course key: [21575]

Lecturers: Wilhelm
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Specific Topics in Material Science [WI4INGMB18] (S. 89)

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.

Prerequisites
The module *Emphasis Material Science* [WI3INGMB9] has to be completed successfully beforehand.

Conditions
None.

Learning Outcomes
Basic knowledge from the field of casting technology for mechanical engineers; the focus is placed on moulding materials, moulding processes, casting materials and metallurgy. Special notes of virtual casting develoment.

Content
- Moulding and casting processes
- Solidifying of melts
- Castability
- Fe-Alloys
- Non-Fe-Alloys
- Moulding and additive materials
- Core production
- Sand reclamation
- Feeding technology
- Design in casting technology
- Casting simulation
- Foundry Processes

Complementary literature
Will be announced in the lecture.

Course: Constitution and Properties of Protective Coatings Course key: [21601]

Lecturers: Ulrich
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Specific Topics in Material Science [WI4INGMB18] (S. 89)

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.

Prerequisites
The module *Emphasis Material Science* [WI3INGMB9] has to be completed successfully beforehand.
Basic knowledge of physics, chemistry and material science is assumed.

Conditions
None.

Learning Outcomes

Content

Complementary literature
F.-W. Bach: Modern Surface Technology, Wiley-VCH, Weinheim, 2006

Course: Physical Basics of Laser Technology — Course key: [21612]

Lecturers: Schneider
Credit points (CP): 3 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Specific Topics in Material Science [WI4INGMB18] (S. 89)

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.

Prerequisites
The module *Emphasis Material Science* [WI3INGMB9] has to be completed successfully beforehand.
Basic knowledge of physics, chemistry and material science is assumed.

Conditions
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.

Complementary literature

- F. K. Kneubühl, M. W. Sigrist: Laser, 1999, Teubner Studienbücher
- J. Eichler, H.-J. Eichler: Laser: Bauformen, Strahlführung, Anwendungen, 2003, Springer
- R. Poprawe: Lasertechnik für die Fertigung, 2005, Springer
- H. Hügel: Strahlwerkzeug Laser; 1992, Teubner Studienbücher

Course: Superhard Thin Film Materials — Course key: [21618]

Lecturers: Ulrich
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Specific Topics in Material Science [WI4INGMB18] (S. 89)

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.

Prerequisites
The module *Emphasis Material Science* [WI3INGMB9] has to be completed successfully beforehand.
Basic knowledge of physics, chemistry and material science is assumed.

Conditions
None.

Learning Outcomes
The student

- has a specific knowledge of different parts of Material Science
- is able to apply this knowledge in practice

Content
Superhard materials are solids with hardness larger than 4000 HV0,05.
In this lecture, their modelling, production, characterization and application as thin film materials will be discussed.
First, the necessary basics will be shown. Thereby, the focus will be on plasma, which is the central element for all coating methods, allowing the synthesis of superhard materials (definition, characteristics, plasma processes, plasma wall interaction, in-situ-process control, coating modification). Another focus will be on computer simulation that can be used to modulate and depict many processes.
In the second part of the lecture selected super-hard materials will be presented: amorphous hydrogenated carbon, diamond-like carbon, diamond, cubic boron nitride, materials of the system transition metal-B-C-N-Si as well as superhard multilayer.
Microstructure, mechanical, electronic and optical properties, a customized coating method, characterisation methods (quality control), mechanisms for the synthesis of materials will all be examined as well as their applications and market potential.

Complementary literature

- G. Kienel: Vakuumbeschichtung 1 bis 5, VDI-Verlag 1995
- R. A. Haefer: Oberflächen- und Dünnschichttechnologie; Teil I und II, Springer-Verlag 1991

Course: Laser Application in Automotive Engineering — Course key: [21642]

Lecturers: Schneider
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Specific Topics in Material Science [WI4INGMB18] (S. 89)

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.

Prerequisites
The module *Emphasis Material Science* [WI3INGMB9] has to be completed successfully beforehand.
Basic knowledge of physics, chemistry and material science is assumed.

Conditions
It is not possible, to combine this lecture with the lecture *Physical Basics of Laser Technology* [21612]

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 automotive engineering.

Content
Based on a short description of the physical basics of laser technology the lecture reviews the most important high power lasers and their various applications in automotive engineering.

Media
Lecture notes.

Complementary literature

- R. Poprawe: Lasertechnik für die Fertigung, 2005, Springer
- F. K. Kneubühl, M. W. Sigrist: Laser, 1999, Teubner Studienbücher
- W. M. Steen: Laser Material Processing, 1998, Springer

Course: Machine Tools

Course key: [21652]

Lecturers: Munzinger
Credit points (CP): 9 **Hours per week:** 4/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Selected Topics in Production Technology I [WI4INGMB1] (S. 79), Selected Topics in Production Technology II [WI4INGMB2] (S. 80), Selected Topics in Production Technology III [WI4INGMB3] (S. 81)

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Manufacturing Technology Course key: [21657]

Lecturers: Volker Schulze
Credit points (CP): 9 **Hours per week:** 4/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Selected Topics in Production Technology I [WI4INGMB1] (S. 79), Selected Topics in Production Technology II [WI4INGMB2] (S. 80), Selected Topics in Production Technology III [WI4INGMB3] (S. 81)

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Integrated Production Planning — Course key: [21660]

Lecturers: Lanza
Credit points (CP): 9 **Hours per week:** 4/2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Selected Topics in Production Technology I [WI4INGMB1] (S. 79), Selected Topics in Production Technology II [WI4INGMB2] (S. 80), Selected Topics in Production Technology III [WI4INGMB3] (S. 81)

Learning Control / Examinations
The assessment consists of a written exam (240 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.

Prerequisites
It is recommended to attend the course *Manufacturing Technology* [21657] beforehand.

Conditions
None.

Learning Outcomes

Content

Course: Quality Management — Course key: [21667]

Lecturers: Lanza
Credit points (CP): 4.5 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Selected Topics in Production Technology I [WI4INGMB1] (S. 79), Selected Topics in Production Technology II [WI4INGMB2] (S. 80), Selected Topics in Production Technology III [WI4INGMB3] (S. 81)

Learning Control / Examinations
The assessment consists of a written exam (180 min) or an oral exam (30 min) taking place at the beginning of 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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Materials and Processes in Automotive Lightweight Construction Course key: [21669]

Lecturers: Haepp
Credit points (CP): 4.5 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Selected Topics in Production Technology I [WI4INGMB1] (S. 79), Selected Topics in Production Technology II [WI4INGMB2] (S. 80), Selected Topics in Production Technology III [WI4INGMB3] (S. 81)

Learning Control / Examinations
The assessment consists of a written exam (90 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.

Prerequisites
It is recommended to attend the courses *Material Science II* [21782] and *Electrical Engineering II* [23224] beforehand.

Conditions
None.

Learning Outcomes

Content

Course: Production system and technology in powertrain production Course key: [21690]

Lecturers: Stauch
Credit points (CP): 4.5 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Selected Topics in Production Technology I [WI4INGMB1] (S. 79), Selected Topics in Production Technology II [WI4INGMB2] (S. 80), Selected Topics in Production Technology III [WI4INGMB3] (S. 81)

Learning Control / Examinations
The assessment consists of a written exam (60 min) or an oral exam (20 min) taking place at the beginning of 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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Seminar Industrial Engineering — Course key: [21690sem]

Lecturers: Volker Schulze, Lanza, Munzinger
Credit points (CP): 4.5 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Selected Topics in Production Technology I [WI4INGMB1] (S. 79), Selected Topics in Production Technology II [WI4INGMB2] (S. 80), Selected Topics in Production Technology III [WI4INGMB3] (S. 81)

Learning Control / Examinations
he assessment consists of a written test taking place at the middle of the lecture term (according to Section 4(2), 3) of the examination regulation).
The result of the test may be used to improve the grade in the main exam. The grade of the main exam may be improved by one half-step grading scales (either from x.3 on x.0 or x.7 on x.3) if the score in the test exceeds a predetermined limit.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: International Production and Logistics — Course key: [21692]

Lecturers: Lanza
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Selected Topics in Production Technology I [WI4INGMB1] (S. 79), Selected Topics in Production Technology II [WI4INGMB2] (S. 80), Selected Topics in Production Technology III [WI4INGMB3] (S. 81), Introduction to Logistics [WI4INGMB20] (S. 82), Technical Logistics and Logistic Systems [WI4INGMB11] (S. 83)

Learning Control / Examinations
The assessment will consist 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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Practical Course in Engineering Ceramics Course key: [21751]

Lecturers: Porz
Credit points (CP): 0 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Specific Topics in Material Science [WI4INGMB18] (S. 89)

Learning Control / Examinations
The assessment consists of an colloquium and a report to every single experiment (according to Section 4(2), 3 of the examination regulation). The assessment won't be graded.

Prerequisites
The module *Emphasis Material Science* [WI3INGMB9] has to be completed successfully beforehand.
Attendance of one course in the area of ceramics is assumed.

Conditions
None.

Learning Outcomes
The aim of the curse is to learn learn the eperimental techniques and to understand the scientific background. In a report the results heve to be discussed. The practical course takes place during the week after the end of the semester.

Content
The course is focused on aspects of processing of a ceramic part. Characterisation of starting powder, forming and sintering, microstructural and mechanical characterisation are the basic topics

Course: Principles of Ceramic and Powder Metallurgy Processing Course key: [21754]

Lecturers: Oberacker
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Specific Topics in Material Science [WI4INGMB18] (S. 89)

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.

Prerequisites
The module *Emphasis Material Science* [WI3INGMB9] has to be completed successfully beforehand.
Basic knowledge of experimental physics and chemistry is recommended.

Conditions
None.

Learning Outcomes
The lecture is focused on basic aspects of powder technology used in ceramic and powder metallurgy (PM) processing. Learning target: Detailed skills of system- and process parameters which control shaping of dry powders, pasts, suspensions

Content
- Overview on the ceramic/PM fabrication process
- Materials produced by powder based technologies
- Powder characteristics and powder characterization
- Shaping by dry pressing
- Control and shaping of powder supensions and pasts

Complementary literature
R.J.Brook: Processing of Ceramics I+II, VCH Weinheim, 1996
M.N. Rahaman: Cermamic Processing and Sintering, 2nd Ed., Marcel Dekker, 2003
F.Thümmler, R. Oberacker: Introduction to Powder Metallurgy, Inst. of Materials,London, 1993

Course: Structural and Functional Ceramics — Course key: [21775]

Lecturers: M. J. Hoffmann
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Specific Topics in Material Science [WI4INGMB18] (S. 89)

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.

Prerequisites
The module *Emphasis Material Science* [WI3INGMB9] has to be completed successfully beforehand.
Basic knowledge of experimental physics and chemistry is recommended.
It is recommended to attend the course *Introduction in Ceramics [21755].*

Conditions
None.

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, Ferrolectric ceramics.

Complementary literature
H. Salmang, H. Scholze, „Keramik“, Springer-Verlag;
Kingery, Bowen, Uhlmann, „Introduction To Ceramics“, Wiley-Verlag

Course: Basics of Automotive Engineering I — Course key: [21805]

Lecturers: Frank Gauterin, Unrau
Credit points (CP): 6 **Hours per week:** 4
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Automotive Engineering [WI4INGMB5] (S. 86)

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.

Prerequisites
None.

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

Complementary literature
1. Reimpell, J.: Fahrwerktechnik: Fahrzeugmechanik, Vogel Verlag, 1992
2. Braes, H.H.; Seiffert, U.: Handbuch Kraftfahrzeugtechnik, Vieweg & Sohn-Verlag, 2005
3. Gnadler, R.: Umdrucksammlung zur Vorlesung “Grundlagen der Fahrzeugtechnik I”

Course: Vehicle Comfort and Acoustics I — Course key: [21806]

Lecturers: Frank Gauterin
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Handling Characteristics of Motor Vehicles [WI4INGMB6] (S. 84)

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.

Prerequisites
None.

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

Complementary literature
1. Michael Möser, Technische Akustik, Springer, Berlin, 2005
2. Russel C. Hibbeler, Technische Mechanik 3, Dynamik, Pearson Studium, München, 2006
3. Manfred Mitschke, Dynamik der Kraftfahrzeuge, Band B: Schwingungen, Springer, Berlin, 1997

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.
suche

Course: Handling Characteristics of Motor Vehicles I — Course key: [21807]

Lecturers: Unrau
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Handling Characteristics of Motor Vehicles [WI4INGMB6] (S. 84)

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.

Prerequisites
None.

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

Complementary literature
1. Willumeit, H.-P.: Modelle und Modellierungsverfahren in der Fahrzeugdynamik, B. G. Teubner Verlag, 1998
2. Zomotor, A.: Fahrwerktechnik: Fahrverhalten, Vogel Verlag, 1991
3. Gnadler, R.: Umdrucksammlung zur Vorlesung "Fahreigenschaften von Kraftfahrzeugen I"

Course: Fundamentals in the Development of Passenger Vehicles I Course key: [21810]

Lecturers: Frech
Credit points (CP): 1.5 **Hours per week:** 1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Vehicle Development [WI4INGMB14] (S. 85)

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.

Prerequisites
None.

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. Aero dynamical dimensioning and design of an automobile I
5. Aero dynamical 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 beprovided during the first lesson).

Course: Fundamentals in the Development of Commercial Vehicles I Course key: [21812]

Lecturers: Zürn
Credit points (CP): 1.5 **Hours per week:** 1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Vehicle Development [WI4INGMB14] (S. 85), Mobile Machines [WI4INGMB15] (S. 87)

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.

Prerequisites
None.

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

Complementary literature
1. Marwitz, H., Zittel, S.: ACTROS - die neue schwere Lastwagenbaureihe von Mercedes-Benz, ATZ 98, 1996, Nr. 9
2. Alber, P., McKellip, S.: ACTROS - Optimierte passive Sicherheit, ATZ 98, 1996
3. Morschheuser, K.: Airbag im Rahmenfahrzeug, ATZ 97, 1995, S. 450 ff.

Course: Fundamentals for Design of Motor-Vehicle Bodies I Course key: [21814]

Lecturers: Bardehle
Credit points (CP): 1.5 **Hours per week:** 1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Automotive Engineering [WI4INGMB5] (S. 86)

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.

Prerequisites
None.

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 technologie
6. Body in white/body-production

Complementary literature
1. Automobiltechnische Zeitschrift ATZ, Friedr. Vieweg & Sohn Verlagsges. mbH, Wiesbaden
2. Automobil Revue, Bern (Schweiz)
3. Automobil Produktion, Verlag Moderne Industrie, Landsberg

Course: Vehicle Mechatronics I — Course key: [21816]

Lecturers: Ammon
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Handling Characteristics of Motor Vehicles [WI4INGMB6] (S. 84), Vehicle Development [WI4INGMB14] (S. 85)

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.

Prerequisites
It is recommeded to have knowledge of control engineering, technical mechanics and automobile technology.

Conditions
None.

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 systemactical 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 assistence 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)

Complementary literature

1. Ammon, D., Modellbildung und Systementwicklung in der Fahrzeugdynamik, Teubner, Stuttgart, 1997
2. Mitschke, M., Dynamik der Kraftfahrzeuge, Bände A-C, Springer, Berlin, 1984ff
3. Miu, D.K., Mechatronics - Electromechanics and Contromechanics, Springer, New York, 1992
4. Popp, K. u. Schiehlen, W., Fahrzeugdynamik - Eine Einführung in die Dynamik des Systems Fahrzeug-Fahrweg, Teubner, Stuttgart, 1993
5. Roddeck, W., Einführung in die Mechatronik, Teubner, Stuttgart, 1997
6. Zomotor, A., Fahrwerktechnik: Fahrverhalten, Vogel, Würzburg, 1987

Course: Vehicle Comfort and Acoustics II — Course key: [21825]

Lecturers: Frank Gauterin
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Handling Characteristics of Motor Vehicles [WI4INGMB6] (S. 84)

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.

Prerequisites
The course can be attended independently from the course *Vehicle Comfort and Acoustics II* [21806].

Conditions
None.

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: Basics of Automotive Engineering II — Course key: [21835]

Lecturers: Frank Gauterin, Unrau
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Automotive Engineering [WI4INGMB5] (S. 86)

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.

Prerequisites
It is recommeded to attend the course *Basics of Automotive Engineering I* [21805].

Conditions
None.

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

Complementary literature
1. Reimpell, J.: Fahrwerktechnik: Grundlagen, Vogel Verlag, 1995
2. Burckhardt, M.: Bremsdynamik und Pkw-Bremsanlagen, Vogel Verlag, 1991
3. Gnadler, R.: Umdrucksammlung zur Vorlesung “Grundlagen der Fahrzeugtechnik II”

Course: Handling Characteristics of Motor Vehicles II — Course key: [21838]

Lecturers: Frank Gauterin
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Handling Characteristics of Motor Vehicles [WI4INGMB6] (S. 84)

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.

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

Conditions
None.

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

Complementary literature
1. Richter, B.: Schwerpunkte der Fahrzeugdynamik, Verlag TÜV, 1990
2. Zomotor, A.: Fahrwerktechnik: Fahrverhalten, Vogel Verlag, 1991
3. Gnadler, R.: Umdrucksammlung zur Vorlesung “Fahreigenschaften von Kraftfahrzeugen II “

Course: Fundamentals for Design of Motor-Vehicle Bodies II Course key: [21840]

Lecturers: Bardehle
Credit points (CP): 1.5 **Hours per week:** 1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Automotive Engineering [WI4INGMB5] (S. 86)

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.

Prerequisites
It is recommended to attend the course *Fundamentals for Design of Motor-Vehicle Bodies I* [21814] beforehand.

Conditions
None.

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

Complementary 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 Passenger Vehicles II Course key: [21842]

Lecturers: Frech
Credit points (CP): 1.5 **Hours per week:** 1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Vehicle Development [WI4INGMB14] (S. 85)

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.

Prerequisites
It is recommended to attend the course *Fundamentals in the Development of Passenger Vehicles I* [21810] beforehand.

Conditions
None.

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: Basics and Methods for Integration of Tires and Vehicles Course key: [21843]

Lecturers: Leister
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Vehicle Development [WI4INGMB14] (S. 85)

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.

Prerequisites
Knowledge of automobile technology is recommeded.

Conditions
None.

Learning Outcomes

Content

Course: Fundamentals in the Development of Commercial Vehicles II Course key: [21844]

Lecturers: Zürn
Credit points (CP): 1.5 **Hours per week:** 1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Vehicle Development [WI4INGMB14] (S. 85), Mobile Machines [WI4INGMB15] (S. 87)

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.

Prerequisites
It is recommended to attend the course *Fundamentals in the Development of Passenger Vehicles I* [21810] beforehand.

Conditions
None.

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. Elektronic Systems

Complementary literature
1. Schittler, M., Heinrich, R., Kerschbaum, W.: Mercedes-Benz Baureihe 500 - neue V-Motorengeneration für schwere Nutzfahrzeuge, MTZ 57 Nr. 9, S. 460 ff., 1996
2. Robert Bosch GmbH (Hrsg.): Bremsanlagen für Kraftfahrzeuge, VDI-Verlag, Düsseldorf, 1. Auflage, 1994
3. Rubi, V., Strifler, P. (Hrsg. Institut für Kraftfahrwesen RWTH Aachen): Industrielle Nutzfahr-zeugentwicklung, Schriftenreihe Automobiltechnik, 1993

Course: Project Workshop-Automative Engineering Course key: [21845]

Lecturers: Frank Gauterin
Credit points (CP): 4.5 **Hours per week:** 3
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Handling Characteristics of Motor Vehicles [WI4INGMB6] (S. 84), Vehicle Development [WI4INGMB14] (S. 85), Automotive Engineering [WI4INGMB5] (S. 86)

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

Prerequisites
None.

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).

Complementary literature
Steinle, Claus; Bruch, Heike; Lawa, Dieter (Hrsg.), Projektmanagement, Instrument moderner Innovation, FAZ Verlag, Frankfurt a. M., 2001, ISBN 978-3929368277

Course: Driving Dynamics Evaluation within the Global Vehicle Simulation Course key: [21850]

Lecturers: Schick
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Handling Characteristics of Motor Vehicles [WI4INGMB6] (S. 84)

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.

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

Conditions
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

Complementary literature
1. Reimpell, J.: Fahrwerktechnik: Grundlagen, Vogel Verlag, 1995
2. Unrau, H.-J.: Scriptum zur Vorlesung “Fahreigenschaften I”
3. Unrau, H.-J.: Scriptum zur Vorlesung “Fahreigenschaften II”
4. IPG: Benutzerhandbuch CarMaker

Course: Micro-Actuators — Course key: [21881]

Lecturers: Kohl
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Sensor Technology I [WI4INGETIT3] (S. 107), Sensor Technology II [WI4INGETIT5] (S. 108)

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

Prerequisites
It is recommended to attend the courses *Material Science II* [21782] and *Electrical Engineering II* [23224] beforehand.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Microactuators, M. Tabib-Azar, Kluwer Academic Publishers London, 1998.
Mechatronik, B. Heimann, W. Gerth, K. Popp, Carl Hanser Verlag München, 1998.
Technischer Einsatz Neuer Aktoren, D. Jendritza, Expert-Verlag Renningen, 1995.

Course: Quality Management of Food Processing — Course key: [22205]

Lecturers: Schuchmann
Credit points (CP): 3 **Hours per week:** 1/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Principles of Food Process Engineering [WI4INGCV3] (S. 111), Specialization in Food Process Engineering [WI4INGCV4] (S. 112)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Food Science and Functionality — Course key: [22207]

Lecturers: Watzl
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Principles of Food Process Engineering [WI4INGCV3] (S. 111), Specialization in Food Process Engineering [WI4INGCV4] (S. 112)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Microbiology of Food

Course key: [22209]

Lecturers: Franz
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Specialization in Food Process Engineering [WI4INGCV4] (S. 112)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Principles of Process Engineering referring to Food I — Course key: [22213]

Lecturers: Volker Gaukel
Credit points (CP): 4 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Principles of Food Process Engineering [WI4INGCV3] (S. 111)

Learning Control / Examinations
See module description.

Prerequisites
None.

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

Learning Outcomes

Content

Course: Principles of Process Engineering referring to Food II Course key: [22214]

Lecturers: Volker Gaukel
Credit points (CP): 4 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Principles of Food Process Engineering [WI4INGCV3] (S. 111)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Product Design

Course key: [22215]

Lecturers: Schuchmann
Credit points (CP): 4 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Specialization in Food Process Engineering [WI4INGCV4] (S. 112)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Modern Measurement Techniques for Process Optimization Course key: [22218]

Lecturers: Regier
Credit points (CP): 4 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Specialization in Food Process Engineering [WI4INGCV4] (S. 112)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Fuels II: Gases and Solids — Course key: [22303]

Lecturers: Reimert
Credit points (CP): 6 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Fuels, Environment and Global Development [WI4INGCV2] (S. 110)

Learning Control / Examinations
The assessment is carried out as an oral exam (20-30 min) (according to §4(2), 1 o. 2 of the examination regulation).
Examination an Re-examinations taking place upon appointment.

Prerequisites
It is recommended to attend the course *Reaction Engineering I* [22114] beforehand.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Cerbe G.: Grundlagen der Gastechnik-Gasbeschaffung, Gasverteilung, Gasverwendung, 6. Aufl., Hansa Verlag, München/Wien 2004.
Reimert, R., Schaub, G. in Ullmann's Encyclopedia of Industrial Chemistry, 6. Aufl., Vol. 15, Wiley VCH 2003, S. 357-380 (Gas Production from Coal, Wood and Other Solid Feedstocks).
Higman, Ch., van der Bergt, M.: „Gasification", Elsevier, Amsterdam, Boston, September 2003, ISBN 0750677074

Course: Fuels I: Fundamentals, Liquid Fuels, Petroleum Processing, Bio Fuels Course key: [22305]

Lecturers: Georg Schaub
Credit points (CP): 6 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Fuels, Environment and Global Development [WI4INGCV2] (S. 110)

Learning Control / Examinations
The assessment is carried out as an oral exam (20-30 min) (according to §4(2), 1 o. 2 of the examination regulation).
Examination an Re-examinations taking place upon appointment.

Prerequisites
It is recommended to attend the course *Reaction Engineering I* [22114] beforehand.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Lucas A.G. (Hrsg.): Modern Petroleum Technology,
Vol. 2 Downstream, John Wiley 2000.
Probstein R.F., Hicks R.E.: Synthetic Fuels, pH Press, Cambridge, MA 1990.

Course: Introduction to Process Safety in the Chemical Industry Course key: [22308]

Lecturers: Schmidt
Credit points (CP): 4 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Safety Science I [WI4INGINTER4] (S. 117), Safety Science II [WI4INGINTER5] (S. 118), Safety Science III [WI4INGINTER6] (S. 119)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Remarks
The course is usually held in June.
For further information, see http://www.ebig.uni-karlsruhe.de/289.php

Course: Cycles and Global Development — Course key: [22319]

Lecturers: Georg Schaub
Credit points (CP): 4 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Fuels, Environment and Global Development [WI4INGCV2] (S. 110)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Schlesinger W.H.: Biogeochemistry, an Analysis of Global Change, Academic Press 1997.

Course: Scale up in Biology and Engineering — Course key: [22417]

Lecturers: Hausmann
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Specialization in Food Process Engineering [WI4INGCV4] (S. 112)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Combustion Technology 1 (Basics) Course key: [22501]

Lecturers: Bockhorn
Credit points (CP): 6 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Fuels, Environment and Global Development [WI4INGCV2] (S. 110)

Learning Control / Examinations
The assessment is carried out as an oral exam (20-30 min) (according to §4(2), 1 o. 2 of the examination regulation).
Examination an Re-examinations taking place upon appointment.

Prerequisites
It is recommended to attend the course *Reaction Engineering I* [22114] beforehand.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Beér J.M., Chigier N.: Energy, Combustion and Environment, McGraw Hill Book Company, New York 1981.

Course: Combustion Related Environmental Protection Course key: [22507]

Lecturers: Bockhorn
Credit points (CP): 4 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Fuels, Environment and Global Development [WI4INGCV2] (S. 110)

Learning Control / Examinations
The assessment is carried out as an oral exam (20-30 min) (according to §4(2), 1 o. 2 of the examination regulation). Examination an Re-examinations taking place upon appointment.

Prerequisites
It is recommended to attend the course *Reaction Engineering I* [22114] beforehand.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Beér J.M., Chigier N.: Energy, Combustion and Environment, McGraw Hill Book Company, New York 1981.

Course: Chemical Technology of Water — Course key: [22601]

Lecturers: F.H. Frimmel
Credit points (CP): 4 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Water Chemistry [WI4INGCV5] (S. 113)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
See corresponding module information.

Learning Outcomes

Content

Complementary literature

- Crittenden, J. [Ed.]: Water Treatment. Principles and Design. 2nd ed. Wiley & Sons, 2005.
- DVGW: Wasseraufbereitung - Grundlagen und Verfahren. In: Lehr- und Handbuch Wasserversor-gung Bd.6. Oldenbourg Industrie-verlag, 2004.
- Frimmel, F. H.: Wasser und Gewässer. Ein Hand-buch. Spektrum Verlag, 1999.
- Grohmann, A., Hässelbarth, U., Schwerdtfeger, W.(Hrsg.): Die Trinkwasserverordnung. 4. Auflage, E. Schmid, Berlin, 2002.
- Sigg,L., Stumm, W.: Aquatische Chemie. Eine Einführung in die Chemie wässriger Lösungen und natürlicher Gewässer. Verlag der Fachvereine Zürich, 1994.
- Stumm, W., Morgan, J. J.: Aquatic Chemistry. Chemical Equilibria and Rates in Natural Waters. 3rd ed. Wiley & Sons, 1996

Course: Excercises in Aqueos Chemical Engineering — Course key: [22602]

Lecturers: F.H. Frimmel
Credit points (CP): 2 **Hours per week:** 1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Water Chemistry [WI4INGCV5] (S. 113)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- DVGW: Wasseraufbereitung-Grundlagen und Verfahren. In: Lehr- und Handbuch Wasserversorgung Bd.6. Oldenbourg Industrieverlag, 2004.
- Frimmel, F. H.: Wasser und Gewässer. Ein Handbuch. Spektrum Verlag, 1999.
- Sigg,L., Stumm, W.: Aquatische Chemie. Eine Einführung in die Chemie wässriger Lösungen und natürlicher Gewässer. Verlag der Fachvereine Zürich, 1994.
- Stumm, W., Morgan, J. J.: Aquatic Chemistry. Chemical Equilibria and Rates in Natural Waters. 3rd ed. Wiley & Sons, 1996.

Course: Natural Scientific Basics for Anlysis and Assessment of Aquatic Systems Course key: [22603]

Lecturers: F.H. Frimmel
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Water Chemistry [WI4INGCV5] (S. 113)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- Cammann, K. Instrumentelle Analytische Chemie. Verfahren, Anwendungen, Qualitätssicherung. Spektrum Verlag, 2001.
- Frimmel, F. H.: Wasser und Gewässer. Ein Handbuch. Spektrum Verlag, 1999.
- Grohmann, A., Hässelbarth, U., Schwerdtfeger, W.(Hrsg.): Die Trinkwasserverordnung. 4. Auflage, E. Schmid, Berlin, 2002.
- Kölle, W.: Wasseranalysen-richtig beurteilt. Grundlagen, Parameter, Wassertypen, Inhaltsstoffe, Grenzwerte nach Trinkwasserverordnung und EU-Trinkwasserrichtlinie. 2. Auflage, Wiley-VCH Verlag, 2004.
- Quentin, K.-E.: Trinkwasser; Untersuchung und Beurteilung von Trink- und Schwimmbadwasser. Springer, Heidelberg, 1988.

Course: Water Treatment with Membrane Technology — Course key: [22605]

Lecturers: F.H. Frimmel
Credit points (CP): 2 **Hours per week:** 1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Water Chemistry [WI4INGCV5] (S. 113)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- Baker, R. W.: Membrane Technology and Applications. 2nd ed. Wiley & Sons, 2004.
- Crittenden, J. [Ed.]: Water Treatment. Principles and Design. 2nd ed. Wiley & Sons, 2005.
- Melin, T., Rautenbach, R.: Membranverfahren. Grundlagen der Modul- und Anlagenauslegung. 3., aktualis. u. erw. Aufl. Springer, 2007.
- Ohlrogge, K., Ebert, K. [Hrsg.]: Membranen. Grundlagen, Verfahren und industrielle Anwendungen. Wiley-VCH, 2006.

Course: Sorption-Processes in Water Disinfection — Course key: [22611]

Lecturers: Höll
Credit points (CP): 4 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Water Chemistry [WI4INGCV5] (S. 113)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- Grombach, P., Haberer, K., Merkl, G., Trüeb, E. U.: Handbuch der Wasserversorgungstechnik. 3. Auflage, R. Oldenbourg-Verlag, München, 2000.
- Hancke, K.: Wasseraufbereitung, Chemie und chemische Verfahrenstechnik. 5. Auflage, Springer, Heidelberg, 2000.
- Sontheimer., H., Frick, B. R., Fettig, J., Hörner, G., Hubele, C., Zimmer, G.: Adsorptions-verfahren zur Wasserreinigung. Karlsruhe.

Course: Oxidative Drinking Water Treatment — Course key: [22612]

Lecturers: F.H. Frimmel, Zwiener
Credit points (CP): 4 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Water Chemistry [WI4INGCV5] (S. 113)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- Crittenden, J. [Ed.]: Water Treatment. Principles and Design. 2nd ed. Wiley & Sons, 2005.
- DVGW: Wasseraufbereitung - Grundlagen und Verfahren. In: Lehr- und Handbuch Wasserversorgung Bd.6. Oldenbourg Industrieverlag, 2004.
- Frimmel, F. H.: Wasser und Gewässer. Ein Handbuch. Spektrum Verlag, 1999.
- Grombach, P., Haberer, K., Merkl, G., Trüeb, E. U.: Handbuch der Wasserversorgungstechnik. 3. Auflage, R. Oldenbourg-Verlag, München, 2000.
- Hancke, K.: Wasseraufbereitung, Chemie und chemische Verfahrenstechnik. 5. Auflage, Springer, Heidelberg, 2000.

Course: Fundamentals of Waste Water Treatment — Course key: [22618]

Lecturers: Zwiener
Credit points (CP): 4 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Water Chemistry [WI4INGCV5] (S. 113)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- Bever, J., Stein, A., Teichmann, H. [Hrsg.]: Weitergehende Abwasserreinigung. 4. Aufl. Oldenbourg Industrieverlag, 2002.
- Frimmel, F. H.: Wasser und Gewässer. Ein Handbuch. Spektrum Verlag, 1999.

Course: Excercises in Water Chemistry — Course key: [22664]

Lecturers: F.H. Frimmel, Abbt-Braun
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Water Chemistry [WI4INGCV5] (S. 113)

Learning Control / Examinations
The assessement consists of course-related experiments (according to §4(2), 3 of the examination regulation) and an final oral exam (according to §4(2), 2 of the examination regulation).

The grade of this course is made up of 50% each from the two parts of the assessment.

The successful completion of the *Excercises in Water Chemistry* [22664] ist prerequisited for admission to the module examination.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- Frimmel, F. H.: Wasser und Gewässer. Ein Handbuch. Spektrum Verlag, 1999.
- Frimmel, F. H., Abbt-Braun, G.: Wasser-technologisches und wasserchemisches Praktikum. Band 44. Schriftenreihe des Lehrstuhls für Wasserchemie und der DVGW-Forschungsstelle am Engler-Bunte-Institut der Universität Karlsruhe (TH), 2006.
- Sigg, L., Stumm, W.: Aquatische Chemie. Eine Einführung in die Chemie wässriger Lösungen und natürlicher Gewässer. Verlag der Fachvereine Zürich, 1994.

Course: System Dynamics and Control Engineering Course key: [23155]

Lecturers: N.n.
Credit points (CP): 6 **Hours per week:** 3/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Control Engineering I [WI4INGETIT1] (S. 105)

Learning Control / Examinations
The assessment consists of a written exam (180 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.

Prerequisites
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.

Conditions
None.

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 principl

Basic literature

- Föllinger, Otto: Regelungstechnik, Hüthig-Verlag, 8.Auflage, 1994
- Lunze, Jan: Regelungstechnik 1, Springer-Verlag, 1996

Complementary literature
Will be announced in the lecture.

Course: Automation of Discrete Event and Hybrid Systems Course key: [23160]

Lecturers: Mathias Kluwe
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Control Engineering II [WI4INGETIT2] (S. 106)

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.

Prerequisites
The prior attendance of the course *System Dynamics and Control Engineering* [23155] is assumed.

Conditions
Keine.

Learning Outcomes
In the lecture the students get familiar with the basics of the modelling, simulation, analyses and control of discrete event and hybrid systems.

Content

- *Introduction*
  system classification, definition, example: controlled charging process
- *Model classification and modelling formalisms*
  automata and formal languages, petri nets, net condition/event systems
- *Discrete process modelling*
  state-oriented modeling, ressource-oriented modeling
- *Analysis of discrete event systems*
  characteristics of petri nets, analyzing petri nets, analyzing timed event graphs via Max-plus algebra
- *Specification and Design of discrete controllers*
  classification of control objectives and control, control specification, cotrol design, implementation, control of a lifting table, control of a production line
- *Hybrid Systems*
  hybrid phenomena, simulation, analyzing and control of hybrid systems, example

Media
Supplemental sheets
Demonstration with Matlab/Simulink

Basic literature

- Cassandras, C. G., Lafortune, S.: Introduction to Discrete Event Systems, Kluwer Academic, Boston, 1999

Complementary literature

- Abel, D.: Petri-Netze für Ingenieure, Springer Verlag Berlin, 1990

Course: Control of Linear Multivariable Systems — Course key: [23177]

Lecturers: Mathias Kluwe
Credit points (CP): 6 **Hours per week:** 3/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Control Engineering II [WI4INGETIT2] (S. 106)

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.

Prerequisites
The prior attendance of the course *System Dynamics and Control Engineering* [23155] is assumed.

Conditions
None.

Learning Outcomes
Based on general knowledge of system dynamics and control engineering the course teaches students basic knowledge and skills to analyze linear multivariable dynamic systems (described both in continous and discrete time) and to design linear controllers and observers. The students are enabled to apply these methods in order to solve practical controller design problems like poor sensor informatic or disturbances and uncertainties. The students get familiar with the design of dynamic feedback controllers and learn how to achiev robustness.

Content

- *Modelling of linear systems*
  principles of time-discrete modelling, input-output-models of time and transform domain, continuous system models
- *Analyses of linear systems*
  stability, steering capability and observability, poles and pole-zeros
- *Control synthesis in input-output-models*
  basic principles of time-discrete controller design processes, selective design processes: dead beat control, decoupling in frequency domain
- *Control synthesis in state space models*
  framework with external furnace and condition reversion, basic principles of default eigen-value, selective design processes: modal control, decoupling control, entire modal synthesis, dead beat control, time-discrete Ricati Equations
- *Synthesis of state space observers*
  entire observer, reduced observer
- *Synthesis of output feedback controllers*
- S*ynthesis of controllers for disturbed systems*
  disturbance circiut entering, disturbance modelling
- *Synthesis of dynamic state space controllers*
  PI-controller
- *Synthesis of robust controllers by pole area placement*
  definition and pole-area stability, pole area placement via Konigorski, design of robust output feedback
- *Reduction of the order of high-order models*
  task and principles, modal reduction of order, constuction of the reduced modell via Litz

Media
Supplemental sheets
Demonstration with Matlab/Simulink

Basic literature
Föllinger, Otto: Regelungstechnik, Hüthig-Verlag, 8. Auflage

Complementary literature

- Lunze, Jan: Regelungstechnik 2, Springer-Verlag, 1997
- Föllinger, O.: Lineare Abtastsysteme. 5. Auflage, Oldenburg Verlag, 1993
- Ogata, K.: Discrete-Time control systems. Prentice-Hall, 1987

Course: Optimisation of Dynamic Systems — Course key: [23180]

Lecturers: N.n.
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Control Engineering I [WI4INGETIT1] (S. 105)

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.

Prerequisites
The prior attendance of the course *System Dynamics and Control Engineering* [23155] is assumed.

Conditions
None.

Learning Outcomes
Have still to be defined.

Content
Subjects are not available yet.

Remarks
The lecture won't be offered in winter term 2009/10.

Course: Systematic Product Development in Sensor Technology Course key: [23209]

Lecturers: Ivers-Tiffée, Riegel
Credit points (CP): 3 **Hours per week:** 1/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Sensor Technology I [WI4INGETIT3] (S. 107), Sensor Technology II [WI4INGETIT5] (S. 108)

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

Prerequisites
It is recommended to attend the courses *Material Science II* [21782] and *Electrical Engineering II* [23224] beforehand.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Schaumburg, H.: Sensoren. Stuttgart, Teubner 1992
Schaumburg, H.: Sensoranwendungen. Stuttgart, Teubner 1995

Course: Sensors — Course key: [23231]

Lecturers: Wolfgang Menesklou
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Sensor Technology I [WI4INGETIT3] (S. 107)

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

Prerequisites
See module description.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Schaumburg, H.: Sensoren. Stuttgart, Teubner 1992
Tränkler, H.-R., Obermeier, E. (Hrsg.): Sensortechnik. Springer, Berlin Heidelberg 1998

Course: Experimental Laboratories in Sensors and Actuators Course key: [23232]

Lecturers: Wolfgang Menesklou
Credit points (CP): 6 **Hours per week:** 4
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Sensor Technology I [WI4INGETIT3] (S. 107), Sensor Technology II [WI4INGETIT5] (S. 108)

Learning Control / Examinations
The assessment consits of experiment reports incl. experimental procedure according to Section 4(2), 3 of the examination regulation.
The overall grade consists of the partial grades of the 8 deliverable experiments.

Prerequisites
Siehe Modulbeschreibung.

Conditions
None.

Learning Outcomes

Content

Course: Seminar: Selected Chapters of Passive Components Course key: [23233/23234]

Lecturers: Wolfgang Menesklou
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Sensor Technology I [WI4INGETIT3] (S. 107), Sensor Technology II [WI4INGETIT5] (S. 108)

Learning Control / Examinations
The assessment consists of a term paper (ca. 30 pages) as well as an oral presentation and the discussion of the term paper results according to Section 4 (2), 3 of the examination regulation.
The overall grade consists of the of the grade of the term paper (40 percent) and the grade of the oral presentation (30 percent) and the discussion (30 percent).

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced in the lecture.

Course: Integrated Sensor Actuator Systems — Course key: [23240]

Lecturers: Wersing
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Sensor Technology I [WI4INGETIT3] (S. 107), Sensor Technology II [WI4INGETIT5] (S. 108)

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

Prerequisites
It is recommended to attend the courses *Material Science II* [21782] and *Electrical Engineering II* [23224] beforehand.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- Piezoelectricity: Evolution and Future of a Technology (Springer Series in Materials Science), W. Heywang, K. Lusitz, W. Wersing; Springer 2008
- Principles and Applications of Ferroelectrics and Related Materials, M.E. Lines, A.M. Glas, Clarendon Press, Oxford, 1977.
- Einführung in die Ferroelektrizität, A.S. Sonin, B.A. Strukow, Vieweg Verlag, Braunschweig, 1974
- Piezoelectricity, G.W. Taylor, Gordon Breach Verlag, London, 1977

Course: Electrical Rail Vehicles — Course key: [23346]

Lecturers: Clos
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Guided Systems Engineering [WI4INGBGU6] (S. 97)

Learning Control / Examinations
The assessment will consist of a oral exam (20 min) according to §4 (2), 2 of the examination regulation.
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.

Prerequisites
See module description.

Conditions
See module description.

Learning Outcomes

Content
traction modi; engines; power supply; electrical elements in signalling / operation

Complementary literature
Steimel: Elektrische Triebfahrzeuge und ihre Energieversorgung, Oldenbourg-Verlag, München

Course: High-Voltage Technology I — Course key: [23360/23362]

Lecturers: Badent
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Electrical Power Engineering [WI4INGETIT4] (S. 109)

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.

Prerequisites
Basic Network and Field Theory

Conditions
None.

Learning Outcomes
This course familiarizes students with a wide range of issues of High-Voltage Technology. It provides a deep insight in this special field of electrical engineering.

Content

- Electric potential fields
- Maxwell's equations
- Calculation of static electric fields, charge simulation method
- Difference method, Finite-Element method, Monte-Carlo method, Boundary-element method
- Graphical field evaluation
- Measurement of electric fields, field energy and field forces
- Polarization, boundary layers, inclusions, DC and AC voltage distribution in imperfect dielectrics
- Frequency and temperature dependency of the dissipation factor
- Generation of high DC/AC and impulse voltages and high impulse currents for testing

Basic literature
Küchler, Andreas; Hochspannungstechnik, Springer Verlag 2. Auflage 2005, ISBN 3-540-21411-9

Course: High-Voltage Technology II — Course key: [23361/23363]

Lecturers: Badent
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Electrical Power Engineering [WI4INGETIT4] (S. 109)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
This course familiarizes students with a wide range of issues of High-Voltage Technology. It provides a deep insight in this special field of electrical engineering.

Content
Gas discharges, gaseous electronics, atomic energy niveaus, self-sustained and non-self-sustained discharges
Townsend mechanisms, channel mechanism, similarity laws, Paschen's law
Glow discharges, sparks, arcs, partial discharges, breakdown of liquid and solid dielectrics Statistics of electrical breakdown
Insulation coordination, roots of overvoltage´s, trans-mission line equations, travelling wave theory

Complementary literature
Küchler, A. Hochspannungstechnik; Springer Verlag, 2005

Course: Electric Power System Engineering II: Power Transmission and Power Network Control
Course key: [23372/23374]

Lecturers: Thomas Leibfried
Credit points (CP): 6 **Hours per week:** 2/2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Electrical Power Engineering [WI4INGETIT4] (S. 109)

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.

Prerequisites
The course *Electric Power System Engineering I* [23371] has to be completed successfully beforehand.

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 dynamic behaviour of synchronous generators. The second main chapter deals with HVDC, a technology for the transmission of a high amount of electric energy. Subsequently, FACTS are presented which help to increase the flexibility of power transmission systems. Finally, the dynamic behaviour of power stations and the entire power grid will be discussed.
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 dynamic behaviour of synchronous generators and the mathematical description. In a first step, the construction of synchronous generators is described. Then, the dq0 frame and its application for the mathematical description of the dynamic behaviour of synchronous generators is presented. Subsequently, the transition from the common mathematical description of synchronous generators towards the equations describing the steady state condition is shown. Then, transients are discussed at the example of a 60 Hz synchronous generator. Finally, the short circuit nearby the generator using the dq0 frame is discussed.
The second chapter deals with the HVDC technology. First of all, the characteristics of HVDC for power transmission are discussed. Then, line commutated current converters are introduced, especially the B6 circuit and 12 pulse current converters consisting of two B6 circuits switched in series are discussed. Then, the HVDC system configuration and components like filters, thyristors, smoothing reactors and converter transformers are presented. Finally, the basic control concept for HVDC transmission systems is shown.
The third and very comprehensive chapter deals with the technology and characteristics of FACTS, which can be used to increase the flexibility and the transmission capacity of power transmission systems. First of all the fields of application of FACTS are described. Then, the individual FACTS circuits and their mathematical description are presented, which can be divided into FACTS switched in series and parallel to the grid.
The fourth chapter deals with the dynamic behaviour of power stations and power grids. In the first part of the chapter, the system control modelling of power stations and power grids is presented. Then, the causes of frequency and voltage deviations in the grid are discussed. The main part of the chapter deals with the frequency control in the power grid. Finally, the voltage control of the power grid is presented.
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.

Basic literature
Will be announced in the lecture notes.

Course: Photovoltaic Systems Technology — Course key: [23380]

Lecturers: Schmidt
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Electrical Power Engineering [WI4INGETIT4] (S. 109)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
The goal is to relay theoretical fundamentals.

The fundamentals of photovoltaic systems technology will be presented.

Content

- Introduction
- Ways of solar energy utilisation
- The terrestrial solar radiation
- Solar radiation measuring principles
- Fundamentals of solar cells
- Overview of typical cell technologies
- Efficiency values
- Equivalent circuit diagram of solar cells
- Properties of solar cells and solar modules
- Series and parallel connection of solar cells
- Matching of solar generators and loads
- MPP-Tracking
- Construction of PV-modules
- Partial shading, bypass-technologies
- Overview of different System configurations
- Batteries for PV applications
- Charge controllers
- Battery peripherals
- Inverters for stand-alone systems
- Inverters for grid connected systems
- European efficiency
- Safety and EMC aspects
- Annual yield of PV systems
- Economic evaluation of PV systems
- Examples of realised PV systems

Media
Copies of the main transparenvies will be distributed each lecture.

Complementary literature
„Regenerative Energiesysteme“, Volker Quaschning, ISBN: 978-3-446-40973-6
„Photovoltaik“, Heinrich Häberlin, ISBN:978-3-8007-3003-2

Course: Windpower Course key: [23381]

Lecturers: Lewald
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Electrical Power Engineering [WI4INGETIT4] (S. 109)

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The goal is to relay basic fundamentals for the use of wind power.
Wind Power fundamental lecture. Focus of the lecture is basic knowledge for the use of wind power for electricity, complemented by historical development, basic knowledge on wind systems and alternative renewable energies.

Content
The lecture contacts due to the broadly basic knowledge to all listeners of all terms.
On the basis of an overview of alternative, renewable energy technologies as well as general energy data, the entrance is transacted into the wind energy by means of an overview of the historical development of the wind force.
Since the wind supplies the driving power as indirect solar energy, the global and the local wind systems as well as their measurement and energy content are dedicated to its own chapter.
Whereupon constructing the aerodynamic bases and connections of wind-power plants and/or their profiles are described. The electrical system of the wind-power plants forms a further emphasis. Begun of fundamental generator technology over control and controlling of the energy transfer.
After the emphasis aerodynamics and electrical system the further components of wind-power plants and their characteristics in the connection are described.
Finally the current economic, ecological and legislations boundary conditions for operating wind-power plants are examined.
In addition to wind-power plants for electricity production, the lecture is also shortly aiming at alternative use possibilities such as pumping systems.
Finally an overview of current developments like super-grids and visions of the future of the wind power utilization will be given.

Media
A scriptum that has to be overhault is available on http://www.ieh.uni-karlsruhe.de/windkraftanlagen.php
Further book titles or relevant websites will be announced in the lecture.

Course: Lectures on HVDC and FACTS – Benefits of Power Electronics for Security and Sustainability of Power Supply Course key: [23385]

Lecturers: Retzmann
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Electrical Power Engineering [WI4INGETIT4] (S. 109)

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The goal is to relay understanding and deep knowledge of the different converter technologies and their applications in electric power systems.

Content
There are two mega trends which have a particular impact on the development of power markets: The demographic change and the urbanization.
Both trends result in the increased power demand which runs a risk of local overloads and, to make the matters even worse, blackouts. Security of power supply (its reliability, blackout prevention) depends on the size, structure and loading of power grids. Massive blackouts in America and Europe in the year 2003 revealed the fact that close interconnection of power grids over countries´ frontiers, which is in principle of great advantage, can run the risk of uncontrollable cascading effects in large and heavily loaded synchronous systems.
Subsequently, security of power supply must constitute the cornerstone of planning and expansion of grids, for availability of electrical energy is the crucial pre-requisite for the survival of human society, and power grids are its “lifeline”. In addition to this, the demand for sustainability is gradually gaining in importance for reasons of global climate protection and economical use of limited energy resources. It is, however, not a means to an end to cut off the power in order to slow down the increase in CO2 emissions. It must be rather managed to increase the efficiency by means of intensified integration of regenerative power sources (energy mix) and by means of the overall efficiency boost in the case of conventional power generation, transmission and distribution as well. Regenerative power generation, particularly wind power (even in case of offshore wind farms with strong wind infeed), normally cannot follow the load profile which leads to the additional congestions of the grids. That is, the demands of wind power for flexibility and loading capacity of the grids are extreme.
In the future, power electronics will play an increasingly important role for both grid security and sustainability of power supply. With the help of power electronics, grids can be provided with dynamic support, and the efficiency of power transmission at the different voltage levels can be enhanced. Power electronics is easily controllable which makes the grid more flexible and due to this it can readily include regenerative and distributed energy sources. A flexible grid of this kind can be realized as an autonomous “Micro Grid”, as “Smart Grid” or as “Super Grid” (‘Energy Highway´), or in a combination of them.
The types of power electronics applied to high-voltage grids are HVDC (High-Voltage Direct Current) and FACTS (Flexible AC Transmission Systems). HVDC helps prevent bottlenecks and overloads in power grids by means of systematic power-flow control. The function of HVDC which is decisive for system security is that of an automatic Firewall. This Firewall function prevents the expansion of a disturbance, which occurs in the system, at all times, similar to the traffic lights on a “power highway“. As soon as the disturbance has been cleared, the power transmission can immediately be restored. Moreover, the HVDC allows for grid access of regenerative energy sources, including large offshore wind farms, and it helps reduce transmission losses on the way to the loads, for its level of losses is substantially lower than that of conventional three-phase alternating current transmission.
FACTS was originally created to support weak grids and to stabilize AC transmission over very long distances. FACTS technology encompasses systems for both parallel and series compensation. It rests upon the principle of reactive power elements, controlled by means of power electronics, which can reduce the transmission angle of long AC lines or stabilize the voltage of selected grid nodes. Due to a high utilization degree of AC power grids, the application of FACTS technology will become an increasingly more interesting issue also in the case of meshed power systems, e.g. in Europe.
HVDC and FACTS will consequently play an important role in the future development of power grids. The lecture depicts examples of HVDC and FACTS projects as well as deals with the possibilities of enhancement of grid security, efficiency and sustainability of power supply.

Media
Learning material comprises the lectures in a folder and two CDs with basics and applications, including films and information on large power system disturbances (Blackouts).

Remarks
The course comprises lecture blocks of four full days, including films on new technologies and large disturbances. Current information can be found on the ITIV (www.itiv.kit.edu) webpage and within the eStudium-teachingplatform (www.estudium.org).

Course: High-Voltage Test Technique — Course key: [23392/23394]

Lecturers: Badent
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Electrical Power Engineering [WI4INGETIT4] (S. 109)

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

Prerequisites
High-Voltage-Technology I and II

Conditions
None.

Learning Outcomes
This course familiarizes the students with issues of high voltage testing, calibration and the contents of the international test standards for high voltage testing.

Content

- High voltage test technique
- PD-measurement
- Transformer testing
- Cable and garniture
- Switchyard
- Insulators and overhead pipeline fittings
- Computer based test systems in the area of high voltage testing
- Accreditation of test laboratories

Complementary literature
Küchler, A.; Hochspannungstechnik, Springer Verlag 2005

Course: Commercial and Corporate Law — Course key: [24011]

Lecturers: Peter Sester
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Civil Law [WI4JURA3] (S. 123), Commercial Law [WI4JURA2] (S. 124)

Learning Control / Examinations
Assessment will consist of written exams following §4, Abs. 2, 3 of the examination regulation.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Media
Folien

Basic literature
Klunzinger, Eugen

- Grundzüge des Handelsrechts, Verlag Vahlen, 12. Aufl. 2003, ISBN 3-8006-2914-3
- Grundzüge des Gesellschaftsrechts, Verlag Vahlen, 13. Aufl. 2004, ISBN 3-8006-3077-X

Complementary literature
tba in Vorlesungsfolien

Course: Data Protection Law — Course key: [24018]

Lecturers: Indra Spiecker genannt Döhmann
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: IT-Law [WI4JURA2_08] (S. 122), Public Business Law [WI4JURA6] (S. 127)

Learning Control / Examinations
Assessment will consist of a written exam (following §4(2), 1 SPO).

Prerequisites
Keine.

Conditions
None.

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

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

Media
abstracts, sketches on blackboard, slides

Basic literature
Will be announced in the course.

Complementary literature
Wil be announced in the course.

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

Course: Public Media Law — Course key: [24082]

Lecturers: Christian Kirchberg
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Public Business Law [WI4JURA6] (S. 127)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
As the traditional media (print, radio, TV) the “new media” (online-services and the Internet) is governed by public law, yet with a different extent of regulation and with apparent effects on private law. The main influences for the media law are constitutional law and European community law. The lectures aims at providing an overview of the common grounds and differences of the current media law regime and of the conceivable perspectives of media convergence. Current developments in politics and economics, which are relevant for public media law, will be used as examples in the lecture. Besides, it is planned to attend a court hearing of the Federal Constitutional Court (Bundesverfassungsgericht) and/or the Federal Court (Bundesgerichtshof).

Content
Initially, the lecture will deal with the constitutional basis of the media law regime. i.e. the responsibilities of the Federal and the State legislatures, freedom of speech, freedom of information, constitutional media rights (Art. 5 para. 1 Constitutional Law) and its limitations by general laws, the ban on censorship and the counterstatement law. In addition, the European community principles on broadcasting and media law will be part of the lecture. Next will be an overview of the individual media laws, namely the broadcasting law (especially Rundfunkstaatsvertrag) the press law of the States and the statute on the so-called “telemedia” services. Finally, the protection of minors in the media will be dealt with (Act on Protection of Minors and Treaty on the Protection of Minors in the Media).

Basic literature
To understand the legal framework it is necessary for the students to have the relevant statutes, for example “Telemediarecht, Telekommunikations- und Multimediarecht”, beck-Texte im dtv , 7. Auflage 2007.
As an introduction it is recommended to read: Frank Fechner, Medienrecht, Verlag Mohr Siebeck, Verlag Mohr Siebeck, 8. Auflage 2007.

Course: Copyright — Course key: [24121]

Lecturers: Thomas Dreier
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: IT-Law [WI4JURA2_08] (S. 122), Intellectual Property Law [WI4JURA4] (S. 125)

Learning Control / Examinations
Written exam 100% (§4, Abs. 2, 1 of the SPO).

Prerequisites
None.

Conditions
none

Learning Outcomes
It is the aim of this course to provide students with knowledge in the area of copyright that builds upon, and goes beyond the knowledge the students have already acquired in the general lecture of “Industrial and intellectual property law”. Students shall understand how the legal rules depend upon, and interact with, the economic background, legislative policy and information and communication technologies. Students shall learn about the rules of national, European and international copyright law and to apply these legal rules in practical cases.

Content
The course deals with the subject matter of copyright, the rights of authors, licensing, limitations and exceptions to copyright, term of protection, neighbouring rights, enforcement and collective administration of rights. The course does not merely focus on German copyright law, but likewise puts European and international copyright law into perspective. Students shall understand how the legal rules depend upon, and interact with, the economic background, legislative policy and information and communication technologies. Students shall learn about the rules of national, European and international copyright law and to apply these legal rules in practical cases.

Media
transparancies

Basic literature
Schulze, Gernot Meine Rechte als Urheber Verlag C.H.Beck, current edition

Complementary literature
Additional literature tba in class.

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

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

Lecturers: Yvonne Matz, Peter Sester
Credit points (CP): 3 **Hours per week:** 2/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Intellectual Property Law [WI4JURA4] (S. 125)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

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

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

Basic literature

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

Course: Environmental Law — Course key: [24140]

Lecturers: Indra Spiecker genannt Döhmann
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Environmental Economics [WI4VWL5] (S. 55), Public Business Law [WI4JURA6] (S. 127)

Learning Control / Examinations
The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the SPO.
The assessment will be offered in every winter term and can be repeated at every regular examination date.

Prerequisites
None.
Knowledge of Law, esp. Public Law I or II are recommended.

Conditions
None.

Learning Outcomes
Environmental law is a field of law that influences management in many regards. Students shall develop a feeling for the many different aspects of environmental law and its instruments. Aside from so-called “classical” approaches such as law-and-order students will learn about other, economic influenced, instruments such as the gathering and the transfer of
information or the market for certificates. On this basis, the course will center around immissions and waste management law. Additionally, water law, protection of soil law and nature protection law will be covered. Students shall be enabled to deal with easy cases in regard to environmental law.

Content
The lecture begins with an introduction into the special problems faced by environmental law.” Different instruments, according to common goods theory, will be presented. In the main part of the lecture, immissions law, waste management law, water law, protection of soil law and nature protection law will be analyzed.

Media
abstracts, sketches on blackboard, slides

Basic literature
Will be announced in the course.

Complementary literature
Will be announced in the course.

Course: Employment Law I — Course key: [24167]

Lecturers: Alexander Hoff
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Labor and Tax Law [WI4JURA1] (S. 121), Private Business Law [WI4JURA5] (S. 126)

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

Prerequisites
None.

Conditions
None.

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

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

Basic literature
tba at the beginning of the course.

Course: Tax Law I — Course key: [24168]

Lecturers: Detlef Dietrich
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Labor and Tax Law [WI4JURA1] (S. 121), Private Business Law [WI4JURA5] (S. 126)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
The target of the lecture is an introduction to national business tax law. The legal norms, spread on several individual tax laws, which are decisive for the taxation of the companies and their owners, will be treated. The focus is on basic fiscal knowledge realizable in practice as a component of modern business economics.

Content
Except for a basic knowledge of the existing German company types and the annual financial statements (balance sheet, statement of earnings), no fiscal previous knowledge is required. The lecture intends to give a current global overview about the most important elements of law. The focus is on trade or business companies in the most common forms such like sole traders, partnerships and corporations.

Media
transparancies

Basic literature
- Grashoff Steuerrecht, Verlag C. H. Beck, last edition
- Tipke/Lang Steuerrecht, Verlag C. H. Beck, last edition

Course: Internet Law — Course key: [24501]

Lecturers: Thomas Dreier
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: IT-Law [WI4JURA2_08] (S. 122), Intellectual Property Law [WI4JURA4] (S. 125)

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

Prerequisites
None.

Conditions
None.

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

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

Media
Slides

Basic literature
Script, Internetrecht (Internet Law)

Complementary literature
Additional literature tba in class.

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

Course: Advanced Civil Law — Course key: [24504]

Lecturers: Thomas Dreier, Peter Sester
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 1
Teaching language: Deutsch
Part of the modules: Civil Law [WI4JURA3] (S. 123), Commercial Law [WI4JURA2] (S. 124)

Learning Control / Examinations
Assessment will consist of written exams within *Privatrechtliche Übung* following §4, Abs. 2, 3 of the examination regulation.

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

Conditions
None.

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

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

Media
Transparencies/Slides

Basic literature
Tba at the beginning of the course.

Complementary literature
tba at the beginning of the course

Course: Exercises in Civil Law — Course key: [24506/24017]

Lecturers: Peter Sester, Thomas Dreier
Credit points (CP): 3 **Hours per week:** 2/0
Term: Winter-/Sommersemester **Level:** 1
Teaching language: Deutsch
Part of the modules: Civil Law [WI4JURA3] (S. 123), Commercial Law [WI4JURA2] (S. 124)

Learning Control / Examinations
Assessment will consist of five written exams following §4, Abs. 2, 3 of the SPO. At least two exams have to be passed, to pass the course. The final grade is calculated as the median of the two exams that have been passed with the best grades.

Prerequisites
Students must have attended the course *Civil Law for Beginners* [24012] or a comparable introduction into (German) civil law. It is highly reccomended that students have likewise attended the courses *Advanced Civil Law* [24504] and *Commercial and Corporation Law* [24011].

Conditions
None.

Learning Outcomes
It is the aim of this course to enable students to solve legal cases by way of the appropriate legal technique (so-called Subsumtion). At the same time, the legal knowlegde which students have acquired in the courses “Civil Law for Beginners”, “Advanced Civil Law” and “Commercial and Corporation Law” will be repeated and deepened. This shall enable students to solve practical legal problems in a methodologically correct way.

Content
In 5 sesssions the substantive law twhich students have been taught in the courses “Civil Law for Beginners”, “Advanced Civil Law” and “Commercial and Corporation Law” will be repeated and the method for solving legal cases deepend. Moreover, 5 sessions ae reserved to written exam problems which cover the totality of what students have learned so far. Aditional sessions are reserved for the subsequent in-class discussion of the exam problems.

Media
Slides

Basic literature
tba in the course.

Course: Computer Contract Law — Course key: [24612]

Lecturers: Michael Bartsch
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: IT-Law [WI4JURA2_08] (S. 122), Intellectual Property Law [WI4JURA4] (S. 125)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
It is the aim of this course to provide students with knowledge in the area of contract formation and formulation in practice that builds upon the knowledge the students have already acquired concerning the legal protection of computer programs. Students shall understand how the legal rules depend upon, and interact with, the economic background and the technical features of the subject. The contract drafts shall be prepared by the students and will be corporately completed during the lecture. It is the aim of the course that students will be able to formulate contracts by themselves.

Content
The course deals with contracts from the following areas:

- Contracts of programming, licencing and maintaining software
- Contracts in the field of IT employment law
- IT projects and IT Outsourcing
- Internet Contracts

From these areas single contracts will be chosen and discussed (e.g. software maintenance, employment contract with a software engineer). Concerning the respective contract the technical features, the economic background and the subsumption in the national law of obligation (BGB-Schuldrecht) will be discussed. As a result different contractual clauses will be developed by the students. Afterwards typical contracts and conditions will be analysed with regard to their legitimacy as standard business terms (AGB). It is the aim to show the effects of the german law of standard business terms (AGB-Recht) and to point out that contracts are a means of drafting business concepts and market appearance.

Media
transparancies

Basic literature

- Langenfeld, Gerrit Vertragsgestaltung Verlag C.H.Beck, III. Aufl. 2004
- Heussen, Benno Handbuch Vertragsverhandlung und Vertragsmanagement Verlag C.H.Beck, II. Aufl. 2002
- Schneider, Jochen Handbuch des EDV-Rechts Verlag Dr. Otto Schmidt KG, III. Aufl. 2002

Complementary literature
tba in the transparencies

Course: Telecommunications Law — Course key: [24632]

Lecturers: Indra Spiecker genannt Döhmann
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Public Business Law [WI4JURA6] (S. 127)

Learning Control / Examinations
The assessment consists of an written exam (following §4(2), 1 SPO).

Prerequisites
None.

Conditions
None.

Learning Outcomes
Telecommunications is the technical basis of the Information Engineering and Management. In which way for example UMTS is regulated, is of relevant importance for the supply of services in the world of the mobile contents services. The central defaults of the telecommunications regulation are in the telecommunications law (TKG). This was completely amended due to community-legal defaults 2004. The lecture procures for apprehending the basics of legal framework of the information society the essential knowledge in telecommunication law.

Content
The lecture offers an overview of the new TKG. The whole range of the regulation is treated: Of the material-legal instruments of the competition-creative economic regulation (market -, entrance -, payment regulation as well as special supervision of abuse) and the non-economic regulation (customer protection; Broadcasting; Assignment of frequencies, numbers and rights of way; secrecy of telecommunications; Data security and public security) up to the institutional arrangement of the regulation. To assist in the understanding the technical and economic bases are clarified as well as community and constitutional default sat at the beginning of the lecture.

Media
Content structure

Basic literature
Since the law material is to be partly compiled in the discourse with the studying, a current version of the TKG is to be bring along to the lecture.
Further literature will be announced in the lecture.

Complementary literature
tba

Course: Tax Law II

Course key: [24646]

Lecturers: Detlef Dietrich
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Labor and Tax Law [WI4JURA1] (S. 121), Private Business Law [WI4JURA5] (S. 126)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
It is the target of the lecture to provide extended knowledge in business administration related theory of taxation in the field of economics and law, based on the general lecture “introduction to corporate tax law”. The students obtain the basis for an economic examination of the fiscal prescriptions and are able to assess the impact on business decisions. The emphasis is on such tax law regulations which allow possibilities for action and decision to the taxpayer.

Content
The lecture requires basic knowledge of commercial law and company law as well as of earnings tax law. Basic and current questions of German corporate taxation are systematically prepared in topic blocs; foils, leaflets and supplementary references are distributed in the individual sessions. There is room for discussion. A recent text collection of the tax laws will be necessary.

Media
transparancies

Basic literature

- Grashoff, Steuerrecht, Verlag C.H. Beck, latest edition.
- Spangemacher, Gewerbesteuer, Band 5, Grüne Reihe, Erich Fleischer Verlag
- Falterbaum/Bolk/Reiß/Eberhart, Buchführung und Bilanz, Band 10, Grüne Reihe, Erich Fleischer Verlag
- Tipke, K./Lang, J., Steuerrecht, Köln, in der neuesten Auflage.
- Jäger/Lang Körperschaftsteuer, Band 6, Grüne Reihe, Erich Fleischer Verlag
- Lippross Umsatzsteuer, Band 11, Grüne Reihe, Erich Fleischer Verlag
- Plückebaum/Wendt/ Niemeier/Schlierenkämper Einkommensteuer, Band 3, Grüne Reihe, Erich Fleischer Verlag

Course: Civil Law for Advanced

Course key: [24650]

Lecturers: Peter Sester
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Private Business Law [WI4JURA5] (S. 126)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
The course intents to build up extensive knowledge in german corporate law, trade law and civil law especially in contract law. It is designed for students who have already passed the courses *Civil Law for Beginners* [24012], *Advanced Civil Law* [24504], and *Commercial and Corporate Law* [24011/24509]. At the end students should be able to think through complex legal and economic questions.

Content
The course will focus on corporate law, trade law and civil law, especially contract law. We will discuss legal problems on the basis of selected examples in a application orientated way.

Basic literature
Klunzinger, Eugen: Übungen im Privatrecht, Verlag Vahlen, ISBN 3-8006-3291-8, in der neuesten Auflage

Course: Patent Law — Course key: [24661]

Lecturers: Bernhard Geissler
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Intellectual Property Law [WI4JURA4] (S. 125)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
It is the aim of this course to provide students with knowledge in the area of patent law and the business of technical intellectual property that builds upon, and goes beyond the knowledge the students have already acquired in the general lecture of *Industrial and intellectual property law*. Students shall understand how the legal rules depend upon, and interact with, the economic background and the legislative policy in the field of technical intellectual property, particularly in the field of information and communication technologies. Students shall learn about the rules of national, European and international patent law as well as know-how protection law and to apply these legal rules in practical cases, in particular in the area of utilizing technical intellectual property through agreements and lawsuits. The conflict between the monopoly of a patent and the antitrust law policies in Europe will be reviewed with the students.

Content
The course deals with the subject matter of the law of technical intellectual property, in particular inventions, patents, utility models, design patents, know-how, the rights and obligations of employees as creators of technical IP, licensing, limitations and exceptions to patenting, term of protection, enforcement of the rights and defence against these in invalidation and revocation actions. The course does not merely focus on German patent law, but likewise puts European, US and international patent law into perspective. Students shall understand how the legal rules depend upon, and interact with, the economic background and the legislative policy in the field of technical intellectual property, particularly in the field of information and communication technologies. Students shall learn about the rules of national, European and international patent law as well as know-how protection law and to apply these legal rules in practical cases, in particular in the area of utilizing technical intellectual property through agreements and lawsuits. The conflict between the monopolyöf a patent and the antitrust law policies in Europe will be reviewed with the students.

Media
transparancies

Basic literature

- Schulte, Rainer Patentgesetz Carl Heymanns Verlag, 7. Aufl. 2005 ISBN 3-452-25114-4
- Kraßer, Rudolf, Patentrecht Verlag C.H. Beck, 5. Aufl. 2004 ISBN 3-406-384552

Complementary literature
tba in the transparencies

Course: European and International Law

Course key: [24666]

Lecturers: Indra Spiecker genannt Döhmann
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Public Business Law [WI4JURA6] (S. 127)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Media
Content structure

Basic literature
Further details will be announced in the lecture.

Complementary literature
Further details will be announced in the lecture.

Course: Employment Law II — Course key: [24668]

Lecturers: Alexander Hoff
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Labor and Tax Law [WI4JURA1] (S. 121), Private Business Law [WI4JURA5] (S. 126)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

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

Basic literature
Tba at the beginning of the course.

Course: Law of Contracts

Course key: [24671]

Lecturers: Peter Sester
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Private Business Law [WI4JURA5] (S. 126)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
The course will provide an overview of the forming of an contract. The purpose is to translate legal and economic aspects in a contract to secure the volitional position. The course will also consider international questions.

Content
The purpose of the course is to provide students with an understanding of the legal basics of forming a business contract. By means of special examples an overview of typical corporate contracts will be given. The course discusses the Limited (GmbH), ordinary partnership (OHG), limited partnership (KG), European Economic Interest Grouping (EWIV), club (Verein) and the pubilc limited company (Aktiengesellschaft). In addition it will also focus on international relations.

Basic literature
Tba at the beginning of the course.

Course: Applied Informatics II - IT Systems for e-Commerce Course key: [25033]

Lecturers: Stefan Tai
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 2
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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.

Prerequisites
Knowledge of content of the courses *Foundations of Informatics I* [25074] and *Foundations of Informatics II* [25076] is expected.

Conditions
None.

Learning Outcomes
The student learns about IT methods and systems in support of modern electronic commerce. The student should be able to select, asess, 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.

Basic literature
Tba in the lecture.

Course: Private and Social Insurance — Course key: [25050]

Lecturers: Ute Werner, Heilmann, Besserer
Credit points (CP): 2.5 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Management II [WI4BWLFBV7] (S. 37)

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 every semester. Re-examinations are ofered at every ordinary examination date.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- F. Büchner, G. Winter. Grundriss der Individualversicherung. 1995.
- P. Koch. Versicherungswirtschaft. 2005.
- 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: Applied Informatics I - Modelling — Course key: [25070]

Lecturers: Andreas Oberweis, Rudi Studer, Sudhir Agarwal
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 2
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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).

Prerequisites
None.

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 aspectes, 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 well as event driven process chains together with their respective analysis techniques will be introduced.

Media
Slides.

Basic literature
- Bernhard Rumpe. Modellierung mit UML, Springer-Verlag, 2004.
- R. Elmasri, S. B. Navathe. Fundamentals of Database Systems. Pearson Education, 4. Aufl., 2004, ISBN 0321204484.
- W. Reisig. Petri-Netze, Springer-Verlag, 1986.

Complementary literature
- Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, York Sure: Semantic Web - Grundlagen, Springer, 2008 (ISBN 978-3-540-33993-9)
- Staab, Studer: Handbook on Ontologies, Springer, 2003
- J.L. Peterson: Petri Net Theory and Modeling of Systems, Prentice Hall, 1981.
- Franz Baader, Diego Calvanese, Deborah McGuinness, Daniele Nardi, Peter Patel-Schneider. The Description Logic Handbook - Theory, Implementation and Applications, Cambridge 2003.

Course: Non-linear Optimization — Course key: [25111]

Lecturers: Oliver Stein
Credit points (CP): 9 **Hours per week:** 4/2/2
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Optimization in Practice [WI4OR2] (S. 71)

Learning Control / Examinations
The assessment of the lecture is a written examination (120 minutes) according to §4(2), 1 of the examination regulation.
Examination are held in the semester of the lecture and in the following semester.
Upon attaining more then 50% of the exercise points, the grade of the passed examination is improved by a third of a grading step.
Upon attaining more then 50% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Prerequisites
None.

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:
- Existence results for global minimizers
- First and second order optimality condtions 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)
- 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.

Complementary literature
- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- H.Th. Jongen, K. Meer, E. Triesch, Optimization Theory, Kluwer, 2004
- J. Nocedal, S. Wright, Numerical Optimization, Springer 2000

Course: Nonlinear Optimization I — Course key: [25111]

Lecturers: Oliver Stein
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [WI4OR6] (S. 69)

Learning Control / Examinations
The assessmentconsits 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.
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 then 50% 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 then 50% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Prerequisites
None.

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 condtions 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.

Complementary literature

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- H.Th. Jongen, K. Meer, E. Triesch, Optimization Theory, Kluwer, 2004
- J. Nocedal, S. Wright, Numerical Optimization, Springer 2000

Remarks
Part I and II of the lecture are held consecutively in the *same* semester.

Course: Nonlinear Optimization II — Course key: [25113]

Lecturers: Oliver Stein
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [WI4OR6] (S. 69)

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.
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 50% 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 50% of the computer exercise points, the grade of the passed exam is improved by a third of a grading step.

Prerequisites
None.

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.

Complementary literature

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- H.Th. Jongen, K. Meer, E. Triesch, Optimization Theory, Kluwer, 2004
- J. Nocedal, S. Wright, Numerical Optimization, Springer 2000

Remarks
Part I and II of the lecture are held consecutively in the *same* semester.

Course: Special Topics in Optimization II — Course key: [25126]

Lecturers: Oliver Stein
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [WI4OR6] (S. 69)

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.
Examination are held in the semester of the lecture and in the following semester.
Upon attaining more then 50% of the exercise points, the grade of the passed examination is improved by a third of a grading step.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The student knows and understands fundamentals of a special topic in continuous optimization.

Content

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online (www.ior.kit.edu).

Course: Special Topics in Optimization I — Course key: [25128]

Lecturers: Oliver Stein
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [WI4OR6] (S. 69)

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.
Examination are held in the semester of the lecture and in the following semester.
Upon attaining more then 50% of the exercise points, the grade of the passed examination is improved by a third of a grading step.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The student knows and understands fundamentals of a special topic in continuous optimization.

Content

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online (www.ior.kit.edu).

Course: Combinatorial Optimization — Course key: [25128]

Lecturers: N.n.
Credit points (CP): 9 **Hours per week:** 4/2
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Optimization in Practice [WI4OR2] (S. 71)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Seminar in Continous Optimization — Course key: [25131]

Lecturers: Oliver Stein
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

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.

Prerequisites
See corresponding module information.

Conditions
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 scientifc reasoning. Also rethoric abilities may be improved.

Content
The current seminar topics are announced under http://kop.ior.kit.edu at the end of the preceding semester.

Basic literature
References and relevant sources are announced at the beginning of the seminar.

Course: Global Optimization I — Course key: [25134]

Lecturers: Oliver Stein
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [WI4OR6] (S. 69)

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.
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 50% 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 50% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Prerequisites
None.

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.

Complementary 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
- A. Neumaier *Interval Methods for Systems of Equations* Cambridge University Press 1990

Remarks
Part I and II of the lecture are held consecutively in the *same* semester.

Course: Global Optimization — Course key: [25134]

Lecturers: Oliver Stein
Credit points (CP): 9 **Hours per week:** 4/2/2
Term: Wintersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Optimization in Practice [WI4OR2] (S. 71)

Learning Control / Examinations
The assessment of the lecture is a written examination (120 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.
Upon attaining more then 50% of the exercise points, the grade of the passed examination is improved by a third of a grading step.
Upon attaining more then 50% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Prerequisites
None.

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

- Convex Problems, duality, interior point methods
- Branch and bound methods
- Cutting plane methods
- Interval arithmetic
- Lipschitz optimization and αBB method
- Heuristics

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.

Complementary 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
- A. Neumaier *Interval Methods for Systems of Equations* Cambridge University Press 1990

Course: Global Optimization II — Course key: [25136]

Lecturers: Oliver Stein
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [WI4OR6] (S. 69)

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.
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 50% 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 50% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Prerequisites
None.

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.

Complementary 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
- A. Neumaier *Interval Methods for Systems of Equations* Cambridge University Press 1990

Remarks
Part I and II of the lecture are held consecutively in the *same* semester.

Course: Mixed-integer Optimization — Course key: [25138]

Lecturers: Oliver Stein
Credit points (CP): 9 **Hours per week:** 4/2
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Optimization in Practice [WI4OR2] (S. 71)

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 the semester of the lecture and in the following semester.
Upon attaining more then 50% of the exercise points, the grade of the passed examination is improved by a third of a grading step.
Upon attaining more then 50% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The student

- knows and understands the fundamentals of linear and nonlinear mixed integer programming,
- is able to choose, design and apply modern techniques of mixed integer programming in practice.

Content
Many optimization problems from economics, engineering and natural sciences are modeled with continuous as well as discrete variables. Examples are the energy minimal design of a chemical process in which several reactors may be switched on or off, or the time minimal covering of a distance with a vehicle equipped with a gear shift. While locally and globally optimal points can be defined straightforwardly, for their numerical identification an interplay of ideas from discrete and continuous optimization is necessary.
The lecture treats methods for the numerical solution of optimization problems which depend on continuous as well as discrete variables. It is structured as follows:

- Existence results
- Concepts of linear and convex optimization
- Mixed-integer linear programming (Gomory cuts, branch and cut methods, lift and project cuts)
- Mixed-integer convex programming (branch and bound methods)
- Generalized Benders decomposition
- Nonconvex mixed-integer optimization
- Heuristics

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.

Complementary literature

- C.A. Floudas, Nonlinear and Mixed-Integer Optimization: Fundamentals and Applications, Oxford University Press, 1995
- G.L. Nemhauser, L.A. Wolsey, Integer and Combinatorial Optimization, Wiley, 1988
- A. Schrijver, Theory of Linear and Integer Programming, Wiley, 1998.
- M. Tawarmalani, N.V. Sahinidis, Convexification and Global Optimization in Continuous and Mixed-Integer Nonlinear Programming, Kluwer, 2002.

Course: Mixed Integer Programming I — Course key: [25138]

Lecturers: Oliver Stein
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [WI4OR6] (S. 69)

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.
Examination are held in the semester of the lecture and in the following semester.
Upon attaining more then 50% of the exercise points, the grade of the passed examination is improved by a third of a grading step.
Upon attaining more then 50% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.
The examination can also be combined with the examination of *Mixed Integer Programming II* [25140]. In this case, the duration of the written examination takes 120 minutes.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The student

- knows and understands the fundamentals of linear mixed integer programming,
- is able to choose, design and apply modern techniques of linear mixed integer programming in practice.

Content
Many optimization problems from economics, engineering and natural sciences are modeled with continuous as well as discrete variables. Examples are the energy minimal design of a chemical process in which several reactors may be switched on or off, or the time minimal covering of a distance with a vehicle equipped with a gear shift. While optimal points can be defined straightforwardly, for their numerical identification an interplay of ideas from discrete and continuous optimization is necessary.
The lecture treats methods for the numerical solution of optimization problems which depend linearly on continuous as well as discrete variables. It is structured as follows:

- Existence results
- Concepts of linear optimization
- Mixed-integer linear programming (Gomory cuts, Benders decomposition)

Part II of the lecture treats nonlinear mixed integer programs.
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.

Complementary literature

- C.A. Floudas, Nonlinear and Mixed-Integer Optimization: Fundamentals and Applications, Oxford University Press, 1995
- G.L. Nemhauser, L.A. Wolsey, Integer and Combinatorial Optimization, Wiley, 1988
- M. Tawarmalani, N.V. Sahinidis, Convexification and Global Optimization in Continuous and Mixed-Integer Nonlinear Programming, Kluwer, 2002.

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online (kop.ior.kit.edu).

Course: Mixed Integer Programming II — Course key: [25140]

Lecturers: Oliver Stein
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [WI4OR6] (S. 69)

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.
Examination are held in the semester of the lecture and in the following semester.
Upon attaining more then 50% of the exercise points, the grade of the passed examination is improved by a third of a grading step.
Upon attaining more then 50% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.
The examination can also be combined with the examination of *Mixed Integer Programming I* [25138]. In this case, the duration of the written examination takes 120 minutes.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The student
- knows and understands the fundamentals of convex and of nonconvex mixed integer programming,
- is able to choose, design and apply modern techniques of nonlinear mixed integer programming in practice.

Content
Many optimization problems from economics, engineering and natural sciences are modeled with continuous as well as discrete variables. Examples are the energy minimal design of a chemical process in which several reactors may be switched on or off, or the time minimal covering of a distance with a vehicle equipped with a gear shift. While optimal points can be defined straightforwardly, for their numerical identification an interplay of ideas from discrete and continuous optimization is necessary. Part I of the lecture deals with linear mixed integer programs.
Part II treats methods for the numerical solution of optimization problems which depend nonlinearly on continuous as well as discrete variables. It is structured as follows:
- Concepts of convex optimization
- Mixed integer convex programming (branch and bound methods)
- Mixed integer nonconvex programming
- Generalized Benders decomposition
- Outer approximation methods
- Heuristics

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.

Complementary literature
- C.A. Floudas, Nonlinear and Mixed-Integer Optimization: Fundamentals and Applications, Oxford University Press, 1995
- G.L. Nemhauser, L.A. Wolsey, Integer and Combinatorial Optimization, Wiley, 1988
- M. Tawarmalani, N.V. Sahinidis, Convexification and Global Optimization in Continuous and Mixed-Integer Nonlinear Programming, Kluwer, 2002.

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online (kop.ior.kit.edu).

Course: Modern Market Research — Course key: [25154]

Lecturers: Wolfgang Gaul
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Entrepreneurship, Innovation and International Marketing [WI4BWLMAR6] (S. 23), Market Research [WI4BWLMAR2] (S. 25), Strategy, Innovation and Data Analysis [WI4BWLMAR3] (S. 26), Behavioral Approaches in Marketing and Data Analysis [WI4BWLMAR4] (S. 27), Successful Market Orientation [WI4BWLMAR5] (S. 28), Quantitative Marketing and OR [WI4OR1] (S. 66)

Learning Control / Examinations
See module description.

Prerequisites
Basic knowledge of statistics.

Conditions
None.

Learning Outcomes

Content

Basic literature
Further literature references are announced in the script.

Course: Marketing and Operations Research — Course key: [25156]

Lecturers: Wolfgang Gaul
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Entrepreneurship, Innovation and International Marketing [WI4BWLMAR6] (S. 23), Marketing Planning [WI4BWLMAR1] (S. 24), Successful Market Orientation [WI4BWLMAR5] (S. 28), Quantitative Marketing and OR [WI4OR1] (S. 66)

Learning Control / Examinations
See module description.

Prerequisites
Basics of Operations Research are required.

Conditions
None.

Learning Outcomes

Content

Basic literature
WIll be announced in the lecture. Further literature references are announced in the script.

Course: Corporate Planning and Operations Research Course key: [25158]

Lecturers: Wolfgang Gaul
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Entrepreneurship, Innovation and International Marketing [WI4BWLMAR6] (S. 23), Marketing Planning [WI4BWLMAR1] (S. 24), Successful Market Orientation [WI4BWLMAR5] (S. 28), Quantitative Marketing and OR [WI4OR1] (S. 66)

Learning Control / Examinations
See module description.

Prerequisites
Basics of operations research are assumed.

Conditions
None.

Learning Outcomes

Content

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

Course: e-Business & electronic Marketing — Course key: [25160]

Lecturers: Wolfgang Gaul
Credit points (CP): 2.5 **Hours per week:** 1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Entrepreneurship, Innovation and International Marketing [WI4BWLMAR6] (S. 23), Marketing Planning [WI4BWLMAR1] (S. 24), Market Research [WI4BWLMAR2] (S. 25), Successful Market Orientation [WI4BWLMAR5] (S. 28)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Information Technology and Business Information — Course key: [25162]

Lecturers: Bruno Neibecker
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Strategy, Innovation and Data Analysis [WI4BWLMAR3] (S. 26), Behavioral Approaches in Marketing and Data Analysis [WI4BWLMAR4] (S. 27), Successful Market Orientation [WI4BWLMAR5] (S. 28)

Learning Control / Examinations
Examination performance will consist of a written exam accorcing to the description of the module (written exam following §4(2), 1 of the examination regulation).

Prerequisites
None.

Conditions
None.

Learning Outcomes
(see description of the course)

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

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

Course: International Marketing — Course key: [25164]

Lecturers: Wolfgang Gaul
Credit points (CP): 2.5 **Hours per week:** 1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Entrepreneurship, Innovation and International Marketing [WI4BWLMAR6] (S. 23), Marketing Planning [WI4BWLMAR1] (S. 24), Market Research [WI4BWLMAR2] (S. 25), Successful Market Orientation [WI4BWLMAR5] (S. 28)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

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

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

Course: Marketing and Innovation — Course key: [25165]

Lecturers: Wolfgang Gaul
Credit points (CP): 2.5 **Hours per week:** 1/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Entrepreneurship, Innovation and International Marketing [WI4BWLMAR6] (S. 23), Marketing Planning [WI4BWLMAR1] (S. 24), Market Research [WI4BWLMAR2] (S. 25), Successful Market Orientation [WI4BWLMAR5] (S. 28)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Strategic and Innovative Decision Making in Marketing Course key: [25166]

Lecturers: Bruno Neibecker
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Strategy, Innovation and Data Analysis [WI4BWLMAR3] (S. 26), Successful Market Orientation [WI4BWLMAR5] (S. 28)

Learning Control / Examinations
Examination performance will consist of a written exam accorcing to the description of the module (written exam following §4(2), 1 of the examination regulation).

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes
(see description of the course)

Content
The course places emphasis on the role of marketing in strategic planning. The planning and implementation stages are discussed using a case study in business portfolio analysis, talking about experience effects, approaches in defining strategic business units. A critical view on established paradigms versus weak signals from management practice is given. Further topics are innovation and diffusion models, behavioral approaches to innovative decision processes and a discussion on Porter's single diamond theory and globalization.

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

Course: Behavioral Approaches in Marketing — Course key: [25167]

Lecturers: Bruno Neibecker
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Behavioral Approaches in Marketing and Data Analysis [WI4BWLMAR4] (S. 27), Successful Market Orientation [WI4BWLMAR5] (S. 28)

Learning Control / Examinations
Examination performance will consist of a written exam accorcing to the description of the module (written exam following §4(2), 1 of the examination regulation).

Prerequisites
None.

Conditions
(see description of the module)

Learning Outcomes

Content
This course gives an introduction to consumer behavior and the influence of cognitive and emotional information processing on consumer decision making. The contribution of advertising response models is considered and faced with social and environmental aspects (e.g. cross-cultural influences) on consumer behavior, mass communication and internet advertising. In addition, a scientific case study on the effectiveness of TV-commercials is discussed. Central issues of the course:
Case Studies in brand management and advertising response.
Psychological factors (research design and test marketing / arousal / effectiveness of TV-commercials as case studies).
Emotions in marketing.
Information processing and retention in memory (schema theory / visual information processing).
Complex advertising response models (attitude towads the ad / attitude towards the brand / persuasion / context effects in learning / decision making / Means-end-theory and strategic advertising).
Social processes (culture / subculture / cross cultural influence / product design).

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

Course: Entrepreneurship and Marketing — Course key: [25170]

Lecturers: Wolfgang Gaul
Credit points (CP): 2.5 **Hours per week:** 1/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Entrepreneurship, Innovation and International Marketing [WI4BWLMAR6] (S. 23), Marketing Planning [WI4BWLMAR1] (S. 24), Market Research [WI4BWLMAR2] (S. 25), Successful Market Orientation [WI4BWLMAR5] (S. 28)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The Student should ...

Content

Course: Data Analysis and Operations Research — Course key: [25171]

Lecturers: Wolfgang Gaul
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Entrepreneurship, Innovation and International Marketing [WI4BWLMAR6] (S. 23), Market Research [WI4BWLMAR2] (S. 25), Successful Market Orientation [WI4BWLMAR5] (S. 28), Quantitative Marketing and OR [WI4OR1] (S. 66)

Learning Control / Examinations
See module description.

Prerequisites
Basics of data analysis and operations research are assumed.

Conditions
None.

Learning Outcomes

Content

Course: Master Seminar in Marketing

Course key: [25192]

Lecturers: Wolfgang Gaul
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Master Seminar zu Marktforschung

Course key: [25193]

Lecturers: Wolfgang Gaul
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Master Seminar in Quantitative Marketing and OR — Course key: [25194]

Lecturers: Wolfgang Gaul
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Master-Seminar Marketing Plannning — Course key: [25195]

Lecturers: Wolfgang Gaul
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced at the beginning of the semester.

Course: Master Seminar in Entrepreneurship, Innovation and International MarketingCourse key: [25196]

Lecturers: Gaul
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Wird zur Seminarvorbereitung bekannt gegeben.

Course: Master-Seminar zum strategischen u. verhaltenswissenschaftlichen Marketing Course key: [25197]

Lecturers: Bruno Neibecker
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
Keine.

Conditions
Keine.

Learning Outcomes

Content

Basic literature
Will be allocated according the individual topics.

Course: Management Accounting — Course key: [25210]

Lecturers: Torsten Lüdecke
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: F2 (Finance) [WI4BWLFBV2] (S. 21), F2&F3 (Finance) [WI4BWLFBV3] (S. 22)

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.

Prerequisites
None.

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

Complementary literature

- Coenenberg, A.G. Kostenrechnung und Kostenanalyse, 6. Aufl. 2007.
- Ewert, R. und Wagenhofer, A. Interne Unternehmensrechnung, 7. Aufl. 2008.
- Götze, U. Kostenrechnung und Kostenmanagement. 3. Aufl. 2007.
- Kilger, W., Pampel, J., Vikas, K. Flexible Plankostenrechnung und Deckungsbeitragsrechnung , 11. Aufl. 2002.

Course: Valuation — Course key: [25212]

Lecturers: Martin E. Ruckes
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: F1 (Finance) [WI4BWLFBV1] (S. 20), F2 (Finance) [WI4BWLFBV2] (S. 21), F2&F3 (Finance) [WI4BWLFBV3] (S. 22)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
Students learn to assess and compare corporate investment projects from a financial point of view.

Content
Firms prosper when they create value for their shareholders and stakeholders. This is achieved by investing in projects that yield higher returns than their according cost of capital. Students are told the basic tools for firm and project valuation as well as ways to implement these tools in order to enhance a firm´s value and improve its investment decisions. Among other things, the course will deal with the valuation of firms and individual projects using discounted cash flow and relative valuation approaches and the valuation of flexibility deploying real options.

Complementary literature
Titman/Martin (2007): Valuation – The Art and Science of Corporate Investment Decisions, Addison Wesley.

Course: Corporate Financial Policy — Course key: [25214]

Lecturers: Martin E. Ruckes
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: F2 (Finance) [WI4BWLFBV2] (S. 21), F2&F3 (Finance) [WI4BWLFBV3] (S. 22)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
Students are told profound knowledge about appropriate financing of firms.

Content
The course deals with the theory of corporate finance:

- Financing contracts
- Financing capacity
- Issuance of securities
- Capital structure
- Payout policy
- Liquidity management
- Corporate acquisitions and restructurings

Complementary literature
Tirole, J. (2006): The Theory of Corporate Finance. Princeton University Press.

Course: Financial Intermediation — Course key: [25232]

Lecturers: Martin E. Ruckes
Credit points (CP): 4.5 **Hours per week:** 3
Term: Wintersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: F2 (Finance) [WI4BWLFBV2] (S. 21), F2&F3 (Finance) [WI4BWLFBV3] (S. 22)

Learning Control / Examinations

Prerequisites
None.

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

Complementary literature

- Hartmann-Wendels/Pfingsten/Weber (2006): Bankbetriebslehre, 4. Auflage, Springer Verlag.
- Freixas/Rochet (1997): Microeconomics of Banking, MIT Press.

Course: Market Microstructure — Course key: [25240]

Lecturers: Torsten Lüdecke
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: F2 (Finance) [WI4BWLFBV2] (S. 21), F2&F3 (Finance) [WI4BWLFBV3] (S. 22)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
This lecture makes students familiar with the fundamental models of trading in financial markets. It starts with generic design features of financial markets which are used to frame price discovery as the key element of the trading process. The link between market design and market quality is pointed out by using alternative measures of market quality. Seminal models of market microstructure are used to show how dealer inventoy and/or asymmetric information affect market prices and the pricing of securities. Theoretical models are shown to provide predictions which are consistent with empiricial evidence.

Content
The focus of this lecture is on the question how the microstructure of financial markets affects price discovery and market quality. First, issues in designing market structure are presented and linked to fundamental dimensions of market quality, i.e liquidity and trading costs. In particular, the services and privileges of market makers are stressed. The main part of the lecture covers inventory-models of dealer markets and models of information-based trading. The final part gives attention to some econometric models to analyze the short-term behavior of security prices.

Media
Folien.

Basic literature
keine

Complementary literature
See reading list.

Course: Seminar in Finance — Course key: [25293]

Lecturers: Marliese Uhrig-Homburg, Martin E. Ruckes
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

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.

Basic literature
Will be announced at the end of the foregoing semester.

Course: Exchanges

Course key: [25296]

Lecturers: Jörg Franke
Credit points (CP): 1.5 **Hours per week:** 1
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: F2 (Finance) [WI4BWLFBV2] (S. 21), F2&F3 (Finance) [WI4BWLFBV3] (S. 22)

Learning Control / Examinations

Prerequisites
None.

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?

Complementary literature
Educational material will be offered within the lecture.

Course: Business Strategies of Banks — Course key: [25299]

Lecturers: Wolfgang Müller
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: F2 (Finance) [WI4BWLFBV2] (S. 21), F2&F3 (Finance) [WI4BWLFBV3] (S. 22)

Learning Control / Examinations

Prerequisites
None.

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.

Complementary literature

- A script is disseminated chapterwise within the lecture.
- Hartmann-Wendels, Thomas; Pfingsten, Andreas; Weber, Martin; 2000, Bankbetriebslehre, 2. Auflage, Springer

Course: Multivariate Methods

Course key: [25317]

Lecturers: Wolf-Dieter Heller
Credit points (CP): 5 **Hours per week:** 2/2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Statistical Methods in Risk Management [WI4STAT2] (S. 76)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature

- Fahrmeir L., Hamerle A., Tut G.: Multivariate statistische Verfahren; de Gruyter 1996
- Jobson J.D.: Applied Multivariate Data Analysis Vol. I/II, Springer 1991
- Dobson A.J.: An Introduction to Statistical Modelling, Chapman and Hall
- Hosmer D.W., Lemeshow S.: Applied Logistic Regression, J. Wiley 1989
- Jambu M.: Explorative Datenanalyse, G. Fischer 1992

Course: Stochastic Calculus and Finance — Course key: [25331]

Lecturers: Svetlozar Rachev
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Econometrics and Risk Management in Finance [WI4STAT] (S. 74), Mathematical and Empirical Finance [WI4STAT1] (S. 75)

Learning Control / Examinations
The assessment of this course consists of a written examination (following §4(2), 1 SPO) and of possibble additional assignments during the course (following §4(2), 3 SPO).

Prerequisites
None.

Conditions
None

Learning Outcomes
After successful completion of the course students will be familiar with many common methods of pricing and portfolio models in finance. Emphasis we be put on both finance and the theory behind it.

Content
Stochastic processes (Poisson-process, Brownian motion, martingales), stochastic Integral (Integral, quadratic und co-variation, Ito-formula), stochastic differential equation for price-processes, trading strategies, option pricing(Feynman-Kac), neutral risk rating(equivalent martingale measure, Girsanov theorem), term structure models

Media
transparencies, exercises.

Basic literature
To be announced in lecture.

Complementary literature
Hull, J., Options, Futures, & Other Derivatives, Prentice Hall, Sixth Edition, (2005).

Course: Stochastic and Econometric Models in Credit Risk Management Course key: [25337]

Lecturers: Svetlozar Rachev
Credit points (CP): 5 **Hours per week:** 2/2
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Statistical Methods in Risk Management [WI4STAT2] (S. 76)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content
The deregulation of European markets and the advent of monetary union has resulted in greater liquidity and more competition, creating a truly homogeneous European credit market. Second, given the low level of nominal interest rates, investors are willing to take on more credit risk to boost returns. Third, the regulatory authorities are set to accept the use of internal models for risk management. This will enable banks to better identify and measure credit risk and therefore manage it more effectively.
The course is intended as a mathematically rigorous introduction to the stochastic and econometric models used in credit risk modeling. We will start with a review on term-structure models, and then continue with pricing credit risk and credit risk derivatives using

- firm's value models,
- intensity models,
- pricing credit derivatives.

Basic literature
David Lando, Credit Risk Modeling: Theory and Applications, Princeton Series in Finance, 2004
Philipp J. Schönbucher, Credit Derivatives Pricing Models: Model, Pricing and Implementation, Wiley-Finance, 2003
Darrell Duffie, Kenneth J. Singleton, Credit Risk: Pricing, Measurement and Management, Princeton Series in Finance, Princeton University Press, 2003

Course: Operational Risk and Extreme Value Theory — Course key: [25342]

Lecturers: Svetlozar Rachev
Credit points (CP): 5 **Hours per week:** 2/2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Statistical Methods in Risk Management [WI4STAT2] (S. 76)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content
Operational risk is defined as a consequence of critical contingencies most of which are quantitative in nature and many important questions regarding economic capital allocation for operational risk remain open. The existing quantitative models for operational risk (as well as for market and credit risk) make various assumptions about “normality” and practically exclude extreme and rare events. In this course we formalize the theory of operational risk and apply the extreme value theory for the purpose of calculating the economic capital requirement against unexpected operational losses.

Basic literature
Chernobai, A. Rachev, S., Fabozzi, F. Modeling, Analyzing, and Quantifying Operational Risk , John Wiley, Finance, 2006
P. Embrechts, C. Kluppelberg, T. Mikosch , Modeling Extremal Events , Springer, Berling 1997
Marcelo G. Cruz: Modelling, Measuring and Hedging Operational Risk, Wiley, NY, 2001

Course: Finance and Banking

Course key: [25350/1]

Lecturers: Karl-Heinz Vollmer
Credit points (CP): 5 **Hours per week:** 2/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical and Empirical Finance [WI4STAT1] (S. 75)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature

- Andrew Harvey: The Econometric Analysis of Time Series, 2nd Ed. 1993
- Andrew C. Harvey: Time Series Models, 2nd. Ed.
- Walter Enders: Applied Econometric Time Series, 2nd Ed., 1994
- Granger/Newbold: Forecasting Economic Time Series 2nd. Ed.
- Pindyck/Rubinfeld: Econometric Models and Economic Forecasts, 1998
- Elton/Gruber: Modern Portfolio Theory and Investment Analysis, 1995
- Byrne, Peter, Decision-Making in Property Development, 2nd Ed. 1996

Course: Statistical Methods in Financial Risk Management Course key: [25353]

Lecturers: Svetlozar Rachev
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Econometrics and Risk Management in Finance [WI4STAT] (S. 74), Statistical Methods in Risk Management [WI4STAT2] (S. 76), Risk Management and Econometrics in Finance [WI4STAT3] (S. 77)

Learning Control / Examinations
The assessment of this course consists of a written examination (following §4(2), 1 SPO) and of possible additional assignments during the course (following §4(2), 3 SPO).

Prerequisites
None.

Conditions
None.

Learning Outcomes
Introduction of statistical methods, topics commonly covered by courses on advanced statistics and econometrics supplemented by the latest scientific results in this area

Content
Financial risk management in financial instruments (risk indicators: Single Fixed Flow,Fixed Rate Bond, FRA, Interest Rate Futures, Interest Rate Swaps, FX Spot, FX Forward, “Plain Vanilla” Optionen) and portfolios (risk indicators: Pricing Environment, Interest Rate Factors, FX factors), credit risk, value-at-risk (VAR) and
asset liability management, evaluation of calibration models and measures of success in risk models, determination of operativ risk in the finacial industry.

Media
transparencies, exercises.

Basic literature
To be announced in lecture.

Course: Bank Management and Financial Markets, Applied Econometrics Course key: [25355]

Lecturers: Karl-Heinz Vollmer
Credit points (CP): 5 **Hours per week:** 2/2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical and Empirical Finance [WI4STAT1] (S. 75)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature

- Bierwag: Duration-Analysis; Managing Interest Rat Risk, 1987
- Andrew Harvey: The Econometric Analysis of Time Series, 2nd. Ed. 1993
- Andrew Harvey: Time Series Models, 2nd. Ed. 1994
- Granger/Newbold: Forecasting Economic Time Series; 2nd. Ed. 1986
- Pindyck, Rubinfeld: Econometric Models and Economic Forecasts, 1998
- B. Rolfes: Gesamtbanksteuerung, 1999

Course: Portfolio and Asset Liability Management — Course key: [25357]

Lecturers: Svetlozar Rachev
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Econometrics and Risk Management in Finance [WI4STAT] (S. 74), Mathematical and Empirical Finance [WI4STAT1] (S. 75), Statistical Methods in Risk Management [WI4STAT2] (S. 76)

Learning Control / Examinations
The assessment of this course consists of a written examination (following §4(2), 1 SPO) and of possible additional assignments during the course (following §4(2), 3 SPO).

Prerequisites
None.

Conditions
None.

Learning Outcomes
Introduction and deepening of various portfolio management techniques in the financial industry.

Content
Portfolio theory: principles of investment, Markowitz- portfolio analysis, Modigliani-Miller theorems and absence of arbitrage, efficient markets, capital asset pricing model (CAPM), multi factorial CAPM, arbitragepricing theory (APT), arbitrage and hedging, multi factorial models, equity-portfolio management, passive strategies, active investment
Asset liability: statistical portfolio analysis in stock allocation, measures of success, dynamic multi seasonal models, models in building scenarios, stochastic programming in bond and liability management, optimal investment strategies, integrated asset liability management

Media
transparencies, exercises.

Basic literature
To be announced in lecture.

Complementary literature
To be announced in lecture.

Course: Financial Time Series and Econometrics — Course key: [25359]

Lecturers: Svetlozar Rachev
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Econometrics and Risk Management in Finance [WI4STAT] (S. 74), Mathematical and Empirical Finance [WI4STAT1] (S. 75), Risk Management and Econometrics in Finance [WI4STAT3] (S. 77)

Learning Control / Examinations
The assessment of this course consists of a written examination (following §4(2), 1 SPO) and of possible additional assignments during the course (following §4(2), 3 SPO).

Prerequisites
None.

Conditions
None.

Learning Outcomes
After successful completion of the course students will have the knowledge and qualification to comprehend the essential models -incl. state of the arts science- in financial econometrics, as well as risk measurement and management.

Content
Linear financial time series models: ARMA, ARIMA and forecasting, integrated time series models and so called long memory processes.
Non linear financial time series models: test for odyssey properties, stochastic variance and ARCH-process, regime switching models, test for non linearity, root of unit test and cointegration

Media
transparencies lecture, exercises

Basic literature
Mills: The Econometric Modelling Of Financial Markets. Cambridge University Press.

Course: Game Theory II — Course key: [25369]

Lecturers: Siegfried Berninghaus
Credit points (CP): 4.5 **Hours per week:** 2/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Applied Strategic Decisions [WI4VWL2] (S. 52), Stochastic Modelling and Optimization [WI4OR4] (S. 73)

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.

Prerequisites
See corresponding module information.
Basic knowledge of mathematics and statistics is assumed.

Conditions
None.

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 apmplifying 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.

Basic literature
- Berninghaus/Ehrhart/Güth, Strategische Spiele, 2. Auflage, Springer Verlag, 2006
- van Damme, Stability and Perfection of Nash Equilibria, 2. Auflage, Springer Verlag, 1991

Complementary literature
- Aumann/Hart (edts.), Handbook of Game Theory I-III, Elsevier Publishers, North Holland, 1992/1994/2002

Course: Experimental Economics — Course key: [25373]

Lecturers: Siegfried Berninghaus, Bleich
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Market Engineering [WI4BWLISM3] (S. 40), Applied Strategic Decisions [WI4VWL2] (S. 52)

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.

Prerequisites
See corresponding module information.

Conditions
None.

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 empricial validation, this method is applied in political and strategic consulting. The lecture gives an introducation 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.

Complementary literature

- Strategische Spiele; S. Berninghaus, K.-M. Ehrhart, W. Güth; Springer Verlag, 2nd ed., 2006.
- Handbook of Experimental Economics; J. Kagel, A. Roth; Princeton University Press, 1995.
- Experiments in Economics; J.D. Hey; Blackwell Publishers, 1991.
- Experimental Economics; D.D. Davis, C.A. Holt; Princeton University Press, 1993.
- Experimental Methods: A Primer for Economists; D. Friedman, S. Sunder; Cambridge University Press, 1994.

Course: Data Mining — Course key: [25375]

Lecturers: Gholamreza Nakhaeizadeh
Credit points (CP): 5 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Statistical Methods in Risk Management [WI4STAT2] (S. 76)

Learning Control / Examinations

Prerequisites
None.

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

Basic literature
U. Fayyad, G. Piatetsky-Shapiro, P. Smyth, R. Uthurusamy, editors, Advances in Knowledge Discovery and Data Mining, AAAI/MIT Press, 1996 (order on-line from Amazon.com or from MIT Press).

- 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
- Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Springer Verlag, 2001.
- Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson Addison wesley (May, 2005). Hardcover: 769 pages. ISBN: 0321321367
- Ripley, B.D. (1996) Pattern Recognition and Neural Networks, Cambridge: Cambridge University Press.
- Ian witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques, 2nd Edition, Morgan Kaufmann, ISBN 0120884070, 2005.

Course: Advanced Econometrics of Financial Markets Course key: [25381]

Lecturers: Svetlozar Rachev
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Econometrics and Risk Management in Finance [WI4STAT] (S. 74), Mathematical and Empirical Finance [WI4STAT1] (S. 75), Risk Management and Econometrics in Finance [WI4STAT3] (S. 77)

Learning Control / Examinations
The assessment of this course consists of a written examination (following §4(2), 1 SPO) and of possible additional assignments during the course (following §4(2), 3 SPO).

Prerequisites
None.

Conditions
None.

Learning Outcomes
After successful completion of the course students will have attained both knowledge and competency to comprehend the theories behind portfolio management of major financial institutions. Hence students can adapt this understanding to the more specialised needs of the intermediary.

Content
Advanced Econometrics of Financial Markets covers: Forecasting stock return, market microstructure(non-synchronised trading, spread and modelling transactions), “event studies analysis”, capital asset pricing model, multi-factor price models, intertemporal equilibrium models.

Media
transparencies, exercises.

Basic literature
Campbell, Lo, McKinlay: The Econometrics of Financial Markets. Princeton University Press.

Course: Auction Theory — Course key: [25408]

Lecturers: Karl-Martin Ehrhart, Stefan Seifert
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Market Engineering [WI4BWLISM3] (S. 40), Communications & Markets [WI4BWLISM5] (S. 42), Applied Strategic Decisions [WI4VWL2] (S. 52)

Learning Control / Examinations
Written exam of 80 mins (§4(2), 1 SPO). Exam is offered each semester.

Prerequisites
We suggest to attend either Game Theory I or Economics of Uncertainty beforehand.

Conditions
None.

Learning Outcomes
The student
- understands problems of auction design and empirical methods,
- designs and analyzes auction desgins,
- evaluates empirically demo-experiments.

Content
Auction theory is based on game theory. Practical aspects and experiences are also discussed. Main topics are: Single- and multi-unit auctions, procurement auctions, license auctions, electronic auctions (e.g. eBay, C2C, B2B), multi-attributive auctions.

Complementary literature
Berninghaus, S., K.-M. Ehrhart und W. Güth: Strategische Spiele, 2nd extended edition, Springer Verlag, 2006
- Krishna, V.: Auction Theory, Academic Press,2002
- Kräkel, M.: Auktionstheorie und interne Organisation, Gabler Verlag, 1992
- Milgrom, P.: Putting Auction Theory to Work, Cambridge University Press, 2004
- Ausubel, L.M. und P. Cramton: Demand Reduction and Inefficiency in Multi-Unit Auctions, University of Maryland, 1999

Course: Facility Location and Strategic Supply Chain Management Course key: [25486]

Lecturers: Stefan Nickel
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operations Research in Supply Chain Management and Health Care Management [WI4OR5] (S. 67)

Learning Control / Examinations
The assessment consist of a written exam (120 min) according to Section 4 (2), 1 of the examination regulation.
The exam takes place in every semester.

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

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.

Complementary literature
- Daskin: Network and Discrete Location: Models, Algorithms, and Applications, Wiley, 1995
- Domschke, Drexl: Logistik: Standorte, 4. Auflage, Oldenbourg, 1996
- Francis, McGinnis, White: Facility Layout and Location: An Analytical Approach, 2nd Edition, Prentice Hall, 1992
- Love, Morris, Wesolowsky: Facilities Location: Models and Methods, North Holland, 1988
- Thonemann: Operations Management - Konzepte, Methoden und Anwendungen, Pearson Studium, 2005

Remarks
The lecture is offered in every summer term.
The planned lectures and courses for the next three years are announced online.

Course: Tactical and Operational Supply Chain Management Course key: [25488]

Lecturers: Stefan Nickel
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operations Research in Supply Chain Management and Health Care Management [WI4OR5] (S. 67)

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.

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

Conditions
None.

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.

Complementary literature
- Domschke: Logistik: Transporte, 5. Auflage, Oldenbourg, 2005
- Domschke: Logistik: Rundreisen und Touren, 4. Auflage, Oldenbourg, 1997
- Ghiani, Laporte, Musmanno: Introduction to Logistics Systems Planning and Control, Wiley, 2004
- Gudehus: Logistik, 3. Auflage, Springer, 2005
- Simchi-Levi, Kaminsky, Simchi-Levi: Designing and Managing the Supply Chain, 3rd edition, McGraw-Hill, 2008
- Silver, Pyke, Peterson: Inventory management and production planning and scheduling, 3rd edition, Wiley, 1998

Remarks
The lecture is offered in every winter term.
The planned lectures and courses for the next three years are announced online.

Course: Seminar in Discrete Optimization Course key: [25491]

Lecturers: Stefan Nickel
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

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.

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

Conditions
Attendance is compulsory.
If possible, at least one module of the institute should be taken before attending the seminar.

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 current topic of the seminar will be announced at the end of the preceding term on the internet.

Basic literature
Literature and relevant sources will be announced at the beginning of the seminar.

Remarks
The seminar is offered in each term.

Course: Welfare Economics — Course key: [25517]

Lecturers: Clemens Puppe
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Allocation and Equilibrium [WI4VWL7] (S. 57), Social Choice Theory [WI4VWL9] (S. 59)

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.

Prerequisites
The courses *Economics I: Microeconomics* [25012] and *Economics II: Macroeconomics* [25014] have to be completed beforehand.

Conditions
None.

Learning Outcomes

Content

Complementary literature
- J. Rawls: *A Theory of Justice*. Harvard University Press (1971)
- J. Roemer: *Theories of Distributive Justice*. Harvard University Press (1996)

Course: Game Theory I — Course key: [25525]

Lecturers: Siegfried Berninghaus
Credit points (CP): 4.5 **Hours per week:** 2/2
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Applied Strategic Decisions [WI4VWL2] (S. 52), Social Choice Theory [WI4VWL9] (S. 59)

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.

Prerequisites
Basic knowledge of mathematics and statistics is assumed.
See corresponding module information.

Conditions
None.

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.

Basic literature
Gibbons, A primer in Game Theory, Harvester-Wheatsheaf, 1992
Holler/Illing, Eine Einführung in die Spieltheorie, 5. Auflage, Springer Verlag, 2003
Gardner, Games for Business and Economics, 2. Auflage, Wiley, 2003
Berninghaus/Ehrhart/Güth, Strategische Spiele, 2. Auflage, Springer Verlag 2006

Complementary literature
- Binmore, Fun and Games, DC Heath, Lexington, MA, 1991

Course: Advanced Microeconomic Theory — Course key: [25527]

Lecturers: Clemens Puppe
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Allocation and Equilibrium [WI4VWL7] (S. 57)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Decision Theory and Objectives in Applied Politics — Course key: [25537]

Lecturers: Tangian
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Social Choice Theory [WI4VWL9] (S. 59)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Mathematical Theory of Democracy — Course key: [25539]

Lecturers: Tangian
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Social Choice Theory [WI4VWL9] (S. 59)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Theory of Economic Growth — Course key: [25543]

Lecturers: Marten Hillebrand
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Macroeconomic Theory [WI4VWL8] (S. 58)

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.

Prerequisites
Basic knowledge in micro- and macroeconomics, as conveyed in the courses *Economics I: Microeconomics* [25012] and *Economics II: Macroeconomics* [25014], is assumed.
According the focus of the course quantitativ-mathematical modelling should be in participiant's interest.

Conditions
None.

Learning Outcomes

Content

Course: Environmental Economics and Sustainability Course key: [25547]

Lecturers: Rainer Walz
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Environmental Economics [WI4VWL5] (S. 55)

Learning Control / Examinations

Prerequisites
It is recommended to already have knowledge in the area of macro- and microeconomics. This knowledge may be acquired in the courses *Economics I: Microeconomics* [25012] and *Economics II: Macroeconomics* [25014].

Conditions
None.

Learning Outcomes

Content

Complementary literature
Hodge, I.: Environmental Economics, Houndsmills
Umweltbundesamt: Nachhaltige Entwicklung in Deutschland, Erich Schmidt Verlag,Berlin

Course: Environmental and Ressource Policy — Course key: [25548]

Lecturers: Rainer Walz
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Environmental Economics [WI4VWL5] (S. 55)

Learning Control / Examinations

Prerequisites
It is recommended to already have knowledge in the area of industrial organization and economic policy. This knowledge may be acquired in the courses *Introduction to Industrial Organization* [25371] and *Economic Policy* [26280].

Conditions
None.

Learning Outcomes

Content

Complementary literature
Michaelis, P.: Ökonomische Instrumente in der Umweltpolitik. Eine anwendungsorientierte Einführung, Heidelberg
OECD: Environmental Performance Review Germany, Paris

Course: Theory of Business Cycles — Course key: [25549]

Lecturers: Marten Hillebrand
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 3
Teaching language: Englisch
Part of the modules: Allocation and Equilibrium [WI4VWL7] (S. 57), Macroeconomic Theory [WI4VWL8] (S. 58)

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.

Prerequisites
Basic knowledge in micro- and macroeconomics, as conveyed in the courses *Economics I: Microeconomics* [25012] and *Economics II: Macroeconomics* [25014], is assumed.
According the focus of the course quantitativ-mathematical modelling should be in participiant's interest.

Conditions
None.

Learning Outcomes

Content

Complementary literature
David Romer, *Advanced Macroeconomics*, 3rd edition, MaGraw-Hill (2006)
Lutz Arnold: Makroökonomik. Eine Einführung in die Theorie der Güter-, Arbeits- und Finanzmärkte (2003)

Course: Quality Control II — Course key: [25659]

Lecturers: Karl-Heinz Waldmann
Credit points (CP): 4.5 **Hours per week:** 2/1/2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Special Topics in Optimization [WI4OR7] (S. 70), Stochastic Methods in Economy and Engineering/ Management of Operations [WI4OR3] (S. 72)

Learning Control / Examinations
The assessment consists of an 2h written exam following §4(2), 1 SPO combined with quality assurance I. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The lecture provides students with knowledge of modern techniques in reliability engineering.

Content
See module.

Media
Blackboard, Slides, Flash Animations.

Basic literature
Lecture Notes

Complementary literature
- BARLOW, R.E., PROSCHAN, F.: Statistische Theorie der Zuverlässigkeit. Harri Deutsch, Thun-Frankfurt, 1978.
- KOHLAS, J.: Zuverlässigkeit und Verfügbarkeit. B.G. Teubner, Stuttgart, 1987.
- BIROLINI, A: Qualität und Zuverlässigkeit technischer Systeme, Springer, Berlin, 1991.

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Simulation I — Course key: [25662]

Lecturers: Karl-Heinz Waldmann
Credit points (CP): 4.5 **Hours per week:** 2/1/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Special Topics in Optimization [WI4OR7] (S. 70), Stochastic Modelling and Optimization [WI4OR4] (S. 73)

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).

Prerequisites
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].

Conditions
None.

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 oftern 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 continous random variables, statistical analysis of simulated data, variance reduction techniques, case studies.

Media
Blackboard, Slides, Flash Animations, Simulation Software

Basic literature

- Lecture Notes
- K.-H. Waldmann / U. M. Stocker: Stochastische Modelle - Eine anwendungsorientierte Einführung; Springer (2004).

Complementary literature

- A. M. Law / W. D. Kelton: Simulation Modeling and Analysis (3rd ed); McGraw Hill (2000)

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Simulation II — Course key: [25665]

Lecturers: Karl-Heinz Waldmann
Credit points (CP): 4.5 **Hours per week:** 2/1/2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Special Topics in Optimization [WI4OR7] (S. 70), Stochastic Modelling and Optimization [WI4OR4] (S. 73)

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).

Prerequisites
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]

Conditions
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 oftern 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

Basic literature

- Skript
- K.-H. Waldmann / U. M. Stocker: Stochastische Modelle - Eine anwendungsorientierte Einführung; Springer (2004).

Complementary literature

- A. M. Law / W. D. Kelton: Simulation Modeling and Analysis (3rd ed); McGraw Hill (2000)

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Quality Control I — Course key: [25674]

Lecturers: Karl-Heinz Waldmann
Credit points (CP): 4.5 **Hours per week:** 2/1/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Special Topics in Optimization [WI4OR7] (S. 70), Stochastic Methods in Economy and Engineering/ Management of Operations [WI4OR3] (S. 72)

Learning Control / Examinations
The assessment consists of an 2h written exam following §4(2), 1 SPO combined with quality management II. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The lecture provides students with knowledge of modern techniques in quality management. Students learn to use the techniques, such as control charts, experimental design, efficiently and targeted.

Content
See module.

Media
Blackboard, Slides, Flash Animations.

Basic literature
Lecture Notes

Complementary literature
- Montgomory, D.C. (2005): Introduction to Statistical Quality Control (5e); Wiley.

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Markov Decision Models I — Course key: [25679]

Lecturers: Karl-Heinz Waldmann
Credit points (CP): 4.5 **Hours per week:** 2/1/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Special Topics in Optimization [WI4OR7] (S. 70), Stochastic Modelling and Optimization [WI4OR4] (S. 73)

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).

Prerequisites
None.

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

Basic literature
Lecture Notes

Complementary literature
Waldmann, K.H. , Stocker, U.M. (2004): Stochastische Modelle - eine anwendungsorientierte Einführung; Springer

Course: Markov Decision Models II — Course key: [25682]

Lecturers: Karl-Heinz Waldmann
Credit points (CP): 4.5 **Hours per week:** 2/1/2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Special Topics in Optimization [WI4OR7] (S. 70), Stochastic Modelling and Optimization [WI4OR4] (S. 73)

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Optimization in a Random Environment — Course key: [25687]

Lecturers: Karl-Heinz Waldmann
Credit points (CP): 4.5 **Hours per week:** 2/1/2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Special Topics in Optimization [WI4OR7] (S. 70), Stochastic Methods in Economy and Engineering/ Management of Operations [WI4OR3] (S. 72)

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).

Prerequisites
None.

Conditions
None.

Learning Outcomes
Students are enabled to apply their knowledge about techniques and methodology on current problems such as the measurement and evaluation of operational risk as required by the Basel II accord.

Content
See module.

Media
Blackboard, Slides, Flash Animations, Simulation Software

Basic literature
Lecture Notes.

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Efficient Algorithms — Course key: [25700]

Lecturers: Hartmut Schmeck
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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 periodwrt (§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.

Prerequisites
credits for the Informatics modules of years 1 and 2.

Conditions
None.

Learning Outcomes
The student will learn how to use methods and concepts of ëfficient algorithmsänd 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 ressources
- lecture recording (camtasia)

Basic literature
Akl, S.G.: The Design and Analysis of Parallel Algorithms. Prentice-Hall, Englewood Cliffs, New Jersey,1989.
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)

Complementary literature
will be announced in class

Course: Advanced Lab in Efficient Algorithms — Course key: [25700p]

Lecturers: Hartmut Schmeck
Credit points (CP): 4 **Hours per week:** 3
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Will be announced at the beginning of the computer lab.

Course: Special Topics of Efficient Algorithms — Course key: [25700sp]

Lecturers: Hartmut Schmeck
Credit points (CP): 5 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Will be announced in the lecture.

Course: Algorithms for Internet Applications — Course key: [25702]

Lecturers: Hartmut Schmeck
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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).

Prerequisites
None.

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

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

Complementary literature
- Further references will be given in the course.

Course: Organic Computing — Course key: [25704]

Lecturers: Hartmut Schmeck, Sanaz Mostaghim
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations
The assessment of this course consists of a written examination (60 min) (following §4(2), 1 SPO) and of submitting written papers or of writing an additional examination (called "bonus exam", 60 min) (following §4(2), 3 SPO). The exam will be offered every second semester (summer term) and may be repeated at every ordinary exam date.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The student acquires the ability to master methods and concepts of Organic Computing and to demonstrate innovation skills regarding the used methods.
Therefore the course aims at the teaching of fundamentals and methods of Organic Computing within the context of its applicability in practice. On the basis of a fundamental understanding of the taught concepts and methods the students should be able to choose the adequate methods and concepts, if necessary further develop them according to the situation and use them properly when facing related problems in their later job. The students should be capable of finding arguments for the chosen solutions and express them to others.

Content
The mission of Organic Computing is to tame complexity in technical systems by providing appropriate degrees of freedom for self-organized behaviour adapting to changing requirements of the execution environment, in particular with respect to human needs. According to this vision an organic computer system should be aware of its own capabilities, the requirements of the environment, and it should be equipped with a number of "self-x" properties allowing for the anticipated adaptiveness and for a reduction in the complexity of system management. These self-x properties are self-organisation, self-configuration, self-optimization, self-healing, self-protection and self-explanation. In spite of these self-x properties, an organic system should be open to external control actions which might be necessary to prevent undesired behaviour.

Media
powerpoint slides with annotations using a tablet pc access to applets and Internet ressources lecture recording (camtasia).

Basic literature

- Autonomic Computing: Concepts, Infrastructure and Applications. M. Parashar and S. Hariri (Ed.), CRC Press. December 2006.
- Self-Organization in Biological Systems. S. Camazine, J. Deneubourg, N. R. Franks, J. Sneyd, G. Theraulaz and E. Bonabeau. Princeton University Press, 2003.
- Complex Adaptive Systems: An Introduction. H. G. Schuster, Scator Verlag, 2001.
- Introduction to Evolutionary Computing. A. E. Eiben and J. E. Smith. Natural Computing Series, Springer Verlag, 2003. Swarm Intelligence: From Natural to Artificial Systems.Eric Bonabeau, Marco Dorigo and Guy Theraulaz. Oxford University Press, 1999.
- Control of Complex Systems. K. Astrom, P. Albertos, M. Blanke, A. Isidori and W. Schaufelberger. Springer Verlag, 2001.

Complementary literature

- **Adaptive and Self-organising Systems,** Christian Müller-Schloer, Moez Mnif, Emre Cakar, Hartmut Schmeck, Urban Richter,
  June 2007. Preprint.Submitted to ACM Transactions on Autonomous and Adaptive Systems (TAAS)
- **Organic Computing - Addressing Complexity by Controlled Self-organization,** Jürgen Branke, Moez Mnif, Christian Müller-Schloer, Holger Prothmann, Urban Richter, Fabian Rochner, Hartmut Schmeck, In Tiziana Margaria, Anna Philippou, and Bernhard Steffen, *Proceedings of ISoLA 2006*, pp. 200-206. Paphos, Cyprus, November 2006.
- Evolutionary Optimization in Dynamic Environments. J. Branke. Kluwer Academic Publishers, 2002.
- Self-star Properties in Complex Information Systems: Conceptual and Practical Foundations (Lecture Notes in Computer Science. O. Babaoglu, M. Jelasity, A. Montresor, C. Fetzer, S. Leonardi, A. van Moorsel and M. van Steen. Springer Verlag, 2005.
- Design and Control of Self-organizing Systems. C. Gershenson. PhD thesis, Vrije Universiteit Brussel, Brussels, Belgium, 2007.

- VDE / ITG / GI - Positionspapier: Organic Computing - Computer- und Systemarchitektur im Jahr 2010. Juli 2003. it - Information Technology, Themenheft Organic Computing, Oldenbourg Verlag. Volume: 47, Issue: 4/2005.

further references will be announced in class

Course: Nature-inspired Optimisation Course key: [25706]

Lecturers: Sanaz Mostaghim, Pradhyum Shukla
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Database Systems — Course key: [25720]

Lecturers: Andreas Oberweis, Dr. D. Sommer
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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

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

Conditions
None.

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

Complementary literature

- Schlageter, Stucky. Datenbanksysteme: Konzepte und Modelle. Teubner 1983.
- S. M. Lang, P. C. Lockemann. Datenbankeinsatz. Springer-Verlag 1995.
- Jim Gray, Andreas Reuter. Transaction Processing: Concepts and Techniques. Morgan Kaufmann 1993.

Further literature will be given individually.

Course: Distributed Database Systems: Basic Technology for e-Business Course key: [25722]

Lecturers: Andreas Oberweis
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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

Prerequisites
Knowledge of course *Database Systems and XML* [25724] is expected.

Conditions
None.

Learning Outcomes
Students are familiar with the requirements and limitations of distributed database systems. Based on sound theoretical basis and practical exercises, they are able to design and build a distributed database system. They know methods to ensure error-free operation and the consistency of distributed databases and they are able to identify and to assess current and future application areas of distributed database systems. Furthermore, they know how to use them taking into account aspects of economy.

Content
This lecture deals with tasks in spatially distributed data management under special consideration of aspects of economy. Based on existing general knowledge in the field of database systems, the following topics will be addressed among other things: networked systems, design of distributed databases, distributed transaction concepts, request handling in distributed databases, distributed multi-user control, distributed error handling, and distributed data management on the internet.

Media
Slides, access to internet resources.

Basic literature
- P. Dadam: Verteilte Datenbanken und Client/Server-Systeme. Springer 1996
- M. T. Özsu, P. Valduriez: Principles of Distributed Database Systems. Prentice-Hall 1991

Complementary literature
Further literature is given in each lecture.

Course: Database Systems and XML — Course key: [25724]

Lecturers: Andreas Oberweis
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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

Prerequisites
None.

Conditions
None.

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

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

Media
Slides, access to internet resources.

Basic literature

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

Course: Workflow-Management — Course key: [25726]

Lecturers: Andreas Oberweis
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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

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

Conditions
None.

Learning Outcomes
Students are familiar with the concepts and principles of workflow management concepts and systems and their applications. Based on theoretical foundations they can model business process models. Furthermore they have an overview of further problems of workflow management systems in commercial use.

Content
A workflow is that part of a business process which is automatically executed by a computerized system. Workflow management includes the design, modelling, analysis, execution and management of workflows. Workflow management systems are standard software systems for the efficient control of processes in enterprises and organizations. Knowledge in the field of workflow management systems is especially important during the design of systems for process support.
The course covers the most important concepts of workflow management. Modelling and design techniques are presented and an overview about current workflow management systems is given. Standards, which have been proposed by the workflow management coalition (WfMC), are discussed. Petri nets are proposed as a formal modelling and analysis tool for business processes. Architecture and functionality of workflow management systems are discussed. The course is a combination of theoretical foundations of workflow management concepts and of practical application knowledge.

Media
Slides, Access to internet resources.

Basic literature
- M. Dumas, W. van der Aalst, A. H. ter Hofstede (Hrsg.): Process Aware Information Systems. Wiley-Interscience, 2005
- J.F. Chang: Business Process Management. Auerbach Publications, 2006

Complementary literature
- W. van der Aalst, H. van Kees: Workflow Management: Models, Methods and Systems, Cambridge 2002: The MIT Press
- G. Vossen, J. Becker (Hrsg.): Geschäftsprozessmodellierung und Workflow-Management. Modelle, Methoden, Werkzeuge; Int. Thomson Pub. Company, 1996.
- A. Oberweis: Modellierung und Ausführung von Workflows mit Petri-Netzen. Teubner-Reihe Wirtschaftsinformatik, B.G. Teubner Verlag, 1996.
- G. Alonso, F. Casati, H. Kuno, V. Machiraju: Web Services, 2004, Springer Verlag, Heidelberg 1997
- S. Jablonski, C. Bussler: Workflow-Management, Modeling Concepts, Architecture and Implementation, Int. Thomson Computing Press, 1996.

Course: Software Engineering — Course key: [25728]

Lecturers: Andreas Oberweis, Detlef Seese
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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

Prerequisites
Modul “Introduction to Informatics” [WW1INFO] is precondition

Conditions
None.

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 controling 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.

Complementary literature

- H. Balzert. Lehrbuch der Software-Technik. Spektrum Verlag 1996.
- B. Boehm. Software Engineering Economics. Englewood Cliffs, N.J.: Prentice-Hall 1981.
- P. Brössler, Johannes Siedersleben. Softwaretechnik. Hanser Verlag 2000.
- E. Denert. Software-Engineering. Springer-Verlag 1991.
- Frühauf, K., J. Ludewig, H. Sandmayr. Software-Projektmanagement und – Qualitätssiche-rung. Teubner 1991.
- E. Gamma et al.. Design Patterns. Addison Wesley 1995.

Further literature is given in the course.

Course: Software Technology: Quality Management — Course key: [25730]

Lecturers: Andreas Oberweis
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
Students are familiar with basic concepts and principles of software quality and software quality management. They know key measures and models for certification of quality in software development. They are aware of different test methods and evaluation methods. Furthermore, they are able to asses quality management aspects in different standard process models.

Content
This lecture imparts fundamentals of active software quality management (quality planning, quality testing, quality control, quality assurance) and illustrates them with concrete examples, as currently applied in industrial software development. Keywords of the lecture content are: software and software quality, process models, software process quality, ISO 9000-3, CMM(I), BOOTSTRAP, SPICE, software tests.

Media
Slides, access to internet resources.

Basic literature
- Helmut Balzert: Lehrbuch der Software-Technik. Spektrum-Verlag 1998
- Peter Liggesmeyer: Software-Qualität, Testen, Analysieren und Verifizieren von Software. Spektrum Akademischer Verlag 2002

Complementary literature
Further literature is given in lectures.

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

Lecturers: Stefan Klink
Credit points (CP): 4 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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

Prerequisites
None.

Conditions
None.

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

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

Media
Slides, access to internet resources.

Basic literature

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

Complementary literature
Further literature is given in each lecture individually.

Course: Business Process Modelling — Course key: [25736]

Lecturers: Andreas Oberweis, Marco Mevius
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
Students know goals of business process modelling and master different modelling languages. They are able to choose the appropriate modelling language according to a given context and to use the modelling language with suitable modelling tools. They master methods for analysing and assessing process modells and methods for analysing them according to specific quality characteristics.

Content
The proper modeling of relevant aspects of business processes is essential for an efficient and effective design and implementation of processes. This lecture presents different classes of modeling languages and discusses the respective advantages and disadvantages of using actual application scenarios. For that simulative and analytical methods for process analysis are introduced. In the accompanying exercise the use of process modeling tools is practiced.

Media
Slides, access to internet resources.

Basic literature
Literature will be given in the lecture.

Course: Knowledge Management — Course key: [25740]

Lecturers: Rudi Studer
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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.

Prerequisites
Basics in logic, e.g. from lecture Foundations of Informatics 1.

Conditions
None.

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 corporations, knowledge is an increasingly important aspect for fullfilling central tasls (amelioration of business processes, increasing innovation, increasing customer satisfaction, strategic planning and the like). Therfore, knowledge management has become a determining factor of siccess.
The lecture covers the 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 further emphasize the following computer science techniques for knowledge management:

- Communities of Practice, Collaboration Tools, Skill Management
- ontology-based knowledge management
- Business Process oriented Knowledge Management
- Personal Knowledge Management
- Case Based Reasoning (CBR)

Media
Slides and scientific publications as reading material.

Basic literature

- I. Nonaka, H. Takeuchi: The Knowledge Creating Company. Oxford University Press 1995.
- G. Probst, S. Raub, K. Romhardt: Wissen managen: Wie Unternehmen ihre wertvollste Ressource optimal nutzen. Gabler, Wiesbaden, 5. überarb. Auflage, 2006.
- S. Staab, R. Studer (eds.): Handbook on Ontologies, ISBN 3-540-40834-7, Springer Verlag, 2004.
- A. Back, N. Gronau, K. Tochtermann: Web 2.0 in der Unternehmenspraxis - Grundlagen, Fallstudien und Trends zum Einsatz von Social Software. Oldenbourg Verlag München 2008.
- C. Beierle, G. Kern-Isberner: Methoden wissensbasierter Systeme, Vieweg, Braunschweig/Wiesbaden, 2. überarb. Auflage, 2005

Complementary literature

1. P. Hitzler, M Krötzsch, S. Rudolph, Y. Sure: Semantic Web: Grundlagen, ISBN 3-540-33993-0, Springer Verlag, 2008
2. Abecker, A., Hinkelmann, K., Maus, H., Müller, H.J., (Ed.): Geschäftsprozessorientiertes Wissensmanagement, Mai 2002.VII, 472 S. 70 Abb. Geb. ISBN 3-540-42970-0, Springer Verlag
3. Dieter Fensel. Spinning the Semantic Web. 2003 (ISBN 0262062321).
4. Handschuh, Staab. Annotation for the Semantic Web. 2003 (ISBN 158603345X).
5. J. Sowa. Knowledge Representation. Brooks/Cole 1999
6. Tim Berners-Lee. Weaving the Web. Harper 1999 geb. 2000 Taschenbuch.

Course: Ecxercises in Knowlegde Management — Course key: [25740p]

Lecturers: Rudi Studer
Credit points (CP): 4 **Hours per week:** 3
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations
Assessment is based on equal parts on (acc. to §4(2), 3 SPO)

- Essay
- Presentation
- Implementation

Prerequisites
Attending the lecture “Wissensmanagement” [25860] is required.

Conditions
None.

Learning Outcomes
To autonomously comprehend and work on a topic in the area of knowledge management.

Content
This “Praktikum” covers one of the following topics (the topics rotate annually):

- Ontology based knowledge management
- Information Retrieval and Text Mining
- Data Mining
- Personal Knowledge Management
- Case Based Reasoning (CBR)

Complementary literature
Nonaka, H. Takeuchi. The Knowledge Creating Company. Oxford University Press 1995.
G. Probst et al. Wissen managen - Wie Unternehmen ihre wertvollste Ressource optimal nutzen. Gabler Verlag 1999.
S. Staab, R. Studer. Handbook on Ontologies. Springer Verlag 2004.
R. Baeza-Yates, B. Ribeiro-Neto. Modern Information Retrieval. ACM Press 1999.

Course: Knowledge Discovery — Course key: [25742]

Lecturers: Rudi Studer
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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

Prerequisites
None.

Conditions
None.

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

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

Media
Slides.

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

Complementary literature
None.

Course: Semantic Web Technologies I — Course key: [25748]

Lecturers: Rudi Studer, Sebastian Rudolph
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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.

Prerequisites
Lectures on Informatics of the Bachelor on Information Management (Semester 1-4) or equivalent.

Conditions
None.

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.

Basic literature
- Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, York Sure: Semantic Web - Grundlagen, Springer, 2008 (ISBN 978-3-540-33993-9)
- S. Staab, R. Studer (Editors). Handbook on Ontologies. International Handbooks in Information Systems. Springer 2003.

Complementary literature
1. Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, Foundations of Semantic Web Technologies. Textbooks in Computing, Chapman and Hall/CRC Press, 2009.
2. G. Antoniou, Grigoris Antoniou, Frank Van Harmelen, A Semantic Web Primer, MIT Press, 2004
3. Uwe Schöning. Logik für Informatiker. Spektrum Akademischer Verlag, 5. Auflage 2000
4. Steffen Hölldobler. Logik und Logikprogrammierung. Synchron Verlag, 3. Auflage 2003
5. Dieter Fensel. Spinning the Semantic Web. 2003 (ISBN 0262062321).
6. Handschuh, Staab. Annotation for the Semantic Web. 2003 (ISBN 158603345X).
7. J. Sowa. Knowledge Representation. Brooks/Cole 1999
8. Tim Berners-Lee. Weaving the Web. Harper 1999 geb. 2000 Taschenbuch.

Course: Semantic Web Technologies II — Course key: [25750]

Lecturers: Rudi Studer, Sudhir Agarwal
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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.

Prerequisites
Lectures on Informatics of the Bachelor on Information Management (Semester 1-4) or equivalent. *Semantic Web Technologies I* [25748] is recommended.

Conditions
none.

Learning Outcomes
- Detailed knowledge about the management and the usage of ontologies for Semantic Web Technologies
- Advanced skills in modelling knowledge for Semantic Web Technologies

Content
Building upon the content of the lecture “Semantic Web Technologies I”, the lecture covers methods for the realisation of intelligent systems on the world wide web and in other application domains. The lecture covers central aspects in the life cycle of ontologies and meta data, and in particular the following topics:
- Tools for managing metadaten and ontologies
- Knowledge representation using ontologies
- Semantic wikis
- Semantic Web Services
- Information integration
- Semantic Search
- Applications

Media
Slides.

Basic literature
- Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, York Sure: Semantic Web - Grundlagen, Springer, 2008 (ISBN 978-3-540-33993-9)
- S. Staab, R. Studer (Editors). Handbook on Ontologies. International Handbooks in Information Systems. Springer 2003.

Complementary literature
1. Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, Foundations of Semantic Web Technologies. Textbooks in Computing, Chapman and Hall/CRC Press, 2009.
2. G. Antoniou, Grigoris Antoniou, Frank Van Harmelen, A Semantic Web Primer, MIT Press, 2004
3. Uwe Schöning. Logik für Informatiker. Spektrum Akademischer Verlag, 5. Auflage 2000
4. Steffen Hölldobler. Logik und Logikprogrammierung. Synchron Verlag, 3. Edition 2003
5. Dieter Fensel. Spinning the Semantic Web. 2003 (ISBN 0262062321).
6. Handschuh, Staab. Annotation for the Semantic Web. 2003 (ISBN 158603345X).
7. J. Sowa. Knowledge Representation. Brooks/Cole 1999
8. Tim Berners-Lee. Weaving the Web. Harper 1999 geb. 2000 Taschenbuch.
9. Robin Milner. Communicating and Mobile Systems: The Pi Calculus.

Course: Complexity Management — Course key: [25760]

Lecturers: Detlef Seese
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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 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.

Prerequisites
A basic knowledge in informatics is suitable.

Conditions
None.

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.

Basic literature

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

Complementary literature

- M.R. Garey, D. S. Johnson: Computers and intractability A guide to the theory of NP-completeness, W. H. Freeman and Company, New York, 1979
- N. Immerman: Descriptive Complexity; Springer-Verlag, New York 1999
- R. Diestel: Graphentheorie, Springer 1996
- J. A. Bondy, U.S.R. Murty: Graph Theory, Springer 2008
- H.D. Ebbinghaus, J. Flum, W. Thomas: Mathematical Logic, Springer-Verlag, New York 1984
- Christos H. Papadimitriou: Computational Complexity, Addison-Wesley, Reading, Massachusetts, 1994
- R. Niedermeier: Invitation to Fixed-Parameter Algorithms, Oxford University Press 2006
- W. Metzler: Nichtlineare Dynamik und Chaos, Teubner Studienbücher Mathematik, Stuttgart 1998
- G. Frizelle, H. Richards (eds.): Tackling industrial complexity: the ideas that make a difference. University of Cambridge, Institute of Manufacturing 2002
- W. Bick, S. Drexl-Wittbecker: Komplexität reduzieren, Konzept. Methoden. Praxis, LOG_X Verlag GmbH, Stuttgart, 2008

- U. Lindemann, M. Maurer, T. Braun: Structural Complexity Management, An Approach for the field of Product Design, Springer-Verlag, Berlin, Heidelberg, 2009
- M. J. North, Ch. M. Macal: Managing Busieness 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 contend and schedule.

Course: Intelligent Systems in Finance — Course key: [25762]

Lecturers: Detlef Seese
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations
The assessment is a written examination.
See the German part for special requirements to be admitted for the examination.

Prerequisites
None.

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, Portfolioselection under constraints, information retrieval from business reports, automatic development of trading rules for the capital market, modelling of time series at the capital market, explanation of phenomena at capital markets by simulation, decision support in risk management (credit risk, operational risk). After this the basics of intelligent systems are discussed. Basic ideas and essential results for different stochastic heuristics for local search are discussed next, especially Hill Climbing, Simulated Annealing, Threshold Accepting and Tabu Search. After this different population-based approaches of evolutionary methods are presented, e.g. Genetic Algorithms, Evolutionary Strategies and Programming, Genetic Programming, Memetic Algorithms and Ant-Algorithms. It follows an introduction into Neural Networks, Support Vector Machines and Fuzzylogic. Softwareagents and agentbased stock market models are the next topic. The lecture ends with an overview on the complexity of algorithmic problems in the area of finance, giving in this way one of the key reasons for the necessity to use heuristics and intelligent systems. Essential examples and basic applications are choosen from the area of finance.

Media
Slides.

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

- Z. Michalewicz, D. B. Fogel. How to Solve It: Modern Heuristics. Springer 2000.
- J. Hromkovic. Algorithms for Hard Problems. Springer-Verlag, Berlin 2001.
- P. Winker. Optimization Heuristics in Econometrics. John Wiley & Sons, Chichester 2001.
- A. Brabazon, M. O´Neill. Biologically Inspired Algorithms for Financial Modelling. Springer, 2006.
- A. Zell. Simulation Neuronaler Netze. Addison-Wesley 1994.
- R. Rojas. Theorie Neuronaler Netze. Springer 1993.
- N. Cristianini, J. Shawe-Taylor. An Introduction to Support Vector Machines and other kernal-based learning methods. Cambridge University Press 2003.
- G. Klir, B. Yuan. Fuzzy Sets and Fuzzy Logic: Theory and Applications. Prentice-Hall, 1995.
- F. Schlottmann, D. Seese. Modern Heuristics for Fiance Problems: A Survey of Selected Methods and Applications. In S. T. Rachev (Ed.) Handbook of Computational and Numerical Mrthods in Finance, Birkhäuser, Boston 2004, pp. 331 - 359.

Further references will be given in each lecture.

Complementary literature

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

Remarks

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

Course: Computing Lab in Intelligent Systems in Finance Course key: [25762p]

Lecturers: Detlef Seese
Credit points (CP): 4 **Hours per week:** 3
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations
see German version

Prerequisites
see German version

Conditions
see German version

Learning Outcomes
see German version

Content
see German version

Complementary literature
Literature will be announced in the first meeting.

Remarks
see German version

Course: IT Complexity in Practice — Course key: [25764]

Lecturers: Kreidler
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Will be announced in the lecture.

Course: Service Oriented Computing 1 Course key: [25770]

Lecturers: Stefan Tai
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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).

Prerequisites
Lecture *AI2* [25033] is recommended.

Conditions
None.

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. In addition, software-as-a-service models and emerging trends (incl. Cloud Computing) will be presented and discussed. 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), introduding increased agility and flexibilty 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)
- Software-as-a-Service models
- Service intermediaries (markets)
- Mashups and situational applications
- Cloud computing

Media
Slides, access to internet resources.

Basic literature
Will be announced in the lecture.

Course: Service Oriented Computing 2 Course key: [25772]

Lecturers: Stefan Tai, Rudi Studer
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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).

Prerequisites
It is recommended to attend the course *Service-oriented Computing* [25770] beforehand.

Conditions
None.

Learning Outcomes
Students will extend their knowledge and proficiency in the area of modern service-oriented technologies. Thereby, they acquire the capability to understand, apply and assess concepts and methods that are of innovative and scientific nature.

Content
Building upon basic Web service technologies the lecture introduces select topics of advanced service computing and service engineering. In particular, focus will be placed on new Web-based architectures and applications leveraging Web 2.0, Cloud Computing, Semantic Web and other emerging technologies.

Basic literature
Literature will be announced in the lecture.

Course: Web Service Engineering — Course key: [25774]

Lecturers: Christian Zirpins
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations
The assessment consists of an oral exam (20 min) (following §4(2), 2 SPO).

Prerequisites
None.

Conditions
The course might be combined with the lectures “Applied Informatics II - IT Systems for e-Commerce” and “Service Oriented Computing 1”.

Learning Outcomes
Students will acquire a deep and systematic understanding of service-oriented software systems and their embedding in organizations. Equipped with practical and research-based knowledge, they will be enabled to engineer state-of-art service-oriented applications with Web technologies and gain a broad understanding of tools and methodologies for their own work.

Content
The lecture “Web Service Engineering” covers technical and organizational aspects with respect to the development of modern service-oriented software as socio-technical systems in enterprises and Web environments. It introduces background, state-of-technology and emerging trends of methods, tools and processes for application development with Web services. The topics of the lecture include e.g.:

- Web service foundations and base technologies
- Service-oriented software and enterprise architectures (SOA)
- SOA life cycle and development processes
- Analysis and requirements engineering for SOA
- Service-oriented design and modeling
- Construction and testing of Web service applications
- Web service development tools
- Trends: e.g. development with service mashups / cloud services

Media

Slides in PDF-format will be provided via the course webpages.

Basic literature
Compulsory literature will be announced in the course.

Remarks
This course will be offered from summer term 2009 on.

Course: Cloud Computing

Course key: [25776]

Lecturers: Stefan Tai, Kunze
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Management of IT-Projects — Course key: [25784]

Lecturers: Roland Schätzle
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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

Prerequisites
None.

Conditions
None.

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

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

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

Media
Slides, access to internet resources.

Basic literature

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

Further literature is given in each lecture individually.

Course: Enterprise Architecture Management — Course key: [25786]

Lecturers: Thomas Wolf
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations
The assessment of this course is a written or (if necessary) oral examination according to §4(2) of the examination regulation.

Prerequisites
None.

Conditions
None.

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

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

Media
Slides, access to internet resources.

Basic literature

- Nolan, R., Croson, D.: Creative Destruction: A Six-Stage Process for Transforming the Organization. Harvard Business School Press, Boston Mass. 1995
- Doppler, K., Lauterburg, Ch.: Change Management. Campus Verlag 1997
- Jacobson, I.: The Object Advantage, Business Process Reengineering with Object Technology. Addison-Wesley Publishing Company, Wokingham England 1994
- Keller, G., Teufel, Th.: SAP R/3 prozessorientiert anwenden. Addison Wesley 1998
- Österle, H.: Business Engineering Bd. 1 und 2. Springer Verlag, Berlin 1995

Course: Strategic Management of Information Technology Course key: [25788]

Lecturers: Thomas Wolf
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations
The assessment of this course is a written or (if necessary) oral examination according to §4(2) of the examination regulation.

Prerequisites
None.

Conditions
None.

Learning Outcomes
Students know the outer frame of IT in an enterprise and know which functions IT has within an enterprise. They unterstand the organization and the content of these functions.

Content
The following topics will be covered: strategic planing of ICT, architecture of ICT, overall planning of ICT, outsourcing, operation and controlling of ICT.

Media
Slides, internet resources

Basic literature

- Nolan, R., Croson, D.: Creative Destruction: A Six-Stage Process for Transforming the Organization. Harvard Business School Press, Boston Mass. 1995
- Heinrich, L. J., Burgholzer, P.: Informationsmanagement, Planung, Überwachung, Steuerung d. Inform.-Infrastruktur. Oldenbourg, München 1990
- Nolan, R.: Managing the crises in data processing. Harvard Business Review, Vol. 57, Nr. 2 1979
- Österle, H. et al.: Unternehmensführung und Informationssystem. Teubner, Stuttgart 1992
- Thome, R.: Wirtschaftliche Informationsverarbeitung. Verlag Franz Vahlen, München 1990

Course: Capability maturity models for software and systems engineering Course key: [25790]

Lecturers: Ralf Kneuper
Credit points (CP): 4 **Hours per week:** 2
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
Students master the basics of capability maturity models, oversee the whole process in project management and development processes according to CMMI and SPICE. They know how to use capability maturity models for quality assurance.

Content
Capability maturity models like CMMI and SPICE are an important tool for assessing and improving software development. A significantly increasing number of companies use these models in their own approach to improve their development and to demonstrate a certain minimum quality and effective external presentation. This is the case in Germany, especially in the automotive industry, but also many other industries.

Preliminary Structure of the lecture:

1. Introduction and Overview, motivation
2. Project management according to CMMI
3. Development processes according to CMMI
4. Process management and supporting processes according toCMMI
5. Differences between SPICE and CMMI
6. Introduction of capability maturity models
7. Assessments and Appraisals
8. Costs and benefits of capability maturity models

Media
Slides, access to internet resources.

Basic literature
Literature is given in each lecture individually.

Course: Practical Seminar Knowledge Discovery — Course key: [25810]

Lecturers: Rudi Studer
Credit points (CP): 4 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations

Prerequisites
None.

Conditions
Lecture “Knowledge Discovery” recommended.

Learning Outcomes
Independent preparation and presentation of a seminar topic from the fields of knowledge discovery or text mining adhering to scientific standards. In case of a practical course, additionally, example implementation and/or experiments.

Content
The seminar/practical course will cover topics in the field of Knowledge Discovery. Each term, the seminar will cover a different specialization field, e.g.:

- Text Mining,
- Ontology Learning and Information Extraction,
- Inductive Logic Programming,
- Learning with Background Knowledge.

The topics are usually arranged as a seminar talk + practical work to be acknowledged as seminar/practical course. In individual cases, this course can also be acknowledged just as seminar (without practical work).
Details will be announced every semester.

Media
Slides.

Basic literature

- Christopher Manning and Hinrich Schütze. Foundations of Statistical NLP, MIT Press, 1999.
- Tom Mitchell, Machine Learning, McGraw Hill, 1997.
- Ricardo Baeza-Yates and Berthier Ribeiro-Neto, Modern Information Retrieval, Addison-Wesley, 1999.
- James Allen. Natural Language Understanding, 2nd edition.

Complementary literature
None.

Course: Computing Lab in Complexity Management — Course key: [25818]

Lecturers: Detlef Seese
Credit points (CP): 4 **Hours per week:** 3
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced in the computing lab.

Course: Lab Class Web Services — Course key: [25820]

Lecturers: Stefan Tai, Rudi Studer, Gerhard Satzger, Christian Zirpins
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations
The assessment of this course is according to §4(2), 3 of the examination regulation in form of an examination of the written seminar thesis, a presentation and a project. The final mark is based on the examination of the written seminar thesis and the project but can be upgraded or downgraded according to the quality of the presentation.

Prerequisites
The lecture *Service Oriented Computing 1* [25772] is recommeded.

Conditions
None.

Learning Outcomes
Students will acquire the technical expertise to apply service-oriented platforms and tools. Thereby, they will be enabled to develop practical solutions for concrete problems of constructing service-oriented IT infrastructure for provision of electronic services over the Internet.

Content
The “Praktikum (lab class) Web Services” provides a practical introduction to fundamental Web service technologies and their application to support service value networks on the Internet. Based on concrete application scenarios for Web-based business service networks, the class focuses on the development of software solutions for specific aspects of service-oriented IT-infrastructure. This includes the complete development lifecycle of a large-scale software project and its implementation in small project teams.

Basic literature
For introduction, the following books are recommended:
- M. P. Papazoglou. Web Services: Principles and Technology. Pearson, 2007.
- G. Alonso, F. Casati, H. Kuno, and V. Machira ju. Web Services - Concepts, Architec-tures and Applications. Springer, 2004.

Specific literature will be announced in the course.

Course: Special Topics of Knowledge Management — Course key: [25860sem]

Lecturers: Rudi Studer
Credit points (CP): 5 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations
Assesment is provided by a written exam of 60 minutes or an oral exam during the first few weeks after the lecturing period (acc. to §4(2), 1 or 2 SPO). The exam is offered each semester and may be repeated at the regular examination day.

Prerequisites
The lecture *Angewandte Informatik I - Modellierung* [25070] is a prerequisite.

Conditions
None.

Learning Outcomes
The students acquire the skills, methods and tools in one area of “knowledge management” to demonstrate their mastery and innovativeness.
This event aims at providing basic principles and methods in the context of the practical application of KM. On the basis of a fundamental understanding of these concepts and methods taught to students they will be able to work on advanced problems.
The students will be able to find and argue for solutions of KM problems.

Content
The lecture deals with special topics in the area of knowledge management (incl. Knowledge Discovery and Semantic Web). The lecture deepens one of the following topics:

- Dynamc and interoperable systems in knowledge management
- Personal Knowledge Management
- Formal Concept Analysis

Complementary literature
Depends on the actual content.

Course: Management and Strategy — Course key: [25900]

Lecturers: Hagen Lindstädt
Credit points (CP): 4 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Strategic Corporate Management and Organization [WI4BWLUO1] (S. 29)

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

Prerequisites
None.

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.

Basic literature
- Grant, R.M.: *Contemporary Strategy Analysis.* Blackwell, 5. Aufl. Massachusetts 2005.
- Lindstädt, H.; Hauser, R.: *Strategische Wirkungsbereiche von Unternehmen.* Gabler, Wiesbaden 2004.

The relevant excerpts and additional sources are made known during the course.

Course: Managing Organizations Course key: [25902]

Lecturers: Hagen Lindstädt
Credit points (CP): 4 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Strategic Corporate Management and Organization [WI4BWLUO1] (S. 29)

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.

Prerequisites
None.

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.

Basic literature
- Kieser, A.; Walgenbach, P.: *Organisation*. Schäffer-Poeschel, 4. Aufl. Stuttgart 2003.
- Robey, D.; Sales, C.A.: *Designing Organizations*, McGraw-Hill. 4. Aufl. Boston 1994.
- Scholz, C.: *Strategische Organisation*. 2. Aufl. Landsberg/Lech 2000.
- Staehle, W.H.: *Management*. Vahlen, 8. Aufl. München 1999.

The relevant excerpts and additional sources are made known during the course.

Course: Organization Theory — Course key: [25904]

Lecturers: Hagen Lindstädt
Credit points (CP): 6 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Strategic Corporate Management and Organization [WI4BWLUO1] (S. 29), Strategic Decision Making and Organization Theory [WI4BWLUO3] (S. 30)

Learning Control / Examinations
The assessment consists of a written exam following §4, Abs. 2, 1 of the examination regulation.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The participants are made familiar with mostly classical principles of economic organisational theory and institutional economics. This includes transaction cost theory and agency-theory approaches, models for the function and design of organisational information and decision-making systems, transfer price models to coordinate the exchange of goals and services within companies, models on incentive systems and relative performance tournaments as well as selected OR optimisation approaches to designing organisational structures. The course therefore lays the basis for a deeper understanding of the advanced literature on this key economic area.

Content
- Basic considerations and institution-economic principles of organisational theory
- Transfer prices and internal market-price relationships
- Design and coordination without conflicting objectives
- Economic evaluation of information
- Organisation under asymmetric information and conflicting objectives: agency theory principles

Media
Folien.

Basic literature
- Laux, H.; Liermann, F.: Grundlagen der Organisation. Springer, 5. Aufl. Berlin 2003.
- Milgrom, P.; Roberts, J.: Economics, Organization and Management. Prentice Hall, Englewoods Cliffs 1992.

The relevant excerpts and additional sources are made known during the course.

Course: Modeling Strategic Decision Making — Course key: [25908]

Lecturers: Hagen Lindstädt
Credit points (CP): 6 **Hours per week:** 2/1
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Strategic Corporate Management and Organization [WI4BWLUO1] (S. 29), Strategic Decision Making and Organization Theory [WI4BWLUO3] (S. 30)

Learning Control / Examinations
Written exam 100% following §4, Abs. 2.

Prerequisites
None.

Conditions

Following § 17, 3 of „Prüfungsordnung Informationswirtschaft“ a seminar of this module has to be chosen and completed.

Learning Outcomes
Starting from the basic model of economic decision theory, fundamental decision principles and calculi for multi-attribute decisions in certain and uncertain conditions up to subjective expected utility theory and the economic assessment of information are described. To confront numerous infringements by decision-makers against principles and axioms of this calculus, in addition non-expected utility calculi and advanced models for decisions by economic agents are discussed; these are especially important for management decisions.
Within the chapter concerning leadership frameworks the students are given the possibility to individually analyze their management style on the basis of classical concepts of leadership. These concepts will be presented and discussed in detail.

Content

- Principles of strategic management decisions
- Leadership: Classical leadership concepts
- Basic economic decision models
- Limits of the basic models and advanced concepts
- Advanced models: individual decisions with uncertainty and vague information

Media
Slides.

Basic literature

- Eisenführ, F.; Weber, M.: *Rationales Entscheiden*. Springer, 4. Aufl. Berlin 2003.[1]
- Laux, H.: Entscheidungstheorie. Springer, 6. Aufl. Berlin 2003.[2]
- Lindstädt, H: *Entscheidungskalküle jenseits des subjektiven Erwartungsnutzens*. In: Zeitschrift für betriebswirtschaftliche Forschung 56 (September 2004), S. 495 - 519.
- Scholz, C.: *Personalmanagement*. Vahlen, 5. Aufl. München 2000, Kap. 9.4, S.923 - 948

Course: Value-Based Instruments of Corporate Strategy — Course key: [25912]

Lecturers: Ulrich Pidun, Michael Wolff
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Strategic Corporate Management and Organization [WI4BWLUO1] (S. 29), Strategic Decision Making and Organization Theory [WI4BWLUO3] (S. 30)

Learning Control / Examinations
Written exam 100% following §4, Abs. 2.

Prerequisites
None.

Conditions
none.

Learning Outcomes
The course follows two learning objectives. Firstly, the course participants are presented with the key concepts and models on which the current approaches of value-based management are based in theory and practice. Secondly the course participants should be enabled to transfer the concepts presented to real situations. In order to achieve these learning objectives the connection to classical strategy development instruments is discussed first. Then the various value levers and the concepts of value-based corporate management are presented. This includes both external aspects (such as valuing acquisitions) as well as internal ones ("integrated value management") by value-based corporate management.

Content

- Strategy development in corporate groups
- Growth as a strategic value lever
- Strategic valuation of acquisitions
- Introduction to value management
- Integrated value-based corporate management
- Downsides of multi-business corporations

Media
Slides.

Basic literature

- Brealy, R.A./Myers, S.C. (2000): Principles of Corporate Finance

The relevant excerpts and additional sources are made known during the course.

Course: Seminar: Management and Organization — Course key: [25915]

Lecturers: Hagen Lindstädt
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
See corresponding module information.

Conditions
None.

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.

Basic literature
The relevant sources are made known during the course.

Course: Seminar: Management and Organization — Course key: [25916]

Lecturers: Hagen Lindstädt
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
Completion of all 1st an 2nd year modules of the Bachelor Program or Admission to the Master Program.

Conditions
None.

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.

Basic literature
The relevant sources are made known during the course.

Course: Planning and Management of Industrial Plants Course key: [25952]

Lecturers: Frank Schultmann
Credit points (CP): 5.5 **Hours per week:** 2/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Industrial Production II [WI4BWLIIP2] (S. 45)

Learning Control / Examinations
The assessment consits 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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

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

Basic literature
will be announced in the course

Course: Production and Logistics Management — Course key: [25954]

Lecturers: Magnus Fröhling, Frank Schultmann
Credit points (CP): 5.5 **Hours per week:** 2/2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Industrial Production III [WI4BWLIIP6] (S. 46)

Learning Control / Examinations
The assessment consits 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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content
Within this lecture the main topics of operational production and logistics planning are presented. This comprises structure and functions of of production planning and control systems (PPC systems) as well as enterprise resource planning systems (ERP systems) and Advanced Planning Systems (APS). Planning tasks and exemplary methods, e.g. for master production scheduling (MPS), material requirements planning (MRP I) (demand planning, lot sizing), as well as sequencing, scheduling and capacity planning are discussed. Based on the MRP II concept also integrated approaches for PPC are introduced. Finally an overview on PPC and Enterprise Resource Planning and Advanced Planning Systems that are available on the market are given.

Media
Media will be provided on the e-learning plattform.

Basic literature
will be announced in the course

Course: Strategical Aspects of Energy Economy — Course key: [25958]

Lecturers: Armin Ardone
Credit points (CP): 3.5 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Energy Industry and Technology [WI4BWLIIP5] (S. 48)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Energy Policy

Course key: [25959]

Lecturers: Martin Wietschel
Credit points (CP): 3.5 **Hours per week:** 2/0
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Basics of Liberalised Energy Markets [WI4BWLIIP4] (S. 47)

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.

Prerequisites
Keine.

Conditions
Keine.

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.

Basic literature
Will be anounced in the lecture.

Course: Exhaust Emissions (VWL), Emissions into the Environment (ING) Course key: [25962]

Lecturers: Ute Karl
Credit points (CP): 3.5 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Industrial Production II [WI4BWLIIP2] (S. 45), Safety Science I [WI4INGINTER4] (S. 117), Safety Science II [WI4INGINTER5] (S. 118), Safety Science III [WI4INGINTER6] (S. 119)

Learning Control / Examinations
The assessment consists of an oral exam (20 min) at the beginning of the recess period (according to Section 4(2),2 of the examination regulation.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Compilation of documents will be released in the lecture.

Course: The Management of R&D Projects with Case Studies Course key: [25963]

Lecturers: Helwig Schmied
Credit points (CP): 3.5 **Hours per week:** 2/2
Term: Winter-/Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Industrial Production III [WI4BWLIIP6] (S. 46)

Learning Control / Examinations
The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the Prüfungsordnung.

Prerequisites
None.

Conditions
None

Learning Outcomes

Content

- The communication between R&D, Production and Marketing
- Problems concerning the measurement of the productivity of the R&D system
- Methods for improving the productivity of the R&D system
- Planning of R&D projects with the help of the Communication Matrix-Methods for controlling R&D projects´ progress
- The marketing of scientific competencies
- The Communication Matrix as tool for the implementation of simultaneous engineering
- Case studies

Basic literature
will be announced in the course

Course: Ergonomics I

Course key: [25964]

Lecturers: Peter Knauth
Credit points (CP): 3 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Industrial Ergonomics [WI4BWLIIP1] (S. 49)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Ergonomics II

Course key: [25965]

Lecturers: Dorothee Karl
Credit points (CP): 3 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Industrial Ergonomics [WI4BWLIIP1] (S. 49)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Industrial Studies of Time and Motion

Course key: [25967]

Lecturers: Simone Dürrschnabel
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Industrial Ergonomics [WI4BWLIIP1] (S. 49)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Social Relationships in Organisations — Course key: [25968]

Lecturers: Georg Kraus
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Leadership / Change Management [WI4BWLIIP3] (S. 50)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Herriger, C.: Die Kraft der Rituale. München 1993
Kraus, G., Westermann, R.: Projektmanagement mit System. Wiesbaden 1995
Langenhelder, W.: Theorie menschlicher Entscheidungshandlungen. 1975
Schulz von Thun, F: Miteinander Reden 1 und 2. Hamburg 1993

Course: Development of Personnal and Organisation Course key: [25969]

Lecturers: Jürgen Weisheit
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Leadership / Change Management [WI4BWLIIP3] (S. 50)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- Beck, R., Schwarz, G.: Personalentwicklung: Führen-Fördern-Fordern. Alling 1997
- Garing, F.: Organisationsentwicklung als Lernprozess von Menschen und Systemen, 2. Auflage. Weinheim 1999
- Landsberg, G., von Weiss, R. (Hrsg.). Bildungscontrolling, 2. überarb. Auflage. Stuttgart 1995
- Wildenmann, B., von der Heydt, P.. Führungsnachwuchs Auf dem Sprung. Wie sie Ihre Unternehmen nachhaltig zukunftsfähig machen. Eine Fallstudie über 18 Monate. Darmstadt 2000

Course: Human Resource Management I

Course key: [25972]

Lecturers: Artur Wollert
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Leadership / Change Management [WI4BWLIIP3] (S. 50)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- Wollert, A.: Führen, Verantworten, Werte schaffen. FAZ Verlag 2001
- Malik, F.: Führen, leisten, leben. Stuttgart 2000
- Ulrich, P., Wieland, J. (Hrsg.). Unternehmensethik in der Paxis. Bern 1998
- Schein, W.: Unternehmenskultur. Frankfurt 1995

Course: Human Resource Management II

Course key: [25973]

Lecturers: Artur Wollert
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Leadership / Change Management [WI4BWLIIP3] (S. 50)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Bröckermann, R.: Personalwirtschaft. Köln 1997
Gemeinnützige Hertie-Stiftung: Unternehmensziel: Familienbewusste Personalpolitik. Köln 1999
Hilb, B.: Integriertes Personalmanagement. Lüchterhaud Verlag 2000
Münch, J.: Personal + Organisation als unternehmerische Erfolgsfaktoren. Hochheim 1997

Course: Computer-based Planning and Control of Production and Simulation of Processes Course key: [25975]

Lecturers: Magnus Fröhling, Dominik Möst, Frank Schultmann
Credit points (CP): 3.5 **Hours per week:** 2/0
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Industrial Production III [WI4BWLIIP6] (S. 46)

Learning Control / Examinations
The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the Prüfungsordnung.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content
After an introduction into the structure, the history and still existent shortcomings of systems for planning and control of production, this lecture introduces different approaches for computer-assisted planning. The approaches are subdivided into methodologies for the simulation of processes on the one hand and optimising and descriptive planing models on the other hand. Finally, commercially available, industry-specific software tools are described, focussing on for production planning (PP) and materials management (MM) out of the mySAP ERP system from SAP. In this context the lecture is completed by computer-assisted courses in production planning and materials management with the help of the mySAP ERP system from SAP.

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

Basic literature
will be announced in the course

Course: Changes in th Working World — Course key: [25988]

Lecturers: Sonia Hornberger
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Industrial Ergonomics [WI4BWLIIP1] (S. 49)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Hornberger S.: Individualisierung in der Arbeitswelt aus arbeitswissenschaftlicher Sicht 2005 (Habilitation)

Course: Material Flow Analysis and Life Cycle Assessment Course key: [25995]

Lecturers: Liselotte Schebek
Credit points (CP): 3.5 **Hours per week:** 2/0
Term: Wintersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Industrial Production II [WI4BWLIIP2] (S. 45)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content
Materials – in the sense of raw materials taken from nature – represent the physical basis of the economy and the human society in general. At the same time, global environmental problems, e. g., the greenhouse effect, as well as economic problems, e.g., the availability and the price development of raw materials, are directly linked to the increasing use of specific materials like fossil carbon resources or metals. Hence, for the development of solution strategies, the understanding of material flow systems of the techno-sphere, i. e. the environment made by humans, is essential. The lecture is an introduction into basic system theory and modelling techniques of material flow analysis. On this basis, the methodology of the Life Cycle Assessment (LCA) is then presented, which comprises material flows and their environmental effects throughout the entire life cycle of production, use and disposal of products. For decision-makers in economy and policy, LCA serves as an instrument of analysis in order to compare the different possibilities of the design of products, technologies and services. In this lecture, the structure and particular modules of the Life Cycle Assessment are presented in detail. Furthermore, the applications of the Life Cycle Assessment in the context of decision support are explained, in particular within the context of development of innovative technologies. Recent developments of the Life Cycle Costing and the Social LCA will also be considered.

Basic literature
will be annouced in the course

Course: Basics of Liberalised Energy Markets Course key: [25998]

Lecturers: Wolf Fichtner
Credit points (CP): 3.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Basics of Liberalised Energy Markets [WI4BWLIIP4] (S. 47)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

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

Course: Technological Change in Energy Industry — Course key: [26000]

Lecturers: Martin Wietschel
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Energy Industry and Technology [WI4BWLIIP5] (S. 48)

Learning Control / Examinations
The assessment consists of a written exam.

Prerequisites
Keine.

Conditions
Keine.

Learning Outcomes

Content

Course: Heat Economy

Course key: [26001]

Lecturers: Wolf Fichtner
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Energy Industry and Technology [WI4BWLIIP5] (S. 48)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
See module description.

Content

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

Course: Energy Systems Analysis — Course key: [26002]

Lecturers: Dominik Möst
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Energy Industry and Technology [WI4BWLIIP5] (S. 48)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
See module description.

Content

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

Course: Energy and Environment

Course key: [26003]

Lecturers: Ute Karl, n.n.
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Energy Industry and Technology [WI4BWLIIP5] (S. 48), Environmental Economics [WI4VWL5] (S. 55)

Learning Control / Examinations
The assessment consists of a written exam.

Prerequisites
Keine.

Conditions
None.

Learning Outcomes

Content

Course: Energy Trade and Risk Management — Course key: [26020]

Lecturers: Kai Hufendiek
Credit points (CP): 3.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Basics of Liberalised Energy Markets [WI4BWLIIP4] (S. 47)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
See module description.

Content

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

Course: Gas-Markets

Course key: [26022]

Lecturers: Wolf Fichtner
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Basics of Liberalised Energy Markets [WI4BWLIIP4] (S. 47)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
See module description.

Content

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

Course: Simulation Game in Energy Economics — Course key: [26025]

Lecturers: Wolf Fichtner
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Basics of Liberalised Energy Markets [WI4BWLIIP4] (S. 47)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
See module description.

Content

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

Course: Monetary Theory

Course key: [26100]

Lecturers: Malte Krüger
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Money and Payment [WI4VWL3] (S. 53)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Felderer, B. / Homburg, S.: Makroökonomik und neue Makroökonomik; Berlin/Heidelberg/New York/Tokyo; 9. Auflage 2005.

Course: Seminar Public Finance

Course key: [26130]

Lecturers: Berthold Wigger
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
See module description.

Conditions
None.

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://www.iww.uni-karlsruhe.de/reddot/1563.php and on the notice board prior to the start of semester.

Basic literature
Will be announced at the beginning of the seminar.

Course: Regulation

Course key: [26206]

Lecturers: Andreas Kopp
Credit points (CP): 4 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Network Economics [WI4VWL4] (S. 54)

Learning Control / Examinations

Prerequisites
It is recommended to have attended the courses *Economics I: Microeconomics* [25012] and *Economic Policy* [26280] beforehand.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced in the lecture.

Course: Transport Economics — Course key: [26230]

Lecturers: Gernot Liedtke, Eckhard Szimba
Credit points (CP): 4 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Network Economics [WI4VWL4] (S. 54)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced in the lecture.
(for literature to prepare the lecture - see additional literature)

Complementary literature
Aberle, G: Transportwirtschaft: einzelwirtschaftliche und gesamtwirtschaftliche Grundlagen München; Wien: Oldenbourg, 2003.

Blauwens, G., De Baere, P. and Van der Voorde, E.(2006): Transport Economics.

Frerich, J; Müller, G: Europäische Verkehrspolitik, Landverkehrspolitik
München; Wien: Oldenbourg, 2004.

Dasgupta, A, Pearce, D (1972): Cost-Benefit Analysis, MacMillan, London.

Bossel, H (1994): Modellbildung und Simulation, Vieweg, Braunschweig.

Bundesverkehrswegeplanung (BVWP) (2003), Die gesamtwirtschaftliche Bewertungsmethodik, online unter http://www.bmvbs.de/-,1495.8266/Bundesverkehrswegeplan-2003-Di.htm

BVU, ifo, ITP, and PLANCO (2001): Verkehrsprognose 2015 für die Bundesverkehrswegeplanung, online bei Bundesministerium für Verkehr-, Bau- und Wohnungswesen (http://www.bmvbs.de)
Europäische Kommission (2008): Guide to Cost Benefit Analysis of Investment Projects, online unter http://ec.europa.eu/regional_policy/so

Ben-Akiva, M., Meerseman, H., and Van de Voorde, E. (2008): Recent developments in transport modelling: Lessons for the freight sector.

Manheim, M. (1979): Fundamentals of Transportation Systems Analysis.

Ortúzar, J. d. D. and Willumsen, L. (1990): Modelling Transport.

Gudehus, T. (2004): “Logistik, Grundlagen, Strategien, Anwendungen”

Course: Telecommunication and Internet Economics Course key: [26232]

Lecturers: Kay Mitusch
Credit points (CP): 4 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Network Economics [WI4VWL4] (S. 54)

Learning Control / Examinations
Result of success is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC).
Examination is offered every semester and can be retried at any regular examination date.

Prerequisites
Basic knowledge of microeconomics and skills of undergraduate studies or a bachelor´s degree are required.
Particularly helpful but not necessary: Industrial Economics and Principal-Agent- or Contract theories. Prior attendance of the lecture „Competition in Networks“ [26240] is helpful in any case but not considered a formal precondition.

Conditions
None.

Learning Outcomes
The students should get an idea of the complex competition processes in the telecommunication and internet sector. Besides, they should get to know the analytic instruments with which these competitive processes can be (partially) analyzed. The basic patterns of the current debates on economic and regulation policies should become clear to them. The lecture is suited for all students who will deal in their professional life with these sectors. As the software industry shows similar problems, the lecture is also suited for students interested in this sector.

Content
Among the network sectors the telecommunication and internet sector is the most dynamic one and the one with and most variety of phenomena. Problems of natural monopoly still exist in some parts. But there is also competition, not only at the service level but also at the infrastructural level. Both levels are characterized by (vertical) quality differentiations and by high technology dynamics. What should the regulation of this sector look like? How should the mutual network access prices of two telecommunication providers be regulated? The internet is a free market par excellence, because everybody can open internet businesses without high entry costs. Why then can a company like ebay dominate the market for internet-auction platforms so strongly? The causes of market concentration on the internet will be analyzed. So will be the economic implications of the Next Generations Networks.

Basic literature
Literature and lecture notes will be announced in the lecture.

Course: Regulation Theory and Practice — Course key: [26234]

Lecturers: Kay Mitusch
Credit points (CP): 4 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Basics of Liberalised Energy Markets [WI4BWLIIP4] (S. 47), Network Economics [WI4VWL4] (S. 54)

Learning Control / Examinations
Result of success is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC).
Examination is offered every semester and can be retried at any regular examination date.

Prerequisites
Basic knowledge of microeconomics and skills of undergraduate studies or a bachelor´s degree are required.
Particularly helpful but not necessary: Industrial Economics and Principal-Agent- or Contract theories. Prior attendance of the lecture *Competition in Networks* [26240] is helpful in any case but not considered a formal precondition.

Conditions
May not be examined, when te examination of *Regulation* [26026] was already taken.

Learning Outcomes
The lecture provides insights into the regulation of network or infrastructure industries. Students should learn the basic aims and possibilities as well as the problems and limits of regulation. A central goal is to achieve an understanding of regulation as an incentive system under problems of severe asymmetric information. The lecture is suited for all students who want to work in companies of the network sectors – or who would like to become active on the side of regulators or in the respective political areas. Students should be able to apply general formal methods to the practice of regulation.

Content
In network industries – like transport, utilities or communication – the forces of competition often fail in certain critical areas, so that monopolies will arise. In these cases the usual competition laws often turn out to be insufficient. Then they are complemented by special regulation laws. Accordingly, the regulation authority (in Germany the federal network agency, Bundesnetzagentur) is in charge for network industries side by side with the Federal Cartel Office as another supervisory authority. The lecture begins with a short description of the general competition laws and competition policies. Then it turns to the aims, the possibilities and the practice of regulation which are presented and analyzed critically. This happens from both a theoretical (microeconomic modelling) perspective as well as from a practical perspective with the help of various examples.

Basic literature
Literature and lecture notes are handed out during the course.

Remarks
Dr. Kopp´s lecture *Regulation* [26206] (held for the last time in the WT 09/10) is substituted by the lecture *Regulation Theory and Practice* [26234] by Prof. Mitusch (held for the first time in the ST 10); only one of these lectures can be taken into account.

Course: Competition in Networks — Course key: [26240]

Lecturers: Kay Mitusch
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Network Economics [WI4VWL4] (S. 54)

Learning Control / Examinations
Result of success is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC).
Examination is offered every semester and can be retried at any regular examination date.

Prerequisites
Basics of microeconomics obtained within the undergraduate programme (B.Sc) of economics are required. Useful, but not necessary, are basic knowledge of industrial economics, prinicpal agent theory, and contract theory.

Conditions
None.

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.

Basic literature
Will be announced in the lecture.

Remarks
Beginning in WT 2009/2010, the lecture *Competition in Networks* [26240] will always be held during the winter term.

Course: International Economics — Course key: [26252]

Lecturers: Jan Kowalski
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Money and Payment [WI4VWL3] (S. 53)

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- Siebert H., Außenwirtschaft. Fischer-Verlag 1994
- Burda; Wyplosz. Makroökonomik. Vahlen 1994
- Krugman, P.,Obstfeld, M.;Internationale Wirtschaft, 8. Auflage, Peartson Studium 2009

Course: Economic integration in Europe

Course key: [26257]

Lecturers: Jan Kowalski
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Economic Policy [WI4VWL6] (S. 56)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Baldwin, R./ Wyplosz, M.: “The economics of European Integration“ Mcgraw-Hill 2006, 2nd Edition

Course: Seminar on Network Economics

Course key: [26263]

Lecturers: Kay Mitusch
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
See module description.

Conditions
None.

Learning Outcomes

Content

Course: Economics of Innovation — Course key: [26272]

Lecturers: Hariolf Grupp
Credit points (CP): 6 **Hours per week:** 2/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Innovation and Technical Change [WI4VWL1] (S. 51), Economic Policy [WI4VWL6] (S. 56)

Learning Control / Examinations

Prerequisites
It is recommended to attend the course *Innovation* [26274] of the Bachelor programme beforehand.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- Grupp: Messung und Erklärung des technischen Wandels.
- Fritsch/Wein/Ewers: Marktversagen und Wirtschaftspolitik.

Course: Economic Policy

Course key: [26280]

Lecturers: Axel Schaffer
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Economic Policy [WI4VWL6] (S. 56)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Managing New Technologies — Course key: [26291]

Lecturers: Thomas Reiß
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Innovation and Technical Change [WI4VWL1] (S. 51)

Learning Control / Examinations
Written exam 100% following §4, Abs. 2.

Prerequisites
None.

Conditions
None.

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

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

Media
Slides.

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

Course: Insurance Statistics — Course key: [26303]

Lecturers: Christian Hipp
Credit points (CP): 9 **Hours per week:** 4/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Statistics [WI4BWLFBV8] (S. 33)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- Janka, Tinsley: Introduction to Linear Models and Statistical Inference. Wiley 2005.
- McCullagh, Nelder: generalized Linear Models. Chapman & Hull 1989.
- Mack: Schadenversicherungsmathematik. Schriftenreihe angewandte Versicherungsmathematik Band 28. Verlag VW Karlsruhe.
- Fahrmeir, Tutz: Multivariate Statistical Modelling based on Generalized Linear Models. Springer 2001.
- Cox: Regression Models and Life-Tabels. J. Roy.Stat.Soc. B, 34, pp.187-220, 1972.

Course: Life and Pensions

Course key: [26310]

Lecturers: Christian Hipp, Vogt, Besserer
Credit points (CP): 4.5 **Hours per week:** 3
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Applications of Actuarial Sciences I (BWL) [WI4BWLFBV4] (S. 31), Applications of Actuarial Sciences II (BWL) [WI4BWLFBV5] (S. 32)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
E. Neuburger, Mathematik und Technik betrieblicher Pensionszusagen, Karlsruhe, 1997
H.U. Gerber. Lebensversicherungsmathematik. Berlin 1986
F. Isenbart, H. Münzer, Lebensversicherungsmathematik für Praxis und Studium. Wiesbaden
Ahrendt/Förster/Rößler: Steuerrecht der betrieblichen Altersversorgung Band I und II, Köln
Andresen/Förster/Rößler/Rühmann: Arbeitsrecht der betrieblichen Altersversorgung, Band I und II, Köln
R. Höfer, Reinhold, Gesetz zur Verbesserung der betrieblichen Altersversorgung. Kommentar, München
Schriftenreihe Angewandte Versicherungsmathematik - Heft 25 -

Course: Reinsurance — Course key: [26312]

Lecturers: Christian Hipp, Stöckbauer
Credit points (CP): 4.5 **Hours per week:** 4
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Applications of Actuarial Sciences I (BWL) [WI4BWLFBV4] (S. 31), Applications of Actuarial Sciences II (BWL) [WI4BWLFBV5] (S. 32)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Pfeiffer, C.: Einführung in die Rückversicherung, Wiesbaden, Gabler, 1986.
Mack: Schadenversicherungsmathematik. Schriftenreihe angewandte Versicherungsmathematik Band 28. Verlag VW Karlsruhe.
Embrechts, Klüppelberg, Mikosch: Modelling Extremal Events. Springer 1998.

Course: Insurance Optimisation — Course key: [26316]

Lecturers: Christian Hipp
Credit points (CP): 4.5 **Hours per week:** 3
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Applications of Actuarial Sciences I (BWL) [WI4BWLFBV4] (S. 31), Applications of Actuarial Sciences II (BWL) [WI4BWLFBV5] (S. 32)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- Korn, R. Optimal Portfolios. World Scientific 1997
- Taksar, M. Optimal Risk/Dividend Distribution Control Models: Applications to Insurance. Math.Meth.OR 2000
- Hipp, C. und Plum, M. Optimal investment for an investor with state dependent income, and for insurers. Finance and Stochastics 2003.
- Hipp, Vogt: Optimal Dynamic Reinsurance. ASTIN Bulletin, Vol 33 2003.

Course: Insurance Accounting — Course key: [26320]

Lecturers: Ute Werner, Ludwig
Credit points (CP): 4.5 **Hours per week:** 3/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Management I [WI4BWLFBV6] (S. 36)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

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

Course: Insurance Marketing — Course key: [26323]

Lecturers: Ute Werner
Credit points (CP): 4.5 **Hours per week:** 3/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Management I [WI4BWLFBV6] (S. 36)

Learning Control / Examinations
The assessment consists of an oral exam (according to Section 4 (2), 2 of the examination regulation) and oral presentations within the lecture (according to Section 4 (2), 3 of the examination regulation).
The overall grade consists of the valuation of the oral presentations (incl. elaboration) and the valuation of the oral exam.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- Farny, D.. Versicherungsbetriebslehre (Kapitel III.3 sowie V.4). Karlsruhe 2006
- Kurtenbach / Kühlmann / Käßer-Pawelka. Versicherungsmarketing. . . . Frankfurt 2001
- Wiedemann, K.-P./Klee, A. Ertragsorientiertes Zielkundenmanagement für Finanzdienstleister, Wiesbaden 2003

Remarks
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Insurance Production — Course key: [26324]

Lecturers: Ute Werner
Credit points (CP): 4.5 **Hours per week:** 3/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Management I [WI4BWLFBV6] (S. 36)

Learning Control / Examinations
The assessment consists of an oral presentations within the lecture (according to Section 4 (2), 3 of the examination regulation) and an oral exam at the end of the semester (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the valuation of the oral presentation and the valuation of the oral exam.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
P. Albrecht. Zur Risikotransformationstheorie der Versicherung: Grundlagen und ökonomische Konsequenzen. Mannheimer Manuskripte zur Versicherungsbetriebslehre und Risikotheorie Nr. 36
D. Farny. Versicherungsbetriebslehre. 2006.
H. Neugebauer. Kostentheorie und Kostenrechnung für Versicherungsunternehmen. 1995
A. Wiesehan. Geschäftsprozessoptimierung für Versicherungsunternehmen. München 2001

Remarks
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Enterprise Risk Management — Course key: [26326]

Lecturers: Ute Werner
Credit points (CP): 4.5 **Hours per week:** 3/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operational Risk Management I [WI4BWLFBV9] (S. 34)

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

Prerequisites
None.

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 optimization approaches that allow to consider area-specific objectives, risk-bearing capacity and risk acceptance.

Content
1. Concepts and practice of risk management, based on decision theory
2. Goals, strategies and measures 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.

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

Remarks
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Service Management — Course key: [26327]

Lecturers: Ute Werner
Credit points (CP): 4.5 **Hours per week:** 3/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Management I [WI4BWLFBV6] (S. 36)

Learning Control / Examinations
The assessment consists of an oral presentation (incl. elaboration) within the lecture (according to Section 4 (2), 3 of the examination regulation) and an oral exam at the end of the semester (according to Section 4 (2), 2 of the examination regulation). The overall grade consists of the valuation of the oral presentation (incl. elaboration) and the valuation of the oral exam.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Ch. Belz, T. Bieger. Dienstleistungskompetenz und innovative Geschäftsmodelle, St. Gallen 2002.
M. Bruhn. Qualitätsmanagement für Dienstleistungen. 2. Aufl. Berlin 1997.
H. Corsten. Betriebswirtschaftslehre der Dienstleistungsunternehmen: Einführung. 2. Aufl. 1990.
A. Lehmann. Dienstleistungsmanagement: Strategien und Ansatzpunkte zur Schaffung von Service... 1995.
H. Meffert, M. Bruhn. Dienstleistungsmarketing: Grundlagen - Konzepte – Methoden. 2. Aufl. Wiesbaden 1997

Remarks
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Multidisciplinary Risk Research — Course key: [26328]

Lecturers: Ute Werner
Credit points (CP): 4.5 **Hours per week:** 3/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operational Risk Management II [WI4BWLFBV10] (S. 35)

Learning Control / Examinations
The assessment consists of oral presentations within the lecture (according to Section 4 (2), 3 of the examination regulation) and an oral exam at the end o the semester (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the valuation of the oral presentation and the valuation of the oral exam.

Prerequisites
None.

Conditions
None.

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

Content
The course consists of two chapters:
In the theoretical part risk concepts of various disciplines will be discussed as well as categorisations of risk (e.g. technical or natural origin) and of risk carriers. Based on empirical research, processes of risk perception, risk assessment, and risk taking – at the individual, institutional, and global level - are described and explained.
The methodological part of the course deals with the hazard research, approaches for identification and mapping of risks and their accumulations, as well as with safety culture research. Using empirical studies, survey methods regarding risk perception and risk assessment will be discussed. Specific problems in the context of intercultural research will be considered too.

Basic literature
- U. Werner, C. Lechtenbörger. Risikoanalyse & Risikomanagement: Ein aktueller Sachstand der Risikoforschung. Arbeitspapier 2004
- Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen (WBGU). Welt im Wandel: Strategien zur Bewältigung globaler Umweltrisiken. Jahresgutachten 1998, http://www.wbgu_jg1998.html.
- R. Löfstedt, L. Frewer. Risk and Modern Society, London.
- http://www.bevoelkerungsschutz.ch
- M. Nippa. Risikoverhalten von Managern bei strategischen Unternehmensentscheidungen – eine erste Annäherung. 1999.

Remarks
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Insurance Risk Management — Course key: [26335]

Lecturers: Ute Werner, Maser
Credit points (CP): 2.5 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Management II [WI4BWLFBV7] (S. 37)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- “Mindestanforderungen an ein (Bank-)Risikomanagement”, www.bafin.de
- V. Bieta, W. Siebe. Strategisches Risikomanagement in Versicherungen. in: ZVersWiss 2002 S. 203-221.
- A. Schäfer. Subprime-Krise, in: VW2008, S. 167-169.
- B. Rudolph. Lehren aus den Ursachen und dem Verlauf der internationalen Finanzkrise, in: zfbf 2008, S. 713-741.

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

Course: Risk Controlling in Insurance Groups — Course key: [26336]

Lecturers: Ute Werner, Müller
Credit points (CP): 2 **Hours per week:** 1/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Management II [WI4BWLFBV7] (S. 37)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
H. Perlet. Controlling im internationalen Versicherungskonzern.

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

Course: Saving Societies — Course key: [26340]

Lecturers: Christian Hipp, N.N.
Credit points (CP): 4,5 **Hours per week:** 3/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Applications of Actuarial Sciences I (BWL) [WI4BWLFBV4] (S. 31), Applications of Actuarial Sciences II (BWL) [WI4BWLFBV5] (S. 32)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Degner, J./Röher, A.: Die Bausparkassen, 6. Auflage 1986, Fritz Knapp Verlag Frankfurt/M.
Laux, H.: Die Bausparfinanzierung. Die finanziellen Aspekte des Bausparvertrages als spar- und Kreditinstrument, 6. Auflage 1992, Verlag Recht und Wirtschaft GmbH, Heidelberg.
Laux, H.: Bausparwissen für Bankkaufleute, Baufinanzierungs- und Anlageberater, 6. Auflage 1993, Fritz Knapp Verlag, Frankfurt/M.
Laux, H.: Bauspartarife, 1988, Heft 20 der Schriftenreihe Angewandte Versicherungsmathematik, Verlag Versicherungswirtschaft e.V., Karlsruhe.
Schäfer, O./Cirpka, E./Zehnder, A.J.: Bausparkassengesetz und Bausparkassenverordnung, Kommentar, 5.Auflage 1999, Domus-Verlag GmbH, Bonn.

Course: Current Issues in the Insurance Industry — Course key: [26350]

Lecturers: Ute Werner, Heilmann
Credit points (CP): 2.5 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Management II [WI4BWLFBV7] (S. 37)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary 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 secretariat of the chair of insurance science.

Course: International Risk Transfer — Course key: [26353]

Lecturers: Wolfgang Schwehr
Credit points (CP): 2,5 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operational Risk Management I [WI4BWLFBV9] (S. 34)

Learning Control / Examinations

Prerequisites
None.

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.

Basic literature

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

Complementary literature

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

Course: Risk Management of Microfinance and Private Households Course key: [26354]

Lecturers: Ute Werner
Credit points (CP): 4.5 **Hours per week:** 3/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operational Risk Management II [WI4BWLFBV10] (S. 35)

Learning Control / Examinations
The assessment consists of oral presentations within the lecture (according to Section 4 (2), 3 of the examination regulation) and an oral exam at the end of the semester (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the valuation of the oral presentation and the valuation of the oral exam.

Prerequisites
None.

Conditions
None.

Learning Outcomes
Becoming acquainted with starting points for analysing the special risk situation of private households and micro enterprises; learning to synchonize various risk coping instruments, identifying risks of microfinance products and learning to design innovative microfinance products.

Content
The course consists of two interlocking parts:
In the first part the socio-economic framework as well as the goals and strategies of private-sector risk management are discussed, with an emphasis on insurance decisions. In the second part the issue of small enterpreneural entities and their specific risk related problems in covering their financial requirements is addressed. Typically their size and other specific characteristics lead to high risks for financial services institutions. After an introduction to the economic principles of microfinance, the institutions working in this sector are presented as well as innovative credit-, savings-, and insurance products (which are often combined), and we´ll discuss approaches for performance measurement from the perspectives of customers, suppliers, and investors.

Basic literature
- H.-U. Vollenweider. *Risikobewältigung in Familie und Haushalt - eine sicherheitsökonomische Studie.* 1986.
- P. Zweifel, R. Eisen. Versicherungsökonomie. 2003
- J. Ledgerwood, I. Johnson, J.M. Severino. *Microfinance Handbook: An Institutional and Financial Perspective.* 2001.
- B.M. de Aghion, J. Morduch. *The* Economics of Microfinance.2005.

Complementary literature
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Public Sector Risk Management — Course key: [26355]

Lecturers: Reinhard Mechler
Credit points (CP): 2,5 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operational Risk Management I [WI4BWLFBV9] (S. 34), Operational Risk Management II [WI4BWLFBV10] (S. 35)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
In additin to theoretical and methodological principles of risk research, operative risk management by various institutions and the corresponding characteristics of risk transfer are discussed in this course. As public households often act as “risk carriers of last resort”, i.e. carry risks that other institutions don´t prepare for, their risk management becomes increasingly important on an economic, social und political level.

Content
1. Risk concepts, risk management and the role of the public sector
2. Quantitative and qualitative methods of risk management
3. Problem areas of public sector risk management

- Natural catastrophes
- Climate change
- Aging and social insurance
- Large-scale projects
- Terrorism

Basic literature
P. Bernstein. Against the Gods. Wiley, New York.
M. Fone / P. Young. Public Sector Risk Management, Butterworth Heinemann, Oxford
B. Flyvbjerg / N. Bruzelius / W. Rothengatter. Megaprojects and Risk: An Anatomy of Ambition. Cambridge University Press, Cambridge 2003.
A. Schick / H. Polackova Brixi. Government at Risk. World Bank and Oxford University Press, Washington DC 2004

Remarks
Block course. Please register at the secretariat of the chair of insurance science.

Course: Insurance Contract Law — Course key: [26360]

Lecturers: Ute Werner, Schwebler
Credit points (CP): 4.5 **Hours per week:** 3/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Management I [WI4BWLFBV6] (S. 36), Insurance Management II [WI4BWLFBV7] (S. 37)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Römer/ Langheid. Versicherungsvertragsgesetz. 2. Auflage, München 2002. Schimikowski, Versicherungsvertragsrecht, 3. Auflage, München 2004. Weyers/ Wandt, Versicherungsvertragsrecht, 3. Auflage, Köln 2003.

Remarks
Block course. To attend the course please register at the secretariat of the chair of insurance science.
The course is offered extraordinarily in winter term 2009/10.

Course: Project Work in Risk Research — Course key: [26393]

Lecturers: Ute Werner
Credit points (CP): 4.5 **Hours per week:** 3
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operational Risk Management II [WI4BWLFBV10] (S. 35)

Learning Control / Examinations
The assessment consists of an oral presentation (incl. elaboration) and of the participation in working groups (according to Section 4 (2), 3 of the examination regulation).

Prerequisites
Willingness to work through literature beforehand in order to understand the topic better.

Conditions
None.

Learning Outcomes

Content

Remarks
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Risk Communication — Course key: [26395]

Lecturers: Ute Werner
Credit points (CP): 4.5 **Hours per week:** 3/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operational Risk Management I [WI4BWLFBV9] (S. 34)

Learning Control / Examinations
The assessment consists of an oral presentation (incl. elaboration) within the lecture (according to Section 4 (2), 3 of the examination regulation) and an oral exam at the end of the semester (according to Section 4 (2), 2 of the examination regulation). The overall grade consists of the valuation of the oral presentation (incl. elaboration) and the valuation of the oral exam.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
R. Löfstedt, L. Frewer (Hrsg.). The Earthscan Reader in Risk & Modern Society. London 1998.
B.-M. Drottz-Sjöberg. Current Trends in Risk Communication - Theory and Practice. Hrsg. v. Directorate for Civil Defence and Emergency Planning. Norway 2003.
Munich Re. Risikokommunikation. Was passiert, wenn was passiert? www.munichre.com
O.-P. Obermeier. Die Kunst der Risikokommunikation - Über Risiko, Kommunikation und Themenmanagement. München 1999.
Fallstudien unter www.krisennavigator.de

Remarks
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Topics of Sustainable Management of Housing and Real Estate Course key: [26420]

Lecturers: Thomas Lützkendorf
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

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.

Prerequisites
None.

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, rethorical 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: Principles of Information Engineering and Management Course key: [26450]

Lecturers: Christof Weinhardt, Jan Kraemer, Clemens van Dinther
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Information Engineering [WI4BWLISM7] (S. 44)

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

Prerequisites
None.

Conditions
None.

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

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

Media
- PowerPoint slides
- eLearning Platform Ilias

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

Course: Management of Business Networks — Course key: [26452]

Lecturers: Christof Weinhardt, Jan Kraemer
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Service Management [WI4BWLISM6] (S. 43)

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.

Prerequisites
None.

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).

Basic literature

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

Course: eFinance: Information Engineering and Management for Securities TradingCourse key: [26454]

Lecturers: Christof Weinhardt, Ryan Riordan
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Market Engineering [WI4BWLISM3] (S. 40)

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

Prerequisites
None.

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 make 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

Basic literature

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

Complementary literature

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

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

Lecturers: Christof Weinhardt, Carsten Holtmann
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Business & Service Engineering [WI4BWLISM4] (S. 41)

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

Prerequisites
None.

Conditions
None

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

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

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

Basic literature
Will be announced within the course.

Course: Computational Economics — Course key: [26458]

Lecturers: Jürgen Branke, Clemens van Dinther
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Market Engineering [WI4BWLISM3] (S. 40)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

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

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

Media
Lecture slides and exercises as pdf-files.

Basic literature

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

Complementary literature

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

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

Lecturers: Christof Weinhardt, Jan Kraemer
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Electronic Markets [WI4BWLISM2] (S. 39), Market Engineering [WI4BWLISM3] (S. 40), Communications & Markets [WI4BWLISM5] (S. 42), Information Engineering [WI4BWLISM7] (S. 44), Applied Strategic Decisions [WI4VWL2] (S. 52)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
The students

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

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

Media

- Powerpoint,
- eLearning Platform Ilias

Basic literature

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

Course: Communications Economics — Course key: [26462]

Lecturers: Stefan Seifert, Jan Kraemer
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Communications & Markets [WI4BWLISM5] (S. 42), Information Engineering [WI4BWLISM7] (S. 44)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
The lecture builds upon basic knowledge in game theory and particularly Industrial Organization. Students will be taught basic economic principles of the communications industry, in particular the economics of networks and digital goods. Moreover, provided with the toolsets of game-theory and industrial economics, students are taught how to formalize and then assess complex aspects of current regulatory and economic issues. Furthermore, students will be introduced to scientific work by reading and discussing supplementary research articles.

Content
The communications industry has become one of the key drivers for economic development and, following the liberalization of the sector in the late twentieth century, it has undergone a tremendous transformation. The lecture “Communications Economics” will not only provide students with a basic economic understanding of the communications sector by laying out the economic principles of network industries and digital goods, but also seeks to investigate business strategies, such as handset subsidies, flat rate tariffs or bundle pricing and regulatory challenges, such as Digital Convergence, call termination fees, separation of network infrastructure and services and efficient distribution of spectrum licenses.

Media
- Powerpoint,
- eLearning Platform Ilias

Basic literature
1. J.-J. Laffont, J. Tirole (2000): *Competition in Telecommunications*, MIT Press.
2. R. R. Braeutigam (1989): “Optimal Policies for Natural Monopolies” in: R. Schmalensee and R. Willig (eds.): *Handbook of Industrial Organization*, Vol. 2, Ch. 23, pp. 1289–1346, North-Holland
3. Steger, U., Büdenbender, U., Feess, E., Nelles, D. (2008): *Die Regulierung elektrischer Netze: Offene Fragen und Lösungsansätze*, Springer
4. Varian, Hal (2006): “Intermediate microeconomics: a modern approach”, 7th edition (international student edition), Norton

Course: eServices — Course key: [26466]

Lecturers: Christof Weinhardt, Gerhard Satzger
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 3
Teaching language: Englisch
Part of the modules: Service Management [WI4BWLISM6] (S. 43)

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 (accoring to Section 4(2), 3 of the examination regulation).

Prerequisites
None.

Conditions
None.

Learning Outcomes
This lecture presents concepts, methods and application examples for the engineering and management of eServices. The students will get to know the basic principles and elements of eServices and their specific properties compared to physical goods. Creating eServices needs an overall view of information technology with regards to flexibility, safety, data security, measurability and cost allocation.
In addition, problems and solutions in designing and providing eServices are discussed; the elementary relationship to information management will also be treated. Application examples from industry stress the concepts´ application in the economy.

Content
So far, management studies usually focused on physical goods. However, due to the increasing development of information and communication technology, distribution of electronic services is becoming more important. Electronic services are characterized by an increasing degree of intangibility, interactivity and individuality. Traditional, goods-oriented models, methods and tools for are often found to be inadequate for service engineering and management.
Building on a systematic categorization of (e)Services, we cover concepts and foundations for engineering and managing IT-based services, allowing further specialization in subsequent courses. Topics include service innovation, service economics, service computing, transformation and coordination of service value networks as well as collaboration for knowledge intensive services.
In addition, application examples, guest lectures (e.g. business model changes driven by the advent of eServices) and a number of hands-on exercises will illustrate the applicability of the concepts.

Media
PowerPoint slides;

Course: Service Innovation — Course key: [26468]

Lecturers: Gerhard Satzger, Andreas Neus
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Business & Service Engineering [WI4BWLISM4] (S. 41), Service Management [WI4BWLISM6] (S. 43)

Learning Control / Examinations
The assessment consists of an 1h written exam following §4(2), 3 SPO and of assignments during the course as an "Erfolgskontrolle anderer Art" following §4(2), 3 SPO.

Prerequisites
None.

Conditions
None.

Learning Outcomes
Understand the difference between innovation and invention, and that disruptive effects can be fast and wide-reaching.
Know examples for innovation via processes, organization, business models; see how service and product innovation differ
Understand the link between risk and innovation; be aware of obstacles to innovation and know how to address them

Content
While innovation in manufacturing or agriculture can leverage a considerable body of research, experience and best practice, innovation in services has not reached the same level of maturity. In practice, while many organizations have a well-understood process for innovating in the product business, innovating in services is often still a fuzzy and complex undertaking. In this lecture we will discuss the state of research, compare product and service innovation, understand how innovation diffusion works, examine case studies of service innovation, open vs. closed innovation, how to leverage user communities to drive innovation and understand obstacles, and enablersand how to manage, incentivize and foster service innovation.

Basic literature

- Barras, Richard (1986) Towards a theory of innovation in services. Research Policy 15, 161-173
- Hauschildt, Jürgen und Salomo, Sören (2007) Innovationsmanagement. 4. Auflage, München: Vahlen.
- von Hippel, Erich (2007) Horizontal innovation networks - by and for users. Industrial and Corporate Change, 16:2
- Sundbo, Jon (1997) Management of Innovation in Services. The Service Industries Journal, Vo. 17, No. 3, pp. 432-455

Complementary literature

- Benkler, Yochai (2006) The Wealth of Networks: How Social Production Transforms Markets and Freedom. Yale University Press. (Online: http://www.benkler.org)
- Christensen, Clayton M. (2003) The Innovator's Dilemma, Harper Collins.
- Kanerva, M.; Hollanders, H. & Arundel, A. (2006) TrendChart Report: Can we Measure and Compare Innovation in Services?
- von Hippel, Erich (2005) Democratizing Innovation. The MIT Press, Cambridge, MA. (Online: http://web.mit.edu/evhippel/www/books/DI/De
- Howells, Jeremy & Tether, Bruce (2004) Innovation in Services: Issues at Stake and Trends. Commission of the European Communities, Brussels/Luxembourg. (Online: http://www.isi.fhg.de/publ/downloads/isi04b25/inno-3.pdf)
- Miles, I. (2008) Patterns of innovation in service industries. IBM Systems Journal, Vol. 47, No 1
- Morison, Eltling E. (1966) Gunfire at Sea: A Case Study of Innovation. In: Men, Machines and Modern Times. The MIT Press, pp. 17-44.

Course: Seminar Service Science, Management & Engineering Course key: [26470]

Lecturers: Stefan Tai, Christof Weinhardt, Gerhard Satzger, Rudi Studer
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
See corresponding module information.

Conditions
Lecture *eServices* [26462] 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.

Course: Special Topics in Information Engineering & Management Course key: [26478]

Lecturers: Christof Weinhardt
Credit points (CP): 4.5 **Hours per week:** 3
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Business & Service Engineering [WI4BWLISM4] (S. 41), Communications & Markets [WI4BWLISM5] (S. 42), Information Engineering [WI4BWLISM7] (S. 44)

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The student should be able to do a literature review based on a predefined topic in the context of information engneering 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 furhter 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 a 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 encompases a documentation of the implemented work.

Media
- Power Point
- eLearning Plattform Ilias
- Software tools for development , if needed

Basic literature
The basic literature will be made available to the student according to the respecitive 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: http://www.im.uni-karlsruhe.de/lehre.
This lecture is first offered in the winter term 2009/10.

Course: Business and IT Service Management — Course key: [26484]

Lecturers: Gerhard Satzger
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Service Management [WI4BWLISM6] (S. 43)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
Students understand the importance of “servitization” for organizations, the challenges for the management of service-oriented enterprises and the interdependence of business and IT services.
Students learn standard concepts and methods of service-oriented management and are able to apply them in practical case studies.
Student get familiar with current research and tools and are able to critically evaluate them.
Students practice to communicate in English and to work on solutions in teams.

Content
The rapid development of information and communication technology transforms many enterprises towards service-oriented structures: with new digital services, new business models and SOA-based process structures within larger service networks. Thus, strategic and operative management of service-oriented enterprises increasingly gains importance. In this course, we want to systematically acquire relevant know-how and apply this to real word examples. Particular focus will be on the interdependence of business, IT and legal aspects.
The course will be taught in English. It should provide ample opportunity for active participation of students. The course will integrate presentations of experts from business practice as well as a comprehensive case study (”en bloc” for 1 day) in which students will actively work on the strategic service-oriented shift of an enterprise.

Media
Presentation (pdf)

Basic literature
Fitzsimmons J./Fitzsimmons, M., Service Management, Operations, Strategy and Information Technology, 6. ed., 2007
Maister, David H., Managing The Professional Service Firm, 1997
Teboul, J. , Service is Front Stage: Positioning services for value advantage, 2006
Grönroos, Service Management and Marketing, 2007

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

Lecturers: Andreas Geyer-Schulz
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Electronic Markets [WI4BWLISM2] (S. 39)

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:

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
The student

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

Content
What are the conditions that make electronic markets develop? The first part of the lecture treats the selection of the type of organization as an optimization of transaction costs. The second part includes the efficiency of electronic markets (price, information and allocation efficiency) as well as reasons for market failure.
Besides a centralistic approach, markets can be used for decentral coordination of plans and activities. Hereby, optimality can be garuanteed, if the coordination problem has no design or innovation characteristics. Viewed from a bottom-up perspective, given the coordination problem, it is possible to answer questions regarding the centralization or decentralization, the design of coordination mechanisms, and the coherence of business strategies. The last part of the lecture consists of motivation problems, like bounded rationality and information assymetries (private information and moral hazard) and the development of incentive systems.

Basic literature
Kapitel “Management Control Systems, Dezentralisierung, interne Märkte und Transferpreise” (S. 745-773) in Charles T. Horngren, Srikant M. Datar, and George Foster. Cost Accounting: A Managerial Emphasis. Prentice Hall, Upper Saddle River, 11 edition, 2003.
Paul Milgrom and John Roberts. Economics, Organisation and Management. Prentice Hall, 1 edition, 1992.

Complementary literature
Michael Dell and Catherine Fredman. Direct from DELL: Strategies that Revollutionized an Industry. Harper Collins Publisher, London, 1999.
Andreas Geyer-Schulz, Michael Hahsler, and Maximillian Jahn. Educational and scientific recommender systems: Designing the information channels of the virtual university. International Journal of Engineering Education, 17(2):153 – 163, 2001.

Friedrich A. Hayek. The use of knowledge in society. The American Economic Review, 35(4):519 – 530, Sep 1945.
Norbert Hochheimer. Das kleine QM-Lexikon. Wiley-UCH, Weinheim, 2002.
Adam Smith. An Inquiry into the Nature and Causes of the Wealth of Nations, volume II. 1976.

Course: Electronic Markets: Institutions and Market Mechanisms Course key: [26504]

Lecturers: Andreas Geyer-Schulz
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Electronic Markets [WI4BWLISM2] (S. 39)

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:

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
The student

- specifies different organizational forms of electronic markets, classifies these markets according to their characteristics, and determines the optimal orginizational form for a given task
- defines markets in a structured way and knows the roles of the different players
- is aware of the possibilities and usage of nonlinear pricing and is able to set adequate tariffs

Content
The lecture treats the design of electronic markets. Therefore, interdependencies of market organization, market mechanisms, institutions and products are described and theoretical foundations are lectured.
The topics include:

- classification of markets
- auction methods and auction theory
- automated negotiations
- nonlinear pricing
- continuous double auctions
- market-maker, regulation, control
- ...

Within this course, we analyze in small groups different existing markts, the design of new markets, and the implementation of simple forms of auctions. An emphasis is set on the independent and careful study of relevant scientific articles and thereby the buildup of a collection on this topic.

Basic literature
Thomas Copeland and Fred Weston. Financial Theory and Corporate Policy. Addison-Wesley, Reading, 3 edition, 1988.
Philip Kotler. Marketing Management – analysis, planning, and control, Fourth Edition. Prentice Hall, 1980.
Paul Milgrom and John Roberts. Economics, Organisation and Management. Prentice Hall, 1 edition, 1992.
Michael E. Porter. Competitive Strategy : Techniques for Analyzing Industries and Competitors. Free Press, New York, 1998.

Complementary literature

Deutsche Börse AG. Xetra – market model stock trading rel. 7.0. Technical Report 11, Deutsche Börse AG, Deutsche Börse AG Neue Börsenstr. 1 60284 Frankfurt am Main, 09 2002.
Wiener Börse AG. DAS XETRA MARKTMODELL. Technical report, Wiener Börse AG, 2002.
Yakov Amihud and Haim Mendelson. Trading mechanisms and stock returns: An empirical investigation. The Journal of Finance, 42(3):533–553, 1987.
Martin Bichler. An experimental analysis of multi-attribute auctions. Decision Support Systems, 29, 2000.
Martin Bichler. Simulation multivariater Auktionen – Eine Analyse des OTC-handels mit Finanzderivaten. Wirtschaftsinformatik, 42(3):244–252, 2000.
Martin Bichler. The Future of e-Markets: Multidimensional Market Mechanisms. Cambridge University Press, Cambridge, 2001.
Carrie Beam and Arie Segev. Automated negotiations: A survey of the state of the art. Technical Report 97, Fisher Center for Information Technology and Marketplace Transformation, Haas School Business, University of California, Berkeley, 1997.
Steven J. Brams and Alan D. Taylor. Fair Division : From Cake-Cutting to Dispute Resolution. Cambridge University Press, Cambridge, 1996.
Steven J. Brams and Alan D. Taylor. The Win-Win Solution: Guaranteeing Fair Shares to Everybody. W.W. Norton, New York, 1999.
Edward R. Capen, Robert Clapp, and William Campbell. Competitive bidding in high- risk situations. Journal of Petroleum Technology, 23:641–653, 1971.
Thomas E. Copeland and Dan Galai. Information effects on the bid-ask spread. The Journal of Finance, 38(5):1457–1469, 1983.
Adrian Dragulescu. Applications of Physics to Economics and Finance: Money, Income, Wealth, and the Stock Market. PhD thesis, University of Maryland, College Park, 2002.
Sven De Vries and Rakesh Vohra. Combinatorial auctions: A survey. INFORMS Journal on Computing, 15(3):284–309, 2003.
Eugene F. Fama. Efficient capital markets: A review of theory and empirical work. The Journal of Finance, 25(2):383–417, May 1970.
Eugene F. Fama. Efficient capital markets: Reply. The Journal of Finance, 31(1):143–145, Mar 1976.
Eugene F. Fama. Efficient capital markets: Ii. The Journal of Finance, 46(5):1575–1617, Dec 1991.
Yuzo Fujishima, Kevin Leyton-Brown, and Yoav Shoham. Taming the computational complexity of combinatorial auctions: Optimal and approximate approaches. In Thomas Dean, editor, Proceedings of the Sixteenth International Joint Conference on Artificial Intelligence, pages 548–553, San Francisco, CA, USA, 1999. Morgan Kaufmann Publishers Inc.
Robert Forsythe, Thomas R. Palfrey, and Charles R. Plott. Asset valuation in an experimental market. Econometrica, 50(3):537–568, May 1982.
Sanford J. Grossman and Merton H. Miller. Liquidity and market structure. The Journal of Finance, 43(3):617–633, Jul 1988.
Nils H. Hakansson, Avraham Beja, and Jivendra Kale. On the Feasibility of Automated Market Making by a Programmed Specialist. The Journal of Finance, 40(1):1–20, Mar 1985.
Charles Holt. Industrial organization: A survey of laboratory research. In The Handbook of Experimental Economics, chapter 5, pages 349–443. Princeton University Press, 1998.
Thomas Ho and Hans R. Stoll. Optimal dealer pricing under transactions and return uncertainty. Journal of Financial Economics, 9:47–73, 1981.
Paul Klemperer. Auction theory: A guide to the literature. Journal of Economics Surveys, 13(3):227–286, Jul 1999.
John Kagel and Alvin Roth. The Handbook of Experimental Economics. Princeton University Press, Princeton, 1998.
Frank Kelly and Richard Steinberg. A combinatorial auction with multiple winners for universal service. Management science, 46(4):586–596, 2000.
Roger B. Myerson. Incentive Compatibility and the Bargaining Problem. Econometrica, 47(1):61–74, Jan 1979.
Roger B. Myerson. Optimal auction design. Mathematics of Operations Research, 6(1):58–73, Feb 1981.
Noam Nisan. Bidding and allocation in combinatorial auctions. In Proceedings of the 2nd ACM conference on Electronic commerce, pages 1–12. ACM, 2000.
Maureen O´Hara and George S. Oldfield. The microeconomics of market making. The Journal of Financial and Quantitative Analysis, 21(4):361–376, Dec 1986.
Axel Ockenfels and Alvin E. Roth. Late and Multiple Bidding in Second Price Internet Auctions: Theory and Evidence Concerning Different Rules for Ending an Auction. Technical report, Faculty of Economics and Management, University of Magdeburg, P.O. Box 4120, D-39016 Magdeburg and Harvard University, Department of Economics and Graduate School of Business Administration, Soldiers Field Road, Baker Library 183, Boston, MA 02163, USA, 2001.
Alvin E. Roth and Axel Ockenfels. Last-minute Bidding and the Rules for Ending Second-price Auctions: Evidence from eBay and Amazon Auctions on the Internet. American Economic Review, 2003.
Michael H. Rothkopf, Aleksandar Pekec, and Ronald M. Harstad. Computationally Manageable Combinational Auctions. Management Science, 44(8):1131 – 1147, 1998.
Thomas Sandholm. An algorithm for optimal winner determination in combinatorial auctions. In Thomas Dean, editor, Proceedings of the Sixteenth International Joint Conference on Artificial Intelligence, pages 542–547, San Francisco, CA, USA, 1999. Morgan Kaufmann Publishers Inc.
Julia Schindler. Auctions with interdependent valuations : theoretical and empirical analysis, in particular of internet auctions. PhD thesis, WU-Wien, Augasse 2–6, A-1090 Wien, 2003.
Martin Shubik. Market Structure and Behavior. Harvard University Press, Cambridge, 1980.

Christoph Schlueter and Michael J. Shaw. A strategic framework for developing electronic commerce. IEEE Internet Computing, 1(6):20–28, 11/ 1997.
Robert Wilson. Nonlinear Pricing. Oxford University Press, Oxford, 1997.
Robert B. Wilson. Short course on nonlinear pricing. Technical report, Stanford Business School, Stanford, CA 94305–5015, 10 1999.
Andrew B. Whinston, Dale O. Stahl, and Soon-Yong Choi. The Economics of Electronic Commerce. MacMillan Publishing Company, Indianapolis, 1997.
Fredrik Ygge. Improving the computational efficiency of combinatorial auction algorithms. Technical report, Enersearch AB, Gothenburg, Schweden, 1999.

Course: Personalization and Recommender Systems Course key: [26506]

Lecturers: Andreas Geyer-Schulz
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Advanced CRM [WI4BWLISM1] (S. 38), Business & Service Engineering [WI4BWLISM4] (S. 41)

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:

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

Prerequisites
None.

Conditions
Keine

Learning Outcomes
The student

- knows the options and opportunities of personalization especially in the area of Internet based services
- is proficient in different statistical, data-mining, and game theory methods of computing implicit and explicit recommendations
- evaluates recommender systems and compares these with related services

Content
At first, an overview of general aspects and concepts of personalization and its relevance for service providers and customers is given. Next, different categories of recommender systems are discussed. This includes explicit recommendations like customer reviews as well as implicit services based on behavioral data. Furthermore, the course gives a detailed view of the current research on recommender systems at the Chair of Information Services and Electronic Markets.

Media
Folien, Aufzeichnung der Vorlesung im Internet.

Basic literature
Rakesh Agrawal, Tomasz Imielinski, and Arun Swami. Mining association rules between sets of items in large databases. In Sushil Jajodia Peter Buneman, editor, Proceedings of the ACM SIGMOD International Conference on Management of Data, volume 22, Washington, D.C., USA, Jun 1993. ACM, ACM Press.
Rakesh Agrawal and Ramakrishnan Srikant. Fast algorithms for mining association rules. In Proceedings of the 20th Very Large Databases Conference, Santiago, Chile, pages 487 – 499, Sep 1994.
Asim Ansari, Skander Essegaier, and Rajeev Kohli. Internet recommendation systems. Journal of Marketing Research, 37:363 – 375, Aug 2000.
Christopher Avery, Paul Resnick, and Richard Zweckhauser. The market for evaluations. American Economic Review, 89(3):564 – 584, 1999.
Ibrahim Cingil, Asuman Dogac, and Ayca Azgin. A Broader Approach to Personalization. Communications of the ACM, 43(8):136 – 141, Aug 2000.
Richard O. Duda, Peter E. Hart, and David G. Stork. Pattern Classification. Wiley-Interscience, New York, 2 edition, 2001.

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Paul Resnick, Neophytos Iacovou, Peter Bergstrom, and John Riedl. Grouplens: An open architecture for collaborative filtering of netnews. In Proceedings of the conference on Computer supported cooperative work, pages 175 – 186. ACM Press, 1994.

Complementary literature

Antoinette Alexander. The return of hardware: A necessary evil? Accounting Technology, 15(8):46 – 49, Sep 1999.
Christopher Avery and Richard Zeckhauser. Recommender systems for evaluating computer messages. Communications of the ACM, 40(3):88 – 89, Mar 1997.
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Thomas J. Blischok. Every transaction tells a story. Chain Store Age Executive with Shopping Center Age, 71(3):50–56, Mar 1995.
Hans Hermann Bock. Automatische Klassifikation. Vandenhoeck und Ruprecht, Göttingen, 1974.
Andrew S.C. Ehrenberg. Repeat-Buying: Facts, Theory and Applications. Charles Griffin & Company Ltd, London, 2 edition, 1988.
Wolfgang Gaul, Andreas Geyer-Schulz, Michael Hahsler, and Lars Schmidt-Thieme. eMarketing mittels Recommendersystemen. Marketing ZFP, 24:47 – 55, 2002.
Andreas Geyer-Schulz, Michael Hahsler, and Maximilian Jahn. myvu: a next generation recommender system based on observed consumer behavior and interactive evolutionary algorithms. In W. Gaul, O. Opitz, and M. Schader, editors, Data Analysis – Scientific Modeling and Practical Applications, volume 18 of Studies in Classification, Data Analysis and Knowledge Organization, pages 447 – 457, Heidelberg, Germany, 2000. Springer.
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Mark-Edward Grey. Recommendersysteme auf Basis linearer Regression, 2004.
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Andreas Mild and Martin Natter. Collaborative filtering or regression models for Internet recommendation systems? Journal of Targeting, Measurement and Analysis for Marketing, 10(4):304 – 313, Jan 2002.
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Paul Resnick and Hal R. Varian. Recommender Systems. Communications of the ACM, 40(3):56 – 58, Mar 1997.
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J. Ben Schafer, Joseph Konstan, and Jon Riedl. Recommender Systems in E-commerce. In Proceedings of the 1st ACM conference on Electronic commerce, pages 158 – 166, Denver, Colorado, USA, Nov 1999. ACM.
Upendra Shardanand and Patti Maes. Social information filtering: Algorithms for automating “word of mouth”. In Proceedings of ACM SIGCHI, volume 1 of Papers: Using the Information of Others, pages 210 – 217. ACM, 1995.

Course: Customer Relationship Management — Course key: [26508]

Lecturers: Andreas Geyer-Schulz
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Advanced CRM [WI4BWLISM1] (S. 38)

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:

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

Prerequisites
None.

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

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

Complementary literature
Jill Dyché. The CRM Handbook: A Business Guide to Customer Relationship Management. Addison-Wesley, Boston, 2nd edition, 2002.
Ronald S. Swift. Accelerating Customer Relationships: Using CRM and RelationshipTechnologies. Prentice Hall, Upper Saddle River, 2001.
Stanley A. Brown. Customer Relationship Management: A Strategic Imperative in theWorld of E-Business. John Wiley, Toronto, 2000.

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

Lecturers: Andreas Geyer-Schulz
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations
The assessment of this course is according to §4(2), 3 of the examination regulation in form of an examination of the written seminar thesis and a presentation.
The grade is given, if the presentation is held and the seminar thesis is handed in.
The grade of this course is based on the grade of the seminar thesis. The presentation can improve or worsen the grade of the seminar thesis by up to two grade levels (up to 0,7 grades).

Prerequisites
None.

Conditions
None.

Learning Outcomes
The student is able to

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

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

Course: Social Network Analysis in CRM — Course key: [26518]

Lecturers: Bettina Hoser
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Advanced CRM [WI4BWLISM1] (S. 38)

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:

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

Prerequisites
None

Conditions
keine

Learning Outcomes
The objectives of this course are to give students an introduction to and overview of social network analysis as a methodological approach for analysis in different areas of business administration, especially customer relationship management. Theory as well as application of social network analysis will be discussed. Students will learn how to perform and interpret analysis results.

Content
The trend to view economic and social structures as networks allows to anlysze these networks by well established and new methods from mathematics, business administration, sociology and phyiscs. The goal of these analyses are to understand different aspects of these networks: In organizations (internal Marketing): Here networks analysis kann help to detect whether hierarchies and official structures are 'alive' or if so called 'hidden organizations' have evolved. In addition such results can reveal ineffient procedures or structures within an organization. In CRM: Within analytical CRM the concept of customer value can be enriched by enclosing the network value that customer offers to the company (Customer Network Value). In Marketing: To successfully implement a virale marketing strategy the knowledge of the structure of customer networks is essential. The dynamics on these networks are relevant if one wants to use these networks for marketing purposes. Internetstructure: For information services, such as e.g. search engines, ithe identification of relevant nodes and clusters is a the major service profided and thus relevant for business success.
The analysis should identify the relevant (central) nodes in a network, find cliques, describe their connections and, if relevant, describe alos the direction of information flow within the network. To achieve this different methods will be discussed during the course.

Media
Folien

Basic literature
Christian Grönroos. Service Management and Marketing : A Customer Relationship Management Approach. Wiley, Chicester, 2 edition, 2000.
Sabrina Helm. Viral marketing: Establishing customer relationships by word-of-mouse. Electronic Markets, 10(3):158–161, Jul 2000.
Dieter Jungnickel. Graphs, Networks and Algorithms. Number 5 in Algorithms and Computation in Mathematics. Springer Verlag, Berlin, 1999.
Leo Katz. A new status index derived from sociometric analysis. Psychometrika, 18(1):39–43, Mar 1953.

Jon M. Kleinberg. Authoritative sources in a hyperlinked environment. JACM, 46(5):604–632, sep 1999.
Barry Wellman Laura Garton. Social impacts of electronic mail in organizations: A review of research literature. Communication Yearbook, 18:434–453, 1995.
Carl D. Meyer. Matrix Analysis and Applied Linear Algebra. Society for Industrial and Applied Mathematics, Philadelphia, 2000.
Andrew Richards, William ; Seary. Eigen analysis of networks. Journal of Social Structure, 1(2), Feb 2000.
Pacey C. Foster Stepehen P. Borgatti. The network paradigm in organizational research: A review and typology. Journal of Management, 29(6):991–1013, 2003.
Mani R. Subramani and Balaji Rajagopalan. Knowledge-sharing and influence in online social networks via viral marketing. Communications of the ACM, 46(12):300–307, Dec 2003.
Stanley Wasserman and Katherine Faust. Social Network Analysis: Methods and Applications, volume 8 of Structural Analysis in the Social Sciences. Cambridge University Press, Cambridge, 1 edition, 1999.
Barry Wellman. Computer networks as social networks. Science, 293:2031–2034, Sep 2001.

Course: Derivatives — Course key: [26550]

Lecturers: Marliese Uhrig-Homburg
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: F1 (Finance) [WI4BWLFBV1] (S. 20), F2 (Finance) [WI4BWLFBV2] (S. 21), F2&F3 (Finance) [WI4BWLFBV3] (S. 22)

Learning Control / Examinations

Prerequisites
None.

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

Basic literature

- Hull (2005): Options, Futures, & Other Derivatives, Prentice Hall, 6th Edition

Complementary literature
Cox/Rubinstein (1985): Option Markets, Prentice Hall

Course: Asset Pricing — Course key: [26555]

Lecturers: Marliese Uhrig-Homburg, Martin E. Ruckes
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: F1 (Finance) [WI4BWLFBV1] (S. 20), F2 (Finance) [WI4BWLFBV2] (S. 21), F2&F3 (Finance) [WI4BWLFBV3] (S. 22)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
The objective of this course is to become familiar with investment decisions on stock and bond markets. The students will learn to assess risk and return of security portfolios and their influence on security prices.

Content
The lecture deals with investment decisions under uncertainty, where the main emphasis is on investment decisions on stock markets. At first, fundamental concepts of decision making under uncertainty are introduced. Then, 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.

Complementary literature
Bodie/Kane/Marcus (2008): Investments, 7. Auflage

Course: Fixed Income Securities — Course key: [26560]

Lecturers: Marliese Uhrig-Homburg
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: F2 (Finance) [WI4BWLFBV2] (S. 21), F2&F3 (Finance) [WI4BWLFBV3] (S. 22)

Learning Control / Examinations
The assessment consists of a written exam following §4, Abs. 2, 1.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The objective of this course is to become familiar with national and international bond markets. Therefore, we first have a look at financial instruments that are of particular importance. Thereafter, specific models and methods that allow the evaluation of interest rate derivatives are introduced and applied.

Content
The lecture deals with both German and international bond markets, which are an important source of funding for both the corporate and the public sector. After an overview of the most important bond markets, various definitions of return are discussed. Based on that, the concept of the yield curve is presented. The modelling of the dynamics of the term structure of interest rates provides the theoretical foundation for the valuation of interest rate derivatives, which is discussed in the last part of the lecture.

Basic literature

- Bühler, W., Uhrig-Homburg, M., Rendite und Renditestruktur am Rentenmarkt, in Obst/Hintner, Geld-, Bank- und Börsenwesen - Handbuch des Finanzsystems, (2000), S.298-337.
- Sundaresan, S., Fixed Income Markets and Their Derivatives, South-Western College Publising, (1997).

Complementary literature

- Hull, J., Options, Futures, & Other Derivatives, Prentice Hall, Sixth Edition, (2005).

Course: Credit Risk

Course key: [26565]

Lecturers: Marliese Uhrig-Homburg
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: F2 (Finance) [WI4BWLFBV2] (S. 21), F2&F3 (Finance) [WI4BWLFBV3] (S. 22)

Learning Control / Examinations
The assessment consists of a written exam following §4, Abs. 2, 1.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The objective of this course is to become familiar with the credit markets and the credit risk indicators like ratings, default probabilities and credit spreads. The students learn about the components of credit risk (e.g. default time and default rate) and quantify these in different theoretical models to price credit derivatives.

Content
The lecture deals with the diverse issues arising in the context of measuring and controlling credit risk. At first, the theoretical and empirical relations between ratings, probabilities of default, and credit spreads are analysed. After that, the focus is on the valuation of credit risk. Finally, the management of credit risk, e.g. using credit derivatives and credit portfolio analysis, is examined, and the legal framework and its implications are discussed

Basic literature

- Lando, D., Credit risk modeling: Theory and Applications, Princeton Univ. Press, (2004).
- Uhrig-Homburg, M., Fremdkapitalkosten, Bonitätsrisiken und optimale Kapitalstruktur, Beiträge zur betriebswirtschaftlichen Forschung 92, Gabler Verlag, (2001).

Complementary literature

- Bluhm, C., Overbeck, L., Wagner, C. , Introduction to Credit Risk Modelling, Chapman & Hall, CRC Financial Mathematics Series, (2002).
- Duffie, D., Singleton, K.J., Credit Risk: Pricing, Measurement and Management, Princeton Series of Finance, Prentice Hall, (2003).

Course: International Finance — Course key: [26570]

Lecturers: Marliese Uhrig-Homburg, Walter
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: F2 (Finance) [WI4BWLFBV2] (S. 21), F2&F3 (Finance) [WI4BWLFBV3] (S. 22)

Learning Control / Examinations

Prerequisites
None.

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.

Complementary literature

- D. Eiteman et al. (2004): Multinational Business Finance, 10. Auflage

Course: Elective “Culture - Policy - Science - Technology” Course key: [HoC1]

Lecturers: House of Competence
Credit points (CP): 3 **Hours per week:** meist 2
Term: Winter-/Sommersemester **Level:** ???
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced in the respective course.

Course: Elective “Workshops for Competence and Creativity” Course key: [HoC2]

Lecturers: House of Competence
Credit points (CP): 3 **Hours per week:** meist 2
Term: Winter-/Sommersemester **Level:** ???
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Elective Foreig Languages

Course key: [HoC3]

Lecturers: House of Competence
Credit points (CP): 2-4 **Hours per week:** 2-4
Term: Winter-/Sommersemester **Level:** ???
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
Depending on the choice of the language and the level prior knowledge is assumed.

Conditions
Basic level english language courses can only be attended if english language skills were not acquired in school before.

Learning Outcomes

Content

Course: Elective “Tutor Programmes” Course key: [HoC4]

Lecturers: House of Competence
Credit points (CP): 3 **Hours per week:** k.A.
Term: Winter-/Sommersemester **Level:** ???
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
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.

Conditions
None.

Learning Outcomes

Content

Course: Elective “Personal Fitness & Emotional Competence” Course key: [HoC5]

Lecturers: House of Competence
Credit points (CP): 2-3 **Hours per week:** k.A.
Term: Winter-/Sommersemester **Level:** ???
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
None.

Conditions
Keine.

Learning Outcomes

Content

Basic literature
Will be announced in the respective course.

Course: Special Topics of Complexity Management — Course key: [KompMansp]

Lecturers: Detlef Seese
Credit points (CP): 5 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations
see German part

Prerequisites
see German part

Conditions
None.

Learning Outcomes
see German part

Content
see German part

Complementary literature
Will be announced in the lecture.

Remarks
see German part

Course: Computing Lab Information Systems — Course key: [PraBI]

Lecturers: Andreas Oberweis, Detlef Seese, Wolffried Stucky, Rudi Studer
Credit points (CP): 4 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations
The assessment of this course are practical work, presentations and a written thesis according to §4(2), 3 of the examination regulation. Practical work, presentations and a written thesis are weighted according to the course.

Prerequisites
None.

Conditions
None.

Learning Outcomes
Students are able to

- implement a prototype at the computer based on the given topic.
- write the thesis with a minimal learning curve by using format requirements such as those recommended by well-known publishers.
- give presentations in a scientific context in front of an auditorium. These techniques are presented and learn during the course.
- present results of the research in written form generally found in scientific publications.

Content
The lab intensifies and extends specific topis which are discussed within corresponding lectures. Knowledge of these lecture topics is an advantage but not a precondition.

Media
Slides, Access to internet resources

Basic literature
Literature will be given individually.

Remarks
The title of this course is a generic one. Specific titles and the topics of offered seminars will be announced before the start of a semester in the internet at http://www.aifb.uni-karlsruhe.de/Lehre

Course: Special Topics of Enterprise Information Systems — Course key: [SBI]

Lecturers: Andreas Oberweis, Wolffried Stucky
Credit points (CP): 5 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** ???
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

Learning Control / Examinations
The assessment of this course is a written or (if necessary) oral examination according to §4(2) of the examination regulation.

Prerequisites
None.

Conditions
None.

Learning Outcomes
Students are able to handle methods and instruments in a subarea of “Enterprise Information Systems” 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 enterprise information systems. These topics include in particular the design and the management of database systems, the computer-support of business processes and strategic planning of information systems and their organization.

Basic literature
Will be announced at the beginning of the course.

Course: Special Topics of Software- and Systemsengineering Course key: [SSEsp]

Lecturers: Andreas Oberweis, Detlef Seese
Credit points (CP): 5 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Informatics [WI4INFO1] (S. 60), Emphasis in Informatics [WI4INFO2] (S. 62), Electives in Informatic [WI4INFO3] (S. 64)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
Students are able to handle methods and instruments in a subarea of ”Software and Systems Engineering” 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 software and systems engineering.

Media
Slides, access to internet resources

Complementary literature
Will be announced at the beginning of the course.

Course: Seminar in Enterprise Information Systems Course key: [SemAIFB1]

Lecturers: Rudi Studer, Andreas Oberweis, Wolffried Stucky, Thomas Wolf, Ralf Kneuper
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

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.

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes
Students are able to

- do literature search based on a given topic: identify relevant literature, find, assess and evaluate this literature.
- write the seminar thesis (and later the Bachelor-/Masterthesis) with a minimal learning curve by using format requirements such as those recommended by well-known publishers.
- give presentations in a scientific context in front of an auditorium. These techniques are presented and learned during the seminar.
- present results of the research in written form generally found in scientific publications.

Content
The seminar intensifies and extends specific topis 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

Basic literature
Literature will be given individually in the specific seminar.

Course: Seminar Efficient Algorithms

Course key: [SemAIFB2]

Lecturers: Hartmut Schmeck
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced at the beginning of the semester.

Course: Seminar Complexity Management — Course key: [SemAIFB3]

Lecturers: Detlef Seese
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations
see German part

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes
see German part

Content
see German part

Basic literature
Will be announced in the lecture.

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 in the internet at http://www.aifb.uni-karlsruhe.de/Lehre.

Course: Seminar Knowledge Management — Course key: [SemAIFB4]

Lecturers: Rudi Studer
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

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.

Prerequisites
See module description.

Conditions
None.

Learning Outcomes
The students will learn to perform literature searches on current topics in computer science 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 Scoial Computing.

Media
Slides.

Basic literature

- I. Nonaka, H. Takeuchi: The Knowledge Creating Company. Oxford University Press 1995
- G. Probst et al.: Wissen managen - Wie Unternehmen ihre wertvollste Ressource optimal nutzen. Gabler Verlag, Frankfurt am Main/ Wiesbaden, 1999
- Pascal Hitzler, Markus Krötzsch, Sebastian Rudolf, York Sure: Semantic Web - Grundlagen, Springer, 2008 (ISBN 978-3-540-33993-9)
- S. Staab, R. Studer: Handbook on Ontologies, ISBN 3-540-40834-7, Springer Verlag, 2004
- Modern Information Retrieval, Ricardo Baeza-Yates & Berthier Ribeiro-Neto. New York, NY: ACM Press; 1999; 513 pp. (ISBN: 0-201-39829-X.)

Complementary literature
None.

Remarks
The number of students is limited. Students have to observe the designated registration process.

Course: Seminar in Insurance Management — Course key: [SemFBV1]

Lecturers: Ute Werner
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced at the beginning of the lecture period.

Remarks
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Seminar in Operational Risk Management — Course key: [SemFBV2]

Lecturers: Ute Werner
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced at theend of the recess period.

Remarks
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Seminar in Risk Theory and Actuarial Science — Course key: [SemFBV3]

Lecturers: Christian Hipp
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
See corresponding module information.

Conditions
Knowledge of statistics and actuary science is an advantage.
The seminar is a good addition to the Bachelor module *Calculation and Control* [WW3BWLFBV2] and to the Master modules *Applications of Actuarial Sciences I/II* [WW4BWLFBV4/5] and *Insurance Statistics* [WI4BWLFBV8]. However these modules are not a prerequisite for the participation in the seminar.

Learning Outcomes

Content

Basic literature
Will be announced at the end of the recess period.

Course: Seminar in Ergonomics

Course key: [SemIIP]

Lecturers: Peter Knauth, Dorothee Karl
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced at the end of the recess period.

Course: Seminar in Industrial Production

Course key: [SemIIP2]

Lecturers: Frank Schultmann, Magnus Fröhling, Michael Hiete
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Seminar in Engineering Science

Course key: [SemING]

Lecturers: Fachvertreter ingenieurwissenschaftlicher Fakultäten
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced in the respective seminar.

Complementary literature
Will be announced in the seminar.

Course: Seminar Information Engineering and Management Course key: [SemIW]

Lecturers: Christof Weinhardt
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

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

Prerequisites
See corresponding module information.

Conditions
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

Basic 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 in System Dynamics and Innovation — Course key: [SemIWW]

Lecturers: Hariolf Grupp, N.N.
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
See corresponding module information.

Conditions
The courses *Innovation* [26274] and *Applying Industrial Organization* [26287] should preferably be attended beforehand.

Learning Outcomes

Content

Basic literature
Will be announced at the end of the recess period.

Course: Seminar in International Economy

Course key: [SemIWW2]

Lecturers: Jan Kowalski
Credit points (CP): 3 **Hours per week:** 2/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Seminar in Mathematics

Course key: [SemMath]

Lecturers: Fachvertreter der Fakultät für Mathematik
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced in the respective seminar.

Complementary literature
Will be announced in the seminar.

Course: Seminar Stochastic Models — Course key: [SemWIOR1]

Lecturers: Karl-Heinz Waldmann
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

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.

Prerequisites
None.

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; cf.
http://www4.wiwi.uni-karlsruhe.de/LEHRE/SEMINARE/

Media
Power Point and related presentation techniques.

Basic literature
Will be presented with the actual topic.

Course: Seminar Economic Theory

Course key: [SemWIOR2]

Lecturers: Clemens Puppe
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations

Prerequisites
See corresponding module information.
At least one of the courses *Game Theory I* [25525] and *Welfare Economics* [25517] should have been attended beforehand.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced at the end of the recess period.

Course: Seminar in Experimental Economics — Course key: [SemWIOR3]

Lecturers: Siegfried Berninghaus
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations
Term paper and presentation

Prerequisites
See corresponding module information.
A course in the field of Game Theory should be attended beforehand.

Conditions
None.

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 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.

Basic literature
Will be announced at the end of the recess period.

Course: Seminar in Game and Decision Theory — Course key: [SemWIOR4]

Lecturers: Siegfried Berninghaus
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Seminar Module [WW4SEM] (S. 129)

Learning Control / Examinations
Term paper and presentation

Prerequisites
Completion of all 1st an 2nd year modules of the Bachelor Program.
See corresponding module information.

Conditions
None.

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.

Basic literature
Will be announced at the end of the recess period.

Course: Projectseminar

Course key: [SozSem]

Lecturers: Bernart, Kunz, Pfaff, Haupt, Grenz, Eisewicht
Credit points (CP): 4 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Sociology [WI4SOZ1] (S. 128)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Laws concerning Traffic and Roads — Course key: [VLBGU]

Lecturers: Kuder
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Safety, Computing and Law in Highway Engineering [WI4INGBGU3] (S. 95)

Learning Control / Examinations
See module description.

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes

Content

Course: Location Theory

Course key: [n.n.]

Lecturers: Stefan Nickel
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [WI4OR6] (S. 69)

Learning Control / Examinations
The assessment is a 120 minutes written examination (according to §4(2), 1 of the examination regulation).
The examination is held in the term of the lecture and the following lecture.

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

Conditions
None.

Learning Outcomes

Content

Remarks
The lecture is planned to be held in the winter term 2010/2011.
The planned lectures and courses for the next three years are announced online.

Course: Software Laboratory: Simulation — Course key: [n.n.]

Lecturers: Stefan Nickel
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operations Research in Supply Chain Management and Health Care Management [WI4OR5] (S. 67)

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 lecture and the following term.

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

Conditions
None.

Learning Outcomes
The course covers basic concepts of discrete event simulation models and qualifies students for the computer-based usage of simulation systems. Additionally, students deepen their knowledges for logical issues in modeling and discover the importance of statistical methods in simulation.

Content
Discrete event simulation is one of the fundamental modelling techniques and can be used in the analysis of systems where it is not possible to derive analytical results for the system due to complexity issues.
After an introduction to the basics of event-discrete simulation, the basic modeling approach for simulation systems is presented. The implementation of this paradigm is made with the simulation software ProModel. Therewith, students get an insight to system logics of the algorithms. In the practical part of the course, case-studies from industries and health care are discussed. Again, the implementation of identified OR problems is done with ProModel.

Remarks
The course is planned to be held in the summer term 2011.
The planned lectures and courses for the next three years are announced online.

Course: Software Laboratory: SAP APO — Course key: [n.n.]

Lecturers: Stefan Nickel
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operations Research in Supply Chain Management and Health Care Management [WI4OR5] (S. 67)

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 lecture and the following term.

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

Conditions
None.

Learning Outcomes
Students acquire the ability to safely and efficiently use the software systems SAP and SAP APO.
As these software systems are used in many companies, the students get acquainted with an important and frequently used software tool from practice. Besides basic functional elements of the software, the course provides advanced knowledge for specific planning modules. Furthermore, students are enabled to model realistic logistical systems within the software framework.

Content
SAP Advanced Planning & Optimization (SAP APO) is a software solution for dynamic Supply Chain Management consisting of modules for detailed planning and optimization of all processes along a supply chain. These modules allow a concise and global control and planning of the supply chain on the intercompany level. As a part of mySAP Supply Chain Management (mySAP SCM), SAP APO is a logistics solution with integrated surplus. It covers all processes from the planning on a detailed level to the design of the actual network structure.
After an introductory overview of the organization of SAP and the concepts of SAP solutions, the system SAP Supply Chain Management (SCM) will be presented. In detail, the features of the module SAP SCM Advanced Planning and Optimization (APO) will be addressed.
Afterwards, students obtain a small example to get in touch with the standard user environment of the system. A case study taken from practice serves as the basis for a SAP APO-based implementation of a complete Supply Chain, beginning from suppliers, to production plants, warehouses, distribution centers, to the customers. In Demand Planning (DP) anonymous primary demand will be forecasted. In Supply-Network-Planning (SNP) feasible plans for the satisfaction of demands along the entire supply chain will be generated, while in Production Planning & Detailed Scheduling (PP/DS) clock-time-precise orders under consideration of constraints (capacities, setup costs,. . .) will be generated. The choice of appropriate means of transportation allows the planning of transportation and distribution tasks.

Remarks
The course is planned to be held in the summer term 2012.
The planned lectures and courses for the next three years are announced online.

Course: Graph Theory

Course key: [n.n.]

Lecturers: Stefan Nickel
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [WI4OR6] (S. 69)

Learning Control / Examinations
The assessment is a 120 minutes written examination (according to §4(2), 1 of the examination regulation).
The examination is held in the term of the lecture and the following lecture.

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

Conditions
None.

Learning Outcomes

Content

Remarks
The lecture is planned to be held in the winter term 2011/2012.
The planned lectures and courses for the next three years are announced online.

Course: Software Laboratory: OR Models II — Course key: [n.n.]

Lecturers: Stefan Nickel
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operations Research in Supply Chain Management and Health Care Management [WI4OR5] (S. 67), Mathematical Programming [WI4OR6] (S. 69)

Learning Control / Examinations

Prerequisites
Successful completion of the course *Software Laboratory: OR-Models I* [25490].
Basic knowledge as conveyed in the module *Introduction to Operations Research* [WI1OR] is assumed.

Conditions
None.

Learning Outcomes
The course is based on the first part of the software laboratory. The students advance to detailed modelling knowledge and use the software for the implementation of more complex solution methods. An important aspect lies on the practical application possibilities of OR software in combinatorial and nonlinear optimization problems.

Content
The task of solving combinatorial optimization problems imposes much higher requirements on suggested solution approaches as in linear programming.
During the course of this software laboratory, students get to know important methods from combinatorial optimization, e.g. Branch & Cut- or Column Generation methods and are enabled to solve problems with the software system Xpress-MP IVE with its modeling language Mosel. In addition, issues of nonlinear optimization, e.g. quadratic optimization, are addressed. As an important part of the software laboratory, students get the possibility to model combinatorial and nonlinear problems and implement solution approaches in the software system.

Remarks
The course is offered in every summer term.
The planned lectures and courses for the next three years are announced online.

Course: Operations Research in Supply Chain Management Course key: [n.n.]

Lecturers: Stefan Nickel
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operations Research in Supply Chain Management and Health Care Management [WI4OR5] (S. 67)

Learning Control / Examinations
The assessment is a 120 minutes written examination (according to §4(2), 1 of the examination regulation).
The examination is held in the term of the lecture and the following lecture.

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

Conditions
None.

Learning Outcomes

Content

Remarks
The lecture is planned to be held in the summer term 2011.
The planned lectures and courses for the next three years are announced online.

Course: Practical Course: Health Care Management (with Case Studies) Course key: [n.n.]

Lecturers: Stefan Nickel
Credit points (CP): 7 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operations Research in Supply Chain Management and Health Care Management [WI4OR5] (S. 67)

Learning Control / Examinations
The assessment consists in a case study and the writing of a corresponding paper (according to §4(2), 1 of the examination regulation).
The examination is held in the term of the practical course and the following term.

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

Conditions
None.

Learning Outcomes

Content

Remarks
The lecture is offered irregularly.
The curriculum of the next three years is available online.

Course: OR-nahe Modellierung und Analyse realer Probleme (Projekt) Course key: [n.n.]

Lecturers: Karl-Heinz Waldmann
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Special Topics in Optimization [WI4OR7] (S. 70)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Operations Research in Health Care Management — Course key: [n.n.]

Lecturers: Stefan Nickel
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operations Research in Supply Chain Management and Health Care Management [WI4OR5] (S. 67)

Learning Control / Examinations
The assessment is a 120 minutes written examination (according to §4(2), 1 of the examination regulation).
The examination is held in the term of the lecture and the following lecture.

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

Conditions
None.

Learning Outcomes

Content

Remarks
The lecture is planned to be held in the summer term 2010.
The planned lectures and courses for the next three years are announced online.

Course: Special Sociology

Course key: [spezSoz]

Lecturers: Gerd Nollmann, Pfadenhauer, Pfaff, Haupt, Grenz, Eisewicht, Kunz
Credit points (CP): 4 **Hours per week:** 2/0
Term: Winter-/Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Sociology [WI4SOZ1] (S. 128)

Learning Control / Examinations
The assessment conists of a gradedterm paper (according to Section 4 (2), 3 of the examination regulation.

Prerequisites
None.

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

Content

Media
Will be announced in the lecture.

Basic literature
Will be announced in the lecture.

Complementary literature
Will be announced in the lecture.

Course: Theoretical Sociology

Course key: [thSoz]

Lecturers: Gerd Nollmann, Pfadenhauer, Pfaff, Haupt, Grenz, Eisewicht
Credit points (CP): 2 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Sociology [WI4SOZ1] (S. 128)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

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Prüfungs- und Studienordnung der Universität Karlsruhe (TH) für den Masterstudiengang Wirtschaftsingenieurwesen

Aufgrund von § 34 Absatz 1 Satz 1 des Landeshochschulgesetzes (LHG) vom 1. Januar 2005 hat der Senat der Universität Karlsruhe (TH) am 26.02.2007 die folgende Studien- und Prüfungsordnung für den Masterstudiengang Wirtschaftsingenieurwesen beschlossen.

Der Rektor hat seine Zustimmung am 06.03.2007 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 Masterprüfungsordnung regelt Studienablauf, Prüfungen und den Abschluss des Studiums im Masterstudiengang Wirtschaftsingenieurwesen an der Universität Karlsruhe (TH).

(2) Im Masterstudium sollen die im Bachelorstudium erworbenen wissenschaftlichen Qualifikationen weiter vertieft oder ergänzt werden. Der Studierende soll in der Lage sein, die wissenschaftlichen Erkenntnisse und Methoden selbstständig anzuwenden und ihre Bedeutung und Reichweite für die Lösung komplexer wissenschaftlicher und gesellschaftlicher Problemstellungen zu bewerten.

§ 2 Akademischer Grad

Aufgrund der bestandenen Masterprüfung wird der akademische Grad „Master of Science" (abgekürzt: „M.Sc.") für den Masterstudiengang Wirtschaftsingenieurwesen verliehen.

§ 3 Regelstudienzeit, Studienaufbau, Leistungspunkte

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

(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 § 16 definiert.

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

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

(5) Die 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

(1) Die Masterprüfung besteht aus einer Masterarbeit, Fachprüfungen und einem Seminarmodul. Jede der Fachprüfungen besteht aus einer oder mehreren Modulprüfungen. Eine Modulprüfung kann in mehrere Modulteilprüfungen untergliedert sein. Eine Modul(teil)prüfung besteht aus mindestens einer Erfolgskontrolle nach Absatz 2 Nr. 1 und 2. Ausgenommen hiervon sind Seminarmodule.

(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.

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(3) In den Fachprüfungen (nach § 16 Absatz 2 Nr. 1 bis 6) 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 Masterarbeit 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 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.

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.

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

(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 abzu-

nehmen 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.

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

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

(10) Für Erfolgskontrollen anderer Art sind angemessene Bearbeitungsfristen einzuräumen und Abgabetermine festzulegen. Dabei ist durch die Art der Aufgabenstellung und durch entsprechende Dokumentation sicherzustellen, dass die erbrachte Studienleistung dem Studierenden zurechenbar ist.

(11) Schriftliche Arbeiten im Rahmen einer Erfolgskontrolle anderer Art haben dabei die folgende Erklärung zu tragen: „Ich versichere wahrheitsgemäß, die Arbeit selbstständig angefertigt, alle benutzten Hilfsmittel vollständig und genau angegeben und alles kenntlich gemacht zu haben, was aus Arbeiten anderer unverändert oder mit Abänderungen entnommen wurde.” Trägt die Arbeit diese Erklärung nicht, wird diese Arbeit nicht angenommen.

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

§ 7 Bewertung von Prüfungen und Erfolgskontrollen

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

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

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

Für die Masterarbeit 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.

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(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 angerechnet werden.

(6) Erfolgskontrollen anderer Art dürfen in Modulteilprüfungen oder Modulprüfungen nur eingerechnet 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.

(8) Eine Modulprüfung ist dann bestanden, wenn die Modulnote mindestens „ausreichend" (4.0) ist. Die Modulprüfung und die Bildung der Modulnote werden im Studienplan oder Modulhandbuch geregelt. Die differenzierten Noten der betreffenden Erfolgskontrollen sind bei der Berechnung der Modulnoten als Ausgangsdaten zu verwenden. Enthält der Studienplan oder das Modulhandbuch keine Regelung darüber, wann eine Modulprüfung bestanden ist, so ist diese Modulprüfung dann bestanden, wenn alle dem Modul zugeordneten Modulteilprüfungen bestanden wurden.

(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 Masterarbeit, 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 § 12 nachträglich geltend gemacht werden.

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

bis 1,5	=	sehr gut
1.6 bis 2.5	=	gut
2.6 bis 3.5	=	befriedigend
3.6 bis 4.0	=	ausreichend

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

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

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

§ 8 Erlöschen des Prüfungsanspruchs, Wiederholung von Prüfungen und Erfolgskontrollen

(1) 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.

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

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

(4) Die Wiederholung einer Erfolgskontrolle anderer Art (§ 4 Absatz 2 Nr. 3) wird im Modulhandbuch geregelt.

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

Bei nicht bestandener Erfolgskontrolle sind dem Kandidaten Umfang und Frist der Wiederholung in geeigneter Weise bekannt zu machen.

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

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

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

(9) Ist gemäß § 34 Absatz 2 Satz 3 LHG die Masterprüfung bis zum Beginn der Vorlesungszeit des achten 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.

(10) Der Prüfungsanspruch erlischt endgültig, wenn mindestens einer der folgenden Gründe vorliegt:

1. Der Prüfungsausschuss lehnt einen Antrag auf Fristverlängerung nach Absatz 9 ab.
2. Die Masterarbeit ist endgültig nicht bestanden.
3. Eine Erfolgskontrolle nach § 4 Absatz 2 Nr. 1 und 2 ist in einem Fach endgültig nicht bestanden.
4. Der Prüfungsausschuss hat dem Studierenden nach § 9 Absatz 5 den Prüfungsanspruch entzogen.

Eine Erfolgskontrolle ist dann endgültig nicht bestanden, wenn keine Wiederholungsmöglichkeit im Sinne von Absatz 2 mehr besteht oder gemäß Absatz 5 genehmigt wird. Dies gilt auch sinngemäß für die Masterarbeit.

§ 9 Versäumnis, Rücktritt, Täuschung, Ordnungsverstoß

(1) Der Studierende kann bei Erfolgskontrollen gemäß § 4 Absatz 2 Nr. 1 ohne Angabe von Gründen noch vor Ausgabe der Prüfungsaufgaben zurücktreten. Bei mündlichen Erfolgskontrollen muss der Rücktritt spätestens drei Werktage vor dem betreffenden Prüfungstermin erklärt werden. Die verbindlichen Regelungen zur ordentlichen Abmeldung werden gemäß § 6 Absatz 2 bekannt gegeben. Eine durch Widerruf abgemeldete Prüfung gilt als nicht angemeldet.

(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 Masterarbeit nicht innerhalb der vorgesehenen Bearbeitungszeit erbracht wird, es sei denn, der Studierende hat die Fristüberschreitung nicht zu vertreten.

(3) Der für den Rücktritt nach Beginn der Prüfung oder das Versäumnis geltend gemachte Grund muss dem Prüfungsausschuss unverzüglich schriftlich angezeigt und glaubhaft gemacht werden. Bei Krankheit des Studierenden oder eines von ihm allein zu versorgenden Kindes oder pflegebedürftigen Angehörigen kann in Zweifelsfällen die Vorlage des Attestes eines vom Prüfungsausschuss benannten Arztes oder ein amtsärztliches Attest verlangt werden.

Die Anerkennung des Rücktritts ist ausgeschlossen, wenn bis zum Eintritt des Hinderungsgrundes bereits Prüfungsleistungen erbracht worden sind und nach deren Ergebnis die Prüfung nicht bestanden werden kann.

Wird der Grund anerkannt, wird ein neuer Termin anberaumt. Die bereits vorliegenden Prüfungsergebnisse sind in diesem Fall anzurechnen.

Bei Modulprüfungen, die aus mehreren Prüfungen bestehen, werden die Prüfungsleistungen dieses Moduls, die bis zu einem anerkannten Rücktritt bzw. einem anerkannten Versäumnis einer Prüfungsleistung dieses Moduls erbracht worden sind, angerechnet.

(4) Versucht der Studierende das Ergebnis einer Erfolgskontrolle durch Täuschung oder Benutzung 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 ausgeschlossen 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 Entscheidungen gemäß Absatz 4 und Absatz 5 vom Prüfungsausschuss überprüft werden. Belastende Entscheidungen des Prüfungsausschusses sind unverzüglich schriftlich mitzuteilen. Sie sind zu begründen und mit einer Rechtsbehelfsbelehrung zu versehen. Vor einer Entscheidung ist Gelegenheit zur Äußerung zu geben.

(7) Näheres regelt die Allgemeine Satzung der Universität Karlsruhe (TH) über die 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 vorliegen, die bei einem Arbeitnehmer den Anspruch auf Elternzeit auslösen würden, und teilt dem Studierenden das Ergebnis sowie die neu festgesetzten Prüfungszeiten unverzüglich mit. Die Bearbeitungszeit der Masterarbeit kann nicht durch Elternzeit unterbrochen werden. Die gestellte Arbeit gilt als nicht vergeben. Nach Ablauf der Elternzeit erhält der Studierende ein neues Thema.

§ 11 Masterarbeit

(1) Voraussetzung für die Zulassung zur Masterarbeit ist, dass der Studierende sich in der Regel im 2. Studienjahr befindet und nicht mehr als vier der Fachprüfungen laut § 16 Absatz 2 Nr. 1 bis 6 noch nachzuweisen sind.

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.

Auf Antrag des Studierenden sorgt der Vorsitzende des Prüfungsausschusses dafür, dass der Studierende innerhalb von vier Wochen nach Antragstellung von einem Betreuer ein Thema für die Masterarbeit erhält. Die Ausgabe des Themas erfolgt in diesem Fall über den Vorsitzenden des Prüfungsausschusses.

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

(3) Der Masterarbeit werden 30 Leistungspunkte zugeordnet. Die empfohlene Bearbeitungsdauer beträgt sechs Monate. Die maximale Bearbeitungsdauer beträgt einschließlich einer Verlängerung neun Monate. Die Masterarbeit soll zeigen, dass der Studierende in der Lage ist, ein Problem aus seinem Fach selbstständig und in begrenzter Zeit nach wissenschaftlichen Methoden zu bearbeiten. Sie kann auch in englischer Sprache abgefasst werden.

(4) Die Masterarbeit kann von jedem Prüfer nach § 14 Absatz 2 vergeben und betreut werden. Soll die Masterarbeit außerhalb der Fakultät angefertigt werden, so bedarf dies der Genehmigung des Prüfungsausschusses gemäß Absatz 1. Dem Studierenden ist Gelegenheit zu geben,

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für das Thema Vorschläge zu machen. Die Masterarbeit kann auch in Form einer Gruppenarbeit zugelassen werden, wenn der als Prüfungsleistung zu bewertende Beitrag des einzelnen Studierenden aufgrund objektiver Kriterien, die eine eindeutige Abgrenzung ermöglichen, deutlich unterscheidbar ist und die Anforderung nach Absatz 3 erfüllt.

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

(6) Der Zeitpunkt der Ausgabe des Themas der Masterarbeit und der Zeitpunkt der Abgabe der Masterarbeit sind beim Prüfungsausschuss aktenkundig zu machen. Das Thema kann nur einmal und nur innerhalb des ersten Monats der Bearbeitungszeit zurückgegeben werden. Ein neues Thema ist binnen vier Wochen zu stellen und auszugeben. Auf begründeten Antrag des Studierenden kann der Prüfungsausschuss die in Absatz 3 festgelegte Bearbeitungszeit um höchstens drei Monate verlängern. Wird die Masterarbeit nicht fristgerecht abgeliefert, gilt sie als mit „nicht ausreichend" bewertet, es sei denn, dass der Studierende dieses Versäumnis nicht zu vertreten hat. § 8 gilt entsprechend.

(7) Die Masterarbeit wird von einem Betreuer sowie in der Regel von einem weiteren Prüfer bewertet. Einer der beiden muss Juniorprofessor oder Professor sein. Bei nicht übereinstimmender Beurteilung der beiden Prüfer setzt der Prüfungsausschuss im Rahmen der Bewertung der beiden Prüfer die Note der Masterarbeit fest. Der Bewertungszeitraum soll acht Wochen nicht überschreiten.

§ 12 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 Masterzeugnis aufgenommen und entsprechend gekennzeichnet.

Zusatzmodule müssen nicht im Studienplan oder Modulhandbuch definiert sein. Im Zweifelsfall entscheidet der Prüfungsausschuss.

Zusatzmodule werden bei der Festsetzung der Gesamtnote nicht mit einbezogen. Alle Zusatzleistungen werden im Transcript of Records automatisch aufgenommen und als Zusatzleistungen gekennzeichnet. Zusatzleistungen werden mit den nach § 7 vorgesehenen Noten gelistet. Diese Zusatzleistungen gehen nicht in die Festsetzung der Gesamt-, Fach- und Modulnoten ein.

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

§ 13 Prüfungsausschuss

(1) Für den Masterstudiengang Wirtschaftsingenieurwesen wird ein Prüfungsausschuss gebildet. Er besteht aus fünf stimmberechtigten Mitgliedern: vier Professoren, Juniorprofessoren, Hochschul- oder Privatdozenten, einem Vertreter der Gruppe der wissenschaftlichen Mitarbeiter nach § 10 Absatz 1 Satz 2 Nr. 2 LHG und einem Vertreter der Studierenden mit beratender Stimme. Die Amtszeit der nichtstudentischen Mitglieder beträgt zwei Jahre, die des studentischen Mitglieds ein Jahr.

(2) Der Vorsitzende, sein Stellvertreter, die weiteren Mitglieder des Prüfungsausschusses sowie deren Stellvertreter werden 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 Prüfungssekretariat 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 und für alle Regelfälle auf den Vorsitzenden des Prüfungsausschusses übertragen.

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

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

(7) Belastende Entscheidungen des Prüfungsausschusses sind schriftlich mitzuteilen. Sie sind zu begründen und mit einer Rechtsbehelfsbelehrung zu versehen. Widersprüche gegen Entscheidungen des Prüfungsausschusses sind innerhalb eines Monats nach Zugang der Entscheidung schriftlich oder zur Niederschrift an den Prüfungsausschuss zu richten. Hilft der Prüfungsausschuss dem Widerspruch nicht ab, ist er zur Entscheidung dem für die Lehre zuständigen Mitglied des Rektorats vorzulegen.

§ 14 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 Masterarbeit muss ein Prüfer Hochschullehrer sein.

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

(4) Zum Beisitzenden darf nur bestellt werden, wer einen dem jeweiligen Prüfungsgegenstand entsprechenden akademischen Abschluss erworben hat.

§ 15 Anrechnung von Studienzeiten, Anerkennung von Studienleistungen und Modulprüfungen

(1) Studienzeiten und gleichwertige Studienleistungen und Modulprüfungen, die in gleichen oder anderen Studiengängen an anderen Hochschulen erbracht wurden, werden auf Antrag angerechnet. Gleichwertigkeit ist festzustellen, wenn Leistungen in Inhalt, Umfang und in den Anforderungen denjenigen des Studiengangs im Wesentlichen entsprechen. Dabei ist kein schematischer Vergleich, sondern eine Gesamtbetrachtung vorzunehmen. Bezüglich des Umfangs einer zur Anerkennung vorgelegten Studienleistung und Modulprüfung werden die Grundsätze des ECTS herangezogen; die inhaltliche Gleichwertigkeitsprüfung orientiert sich an den Qualifikationszielen des Moduls.

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(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 Masterprüfung 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 Masterarbeit 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. Masterprüfung

§ 16 Umfang und Art der Masterprüfung

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

(2) Es sind Fachprüfungen im Umfang von neun Modulen mit je neun Leistungspunkten abzulegen. Die Module verteilen sich wie folgt auf die Fächer:

1. Betriebswirtschaftslehre: zwei Module im Umfang von je 9 Leistungspunkten,
2. Volkswirtschaftslehre: ein Modul im Umfang von 9 Leistungspunkten,
3. Informatik: ein Modul im Umfang von 9 Leistungspunkten,
4. Operations Research: ein Modul im Umfang von 9 Leistungspunkten,
5. Ingenieurwissenschaften: zwei Module im Umfang von je 9 Leistungspunkten,
6. Wahlbereich: zwei Module im Umfang von je 9 Leistungspunkten aus den Fächern Betriebswirtschaftslehre, Volkswirtschaftslehre, Informatik, Operations Research, Statistik, Ingenieurwissenschaften, Recht und Soziologie. Auf die Fächer Recht und Soziologie darf dabei in Summe höchstens ein Modul entfallen.

(3) Ferner sind im Rahmen des Seminarmoduls bestehend aus zwei Seminaren mindestens sechs Leistungspunkte nachzuweisen. Neben den hier im Umfang von drei Leistungspunkten vermittelten Schlüsselqualifikationen müssen zusätzliche Schlüsselqualifikationen im Umfang von mindestens drei Leistungspunkten erworben werden.

(4) Die Module, die ihnen zugeordneten Lehrveranstaltungen und Leistungspunkte sowie die Zuordnung der Module zu Fächern sind im Studienplan oder im Modulhandbuch geregelt.

Studienplan oder Modulhandbuch können auch Mehrfachmodule definieren, die aus 18 Leistungspunkten (Doppelmodul) bzw. 27 Leistungspunkten (Dreifachmodul) bestehen und für Fachprüfungen nach 1. bis 6. 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.

(5) Im Studienplan oder Modulhandbuch können darüber hinaus inhaltliche Schwerpunkte definiert werden, denen Module zugeordnet werden können.

Legen die Studierenden ihre Fachprüfungen nach Absatz 2 und 3 in Modulen ab, die nach Art und Umfang den im Studienplan oder Modulhandbuch definierten Anforderungen an diese inhaltlichen Schwerpunkte entsprechen, und wird darüber hinaus die Masterarbeit diesem inhaltlichen Schwerpunkt zugeordnet, so wird der inhaltliche Schwerpunkt auf Antrag des Studierenden in das Diploma Supplement aufgenommen.

§ 17 Bestehen der Masterprüfung, Bildung der Gesamtnote

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

(2) Die Gesamtnote der Masterprüfung errechnet sich als ein mit Leistungspunkten gewichteter Notendurchschnitt. Dabei werden die Fachprüfungen nach § 16 Absatz 2, das Seminarmodul nach § 16 Absatz 3 und die Masterarbeit nach § 11 mit ihren Leistungspunkten gewichtet.

(3) Hat der Studierende die Masterarbeit mit der Note 1.0 und die Masterprüfung mit einem Durchschnitt von 1.1 oder besser abgeschlossen, so wird das Prädikat „mit Auszeichnung" (with distinction) verliehen.

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

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

(2) Das Zeugnis enthält die in den Fachprüfungen, den Modulprüfungen sowie dem Seminarmodul und der Masterarbeit 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.

(3) Weiterhin erhält der Studierende als Anhang ein Diploma Supplement in deutscher und englischer Sprache, das den Vorgaben des jeweils gültigen ECTS User's Guide entspricht. Das Diploma Supplement enthält eine Abschrift der Studiendaten des Studierenden (Transcript of Records) sowie auf Antrag des Studierenden einen möglichen inhaltlichen Schwerpunkt gemäß § 16 Absatz 4.

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

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bei entsprechendem Antrag des Studierenden zum möglichen inhaltlichen Schwerpunkt gemäß § 16 Absatz 4 deutlich erkennbar sein. Angerechnete Studienleistungen sind im Transcript of Records aufzunehmen.

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

III. Schlussbestimmungen

§ 19 Bescheid über Nicht-Bestehen, Bescheinigung von Prüfungsleistungen

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

(2) Hat der Studierende die Masterprüfung endgültig nicht bestanden, wird ihm auf Antrag und gegen Vorlage der Exmatrikulationsbescheinigung eine schriftliche Bescheinigung ausgestellt, die die erbrachten Prüfungsleistungen und deren Noten 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.

§ 20 Aberkennung des Mastergrades

(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 Masterprüfung 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 Masterprüfung 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 Masterurkunde einzuziehen, wenn die Masterprüfung auf Grund einer Täuschung für nicht bestanden erklärt wurde.

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

(6) Die Aberkennung des akademischen Grades richtet sich nach den gesetzlichen Vorschriften.

§ 21 Einsicht in die Prüfungsakten

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

(2) Die Einsichtnahme in die schriftlichen Modulprüfungen bzw. Prüfungsprotokolle erfolgt zu einem durch den Prüfer festgelegten, angemessenen Termin innerhalb der Vorlesungszeit. Der Termin ist mit einem Vorlauf von mindestens 14 Tagen anzukündigen und angemessen bekannt zu geben.

(3) Prüfungsunterlagen sind mindestens fünf Jahre aufzubewahren.

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§ 22 In-Kraft-Treten

(1) Diese Studien- und Prüfungsordnung tritt am 1. Oktober 2007 in Kraft.

(2) Gleichzeitig tritt die Prüfungsordnung der Universität Karlsruhe (TH) für den Diplomstudiengang Wirtschaftsingenieurwesen vom 15. November 2001 (Amtliche Bekanntmachung der Universität Karlsruhe (TH), Nr. 29 vom 24. November 2001), zuletzt geändert durch Satzung vom 4. Juli 2004 (Amtliche Bekanntmachung der Universität Karlsruhe (TH), Nr. 36 vom 14. Juli 2004) außer Kraft, behält jedoch ihre Gültigkeit bis zum 30. September 2013 für Prüflinge, die auf Grundlage der Prüfungsordnung der Universität Karlsruhe (TH)) für den Studiengang Wirtschaftsingenieurwesen vom 15. November 2001 (Amtliche Bekanntmachung der Universität Karlsruhe (TH), Nr. 29 vom 24. November 2001) ihr Studium an der Universität Karlsruhe (TH) aufgenommen haben. Über eine Fristverlängerung darüber hinaus entscheidet der Prüfungsausschuss auf Antrag des Studierenden.

Über einen Antrag an den Prüfungsausschuss können Studierende, die auf Grundlage der Prüfungsordnung der Universität Karlsruhe (TH) für den Studiengang Wirtschaftsingenieurwesen vom 15. November 2001 (Amtliche Bekanntmachung der Universität Karlsruhe (TH), Nr. 29 vom 24. November 2001) ihr Studium an der Universität Karlsruhe (TH) aufgenommen haben, ihr Studium auf Grundlage dieser Prüfungsordnung fortsetzen. Der Prüfungsausschuss stellt dabei fest, ob und wie die bisher erbrachten Prüfungsleistungen in den neuen Studienplan integriert werden können und nach welchen Bedingungen das Studium nach einem Wechsel fortgeführt werden kann.

Karlsruhe, den 06.03.2007

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

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Aufbau des Masterstudiengangs Wirtschaftsingenieurwesen

Die Regelstudienzeit im Masterstudiengang Wirtschaftsingenieurwesen beträgt vier Semester. Im Masterstudium sollen die im Bachelorstudium erworbenen wissenschaftlichen Qualifikationen weiter vertieft oder ergänzt werden. Der Studierende soll in die Lage versetzt werden, die wissenschaftlichen Erkenntnisse und Methoden selbstständig anzuwenden und ihre Bedeutung und Reichweite bei der Lösung komplexer wissenschaftlicher und gesellschaftlicher Problemstellungen zu bearbeiten.

Ferner sind im Rahmen des Seminarmoduls bestehend aus zwei Seminaren mindestens sechs Leistungspunkte nachzuweisen. Neben den hier im Umfang von drei Leistungspunkten vermittelten Schlüsselqualifikationen müssen zusätzliche Schlüsselqualifikationen im Umfang von mindestens drei Leistungspunkten erworben werden.

Die folgende Abbildung zeigt die Fach- und Modulstruktur und die Zuordnung der Leistungspunkte (LP) zu den Fächern. Im Wahlpflichtbereich sind zwei Module aus den Fächern Betriebswirtschaftslehre, Volkswirtschaftslehre, Informatik, Operations Research, Ingenieurwissenschaften, Statistik, Recht und Soziologie zu wählen. Auf die Fächer Recht und Soziologie darf aber in Summe höchstens ein Modul entfallen.

Semester					**Summe LP**
1.	**Modul BWL 9**	**Modul ING 9**	**Modul Info 9**	**Modul Wahlpflicht 9**	30
2.	**Modul VWL 9**	**Modul ING 9**	**Modul OR 9**		30
3.	**Modul BWL 8**	**Modul Wahlpflicht 9**	**Modul Seminare + SQ 6 + 3**		30
4.	**Masterarbeit 30**				30 **Gesamt: 120**

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