Karlsruhe Institute of Technology

Business Engineering (M.Sc.)

Summer term 2011
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Faculty of Economics and Business Engineering

KIT - University of the State of Baden-Wuerttemberg and
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Contents

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.

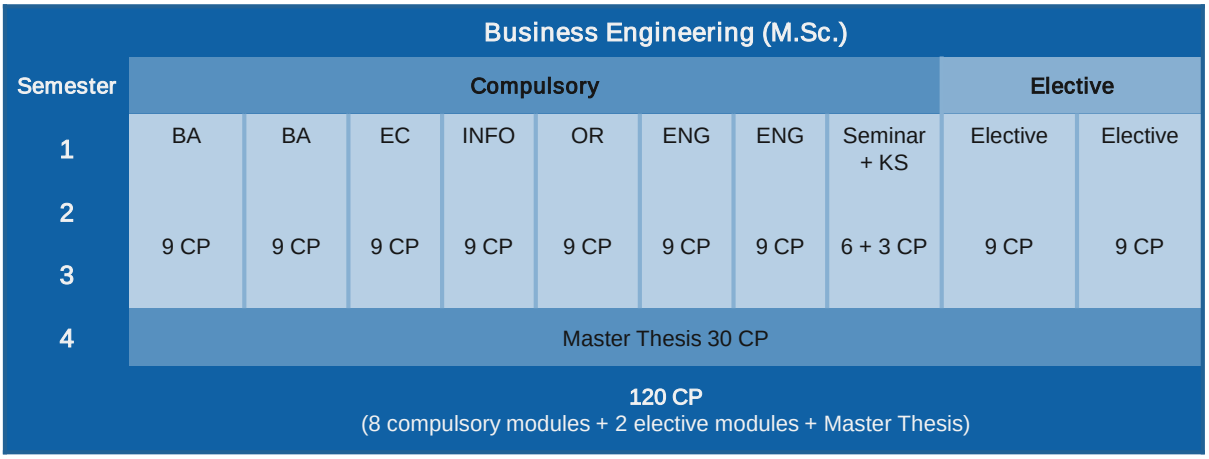

Figure 1: Structure of the Master Programme (Recommendation)

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. Students may choose freely among the offered courses of HoC. Note that within the elective area Culture-Politics-Science-Engineering no course can be taken with its contents too close to the lectures of your own study programme.

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)

Figure 2: Key Skills

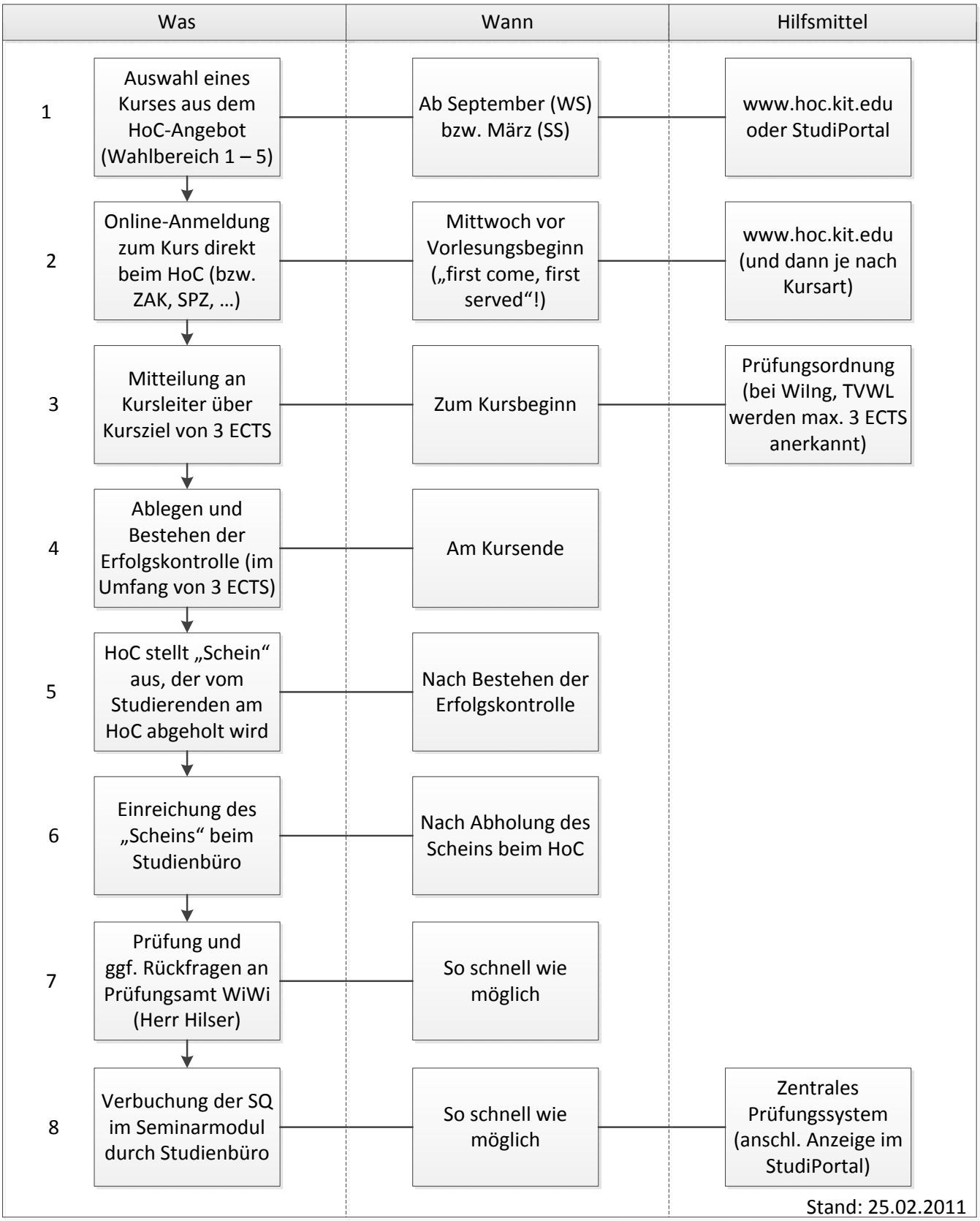

Figure 3: Process of gaining additive key skills

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.kit.edu/serviceHinweise.php.

Bonus accomplishments and additional accomplishments

Bonus accomplishments can be achieved on the basis of entire modules or within modules, if there are alternatives at choice. Bonus accomplishments can improve the module grade and overall grade by taking into account only the best possible combination of all courses when calculating the grades. The student has to declare a Bonus accomplishment as such at the time of registration for the exams. Exams, which have been registered as Bonus accomplishments, are subject to examination regulations. Therefore, a failed exam has to be repeated. Failing the repeat examination implies the loss of the examination claim.
Additional accomplishments are voluntarily taken exams, which have no impact on the overall grade of the student and can take place on the level of single courses or on entire modules. It is also mandatory to declare an additional accomplishment as such at the time of registration for an exam. Up to 2 modules with a minimum of 9 CP may appear additionally in the certificate. After the approval of the examination committee, it is also possible to include modules in the certificate, which are not defined in the module handbook. Single additional courses will be recorded in the transcript of records. Courses and modules, which have been declared as bonus accomplishments, can be changed to additional accomplishments.

Further information

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

Used abbreviations

LP/CP	Credit Points/ECTS	Leistungspunkte/ECTS
LV	course	Lehrveranstaltung
RÜ	computing lab	Rechnerübung
S	summer term	Sommersemester
Sem.	semester/term	Semester
ER/SPO	examination regulations	Studien- und Prüfungsordnung
KS/SQ	key skills	Schlüsselqualifikationen
SWS	contact hour	Semesterwochenstunde
Ü	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. Please also check our updates on http://www.wiwi.kit.edu/lehreMHB.php#mhb_aktuell.

WI4BWLFBV1 - Finance 1 (S. 24)

Anmerkungen

The module has been renamed to *Finance 1*.

WI4BWLFBV2 - Finance 2 (S. 25)

Anmerkungen

The module has been renamed to *Finance 2*.

WI4BWLFBV11 - Finance 3 (S. 27)

Anmerkungen

From winter term 2010/11 on this new module replaces the old module *F2&F3 (Finance)* [WW4BWLFBV3].
The module has been renamed to *Finance 3*.

WI4BWLFBV9 - Operational Risk Management I (S. 33)

Anmerkungen

The courses *Multidisciplinary Risk Research* [2530328], *Risk Communication* [2530395], *Risk Management of Microfinance and Private Households* [26354] and *Project Work in Risk Research* [2530393] are offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
The course *Public Sector Risk Management* [2530355] has been re-included to the module in summer term 2011.

WI4BWLFBV10 - Operational Risk Management II (S. 34)

Anmerkungen

The courses *Multidisciplinary Risk Research* [2530328], *Risk Communication* [2530395], *Risk Management of Microfinance and Private Households* [26354] and *Project Work in Risk Research* [2530393] are offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
The course *Public Sector Risk Management* [2530355] has been re-included to the module in summer term 2011.

WI4BWLISM1 - Advanced CRM (S. 39)

Anmerkungen

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

WI4BWLISM2 - Electronic Markets (S. 40)

Anmerkungen

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

WI4BWLISM3 - Market Engineering (S. 42)

Anmerkungen

The lecture Comptuational Economics was also changed to 4.5 credit points for Computer Science students starting from the winter term 2010/11.
The lecture eEnergy: Markets, Services, Systems [2540464] has been added to the module in the summer term 2011.

WI4BWLISM7 - Information Engineering (S. 46)

Anmerkungen

All practical Seminars offered at the IM can be chosen for *Special Topics in Information Engineering & Management*. Please update yourself on www.iism.kit.edu/im/lehre .
The lecture eEnergy: Markets, Services, Systems [2540464] has been added to the module in the summer term 2011.

WI4BWLIIP5 - Energy Industry and Technology (S. 50)

Anmerkungen

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

WI4VWL2 - Applied Strategic Decisions (S. 51)

Anmerkungen

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

WI4VWL5 - Environmental Economics (S. 54)

Anmerkungen

The course *Environmental and Ressource Policy* [2560548] has been reduced to 4 CP.

WI4STAT2 - Statistical Methods in Risk Management (S. 71)

Anmerkungen

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

WI4INGETIT7 - Generation and transmission of renewable power (S. 109)

Bedingungen

It is only possible to choose this module in combination with the module *High-Voltage Technology* [WW4INGETIT6]. The module is passed only after the final partial exam of *High-Voltage Technology* is additionally passed.
The courses Power Transmission and Power Network Control [23372/23374] and *Power Network Analysis [23371/23373]* are obligatory. *Power Network Analysis* can also be taken within the Bachelor's programme.

Anmerkungen

The module is new in winter term 2010/11 and replaces parts of the former module *Electrical Power* [WW4INGETIT4].
Credits of the course *Power Transmission and Power Network Control* have been changed to 4,5. Credits of the course *High-Voltage Test Technique* have been changed to 4,5.
The course *Power Network Analysis [23371/23373]* is new in summer term 2011.

WI4INGCV4 - Specialization in Food Process Engineering (S. 111)

Anmerkungen

The course *The Making of Emulsions and Dispersions* [22229] was added in summer term 2011.

WI4INGCV5 - Water Chemistry (S. 112)

Anmerkungen

This module is not offered any more in favour of the new modules Water Chemistry I [WW4INGCV6] and II [WW4INGCV7]. Please see German version for details.

WI4INGCV6 - Water Chemistry I (S. 113)

Anmerkungen

The module is new in summer term 2011 and replaces parts of the old module *Water Chemistry* [WW4INGCV5].

WI4INGCV7 - Water Chemistry II (S. 114)

Anmerkungen

The module is new in summer term 2011 and replaces parts of the old module *Water Chemistry* [WW4INGCV5].

WI4INGINTER4 - Safety Science I (S. 118)

Anmerkungen

In agreement with the coordinator of the module other suitable courses than the ones displayed can be taken.
The course *Brandschutz im Hochbau* [20101] has been included in summer term 2011.

WI4INGINTER5 - Safety Science II (S. 119)

Anmerkungen

In agreement with the coordinator of the module other suitable courses than the ones displayed can be taken.
The module is offered as an extension module to *Safety Science I* from winter term 2010/11 on. Students that already began the double module can be assigned to the two single modules.
The course *Brandschutz im Hochbau* [17427] has been included in summer term 2011.

WI4INGMB22 - Specialization in Production Engineering (S. 125)

Anmerkungen

New module in winter term 2010/11.
The course *Machine Tools and Industrial Handling I* [2149900] is not being offered anymore.

WW4INGMB26 - Material Flow in networked Logistics Systems (S. 127)

Bedingungen

The module can only be taken after successful completion of the lecture *Material Flow in Logistic Systems* [21051]. The lecture ist part of the following modules: *Introduction to Technical Logistics* [WW3INGMB13] (Bachelor), *Introduction to Logistics* (Master) [WW4INGMB20] and *Material Flow in Logistic Systems* (Master) [WW4INGMB25].
The course *Analytical Models for Material Flow* [21060] is compulsory and must be examined.

WW4INGMB27 - Technical Logistics (S. 128)

Bedingungen

The module can only be taken after successful completion of the lecture *Material Flow in Logistic Systems* [21051]. The lecture ist part of the following modules: *Introduction to Technical Logistics* [WW3INGMB13] (Bachelor), *Introduction to Logistics* (Master) [WW4INGMB20] and *Material Flow in Logistic Systems* (Master) [WW4INGMB25].
The lecture *Technical Logistics I, basics* [2117081] *or Technical Logistics I, basics and systems* [2117082] has to be chosen.

WW4INGMB28 - Logistics in Value Chain Networks (S. 129)

Bedingungen

The module can only be taken after successful completion of the lecture *Material Flow in Logistic Systems* [21051]. The lecture ist part of the following modules: *Introduction to Technical Logistics* [WW3INGMB13] (Bachelor), *Introduction to Logistics* (Master) [WW4INGMB20] and *Material Flow in Logistic Systems* (Master) [WW4INGMB25].
One of the lectures

- *Logistics – Organization, Design and Control of Logistic Systems* [2118078]
- *Supply Chain Management* [21062]
- *Quantitative Methods for Supply Chain Risk Management* [2118090]

is compulsory and must be examined.

WI4INGMB32 - Machine Tools an Industrial Handling (S. 134)

Anmerkungen

The module is new in summer term 2011.

23372/23374 - Power Transmission and Power Network Control (S. 227)

Anmerkungen

The credits have been reduced to 4,5 in summer term 2011.

23392/23394 - High-Voltage Test Technique (S. 291)

Anmerkungen

The credits have been raised to 4,5 in summer term 2011.

2511402 - Intelligent Systems in Finance (S. 307)

Anmerkungen

The content of the lecture will permanently be adapted to actual developments. This can be the cause to changes of the described contend and schedule.
The course “Intelligent Systems in Finance” will not be offered any more from summer term 2016 on. The examination will be offered latest until summer term 2015 (repeaters only).

24583 - Computer Contract Law (S. 558)

Anmerkungen

The course is lectured in the winterterm 2011/12.

2511400 - Complexity Management (S. 191)

Anmerkungen

The content of the lecture will permanently be adapted to actual developments. This can be the cause to changes of the described contend and schedule.
The course “Complexity Management” will not be offered any more from summer term 2016 on. The examination will be offered latest until summer term 2015 (repeaters only).

2560236 - Innovationtheory and -policy (S. 299)

Anmerkungen

The credits have been changed from 4,5 to 5.

2560254 - International Economic Policy (S. 312)

Anmerkungen

The credits have been changed to 5.

21692 - International Production and Logistics (S. 311)

Anmerkungen

The lecture will not be offered any more. Final examinations take place in september 2010. From the winter term 2010/11 on, a successor lecture will be held.

2530393 - Project Work in Risk Research (S. 399)

Anmerkungen

This course is offered in the spring term 2011.
This course is normally offered each semester. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretary of the chair of insurance science.

2560548 - Environmental and Ressource Policy (S. 532)

Anmerkungen

The credits have been reduced to 4.

2300155 - System Dynamics and Control Engineering (S. 516)

Anmerkungen

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

2118090 - Quantitative Methods for Supply Chain Risk Management (S. 408)

Anmerkungen

From now on the course will be offered in winter terms.

2581002 - Energy Systems Analysis (S. 226)

Anmerkungen

Since 2011 the lecture is offered in winter term. Exams can still be taken in summer term.

24815 - Basic Principles of Patent Law (S. 277)

Anmerkungen

This course was previously announced as *Aktuelle Fragen des Patentrechts.*

2118083 - IT for Facility Logistics (S. 315)

Anmerkungen

The course was formerly known as *Information Technology for Logistic Systems.*

2540531 - Business Dynamics (S. 187)

Anmerkungen

Currently, the course is not offered.

2126749 - High Performance Powder Metallurgy Materials (S. 403)

Anmerkungen

The course is new in summer term 2011.

2540464 - eEnergy: Markets, Services, Systems (S. 207)

Anmerkungen

The lecture is offered the first time in the summer term 2011.
The lecture has also been added in the IIP Module “Basics of Liberalised Energy Markets”.

2530303 - Insurance Statistics (S. 305)

Anmerkungen

This course belongs to the modules “*Applications of Actuarial Sciences I*” and “*Applications of Actuarial Sciences II*”. It doesn't belong to module “*Insurance Statistics*” anymore.
The number of ECTS credits and of hours per week have been reduced.

2530308 - Car Insurance (S. 318)

Anmerkungen

This course *Car Insurance* is newly included in summer term 2011.

N.N. - Pensions (S. 372)

Anmerkungen

This course *pensions* replaces part of *Life and Pensions* [2530310].

N.N. - Life Insurance (S. 375)

Anmerkungen

This course *life insurance* replaces part of *Life and Pensions* [2530310].

neu - (S. 168)

Anmerkungen

The course is new in summer term 2011.

23371/23373 - Power Network Analysis (S. 176)

Anmerkungen

The credits have been changed to 6.

5 Modules

5.1 Business Administration

Module: Finance 1 [WI4BWLFBV1]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530550	Derivatives (p. 203)	2/1	S	4.5	M. Uhrig-Homburg
2530212	Valuation (p. 539)	2/1	W	4.5	M. Ruckes
2530555	Asset Pricing (p. 162)	2/1	S	4.5	M. Uhrig-Homburg, M. Ruckes

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

Conditions
None.

Learning Outcomes
The student

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

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

Remarks
The module has been renamed to *Finance 1*.

Module: Finance 2 [WI4BWLFBV2]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530260	Fixed Income Securities (p. 247)	2/1	W	4.5	M. Uhrig-Homburg
2530214	Corporate Financial Policy (p. 195)	2/1	S	4.5	M. Ruckes
2530240	Market Microstructure (p. 335)	2/0	W	3	T. Lüdecke
2530565	Credit Risk (p. 320)	2/1	W	4.5	M. Uhrig-Homburg
2530210	Management Accounting (p. 313)	2/1	S	4.5	T. Lüdecke
2530555	Asset Pricing (p. 162)	2/1	S	4.5	M. Uhrig-Homburg, M. Ruckes
2530212	Valuation (p. 539)	2/1	W	4.5	M. Ruckes
2530550	Derivatives (p. 203)	2/1	S	4.5	M. Uhrig-Homburg
2530570	International Finance (p. 310)	2	S	3	M. Uhrig-Homburg, Walter
2530299	Business Strategies of Banks (p. 256)	2	W	3	W. Müller
2530296	Exchanges (p. 181)	1	S	1.5	J. Franke
2530232	Financial Intermediation (p. 249)	3	W	4.5	M. Ruckes

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

Conditions
It is only possible to choose this module in combination with the module *F1 (Finance)* [WI4BWLFBV1]. The module is passed only after the final partial exam of *F1 (Finance)*is additionally passed.
The courses *Asset Pricing* [VLAP], *Valuation* [2530212] and *Derivatives* [2530550] can only be chosen if they have not been chosen in the module *F1 (Finance)* [WI4BWLFBV1] already.

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

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

Remarks
The module has been renamed to *Finance 2*.

Module: F2&F3 (Finance) [WI4BWLFBV3]

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

ECTS Credits	Cycle	Duration
18	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530555	Asset Pricing (p. 162)	2/1	S	4.5	M. Uhrig-Homburg, M. Ruckes
2530212	Valuation (p. 539)	2/1	W	4.5	M. Ruckes
2530550	Derivatives (p. 203)	2/1	S	4.5	M. Uhrig-Homburg
2530260	Fixed Income Securities (p. 247)	2/1	W	4.5	M. Uhrig-Homburg
2530565	Credit Risk (p. 320)	2/1	W	4.5	M. Uhrig-Homburg
2530214	Corporate Financial Policy (p. 195)	2/1	S	4.5	M. Ruckes
2530240	Market Microstructure (p. 335)	2/0	W	3	T. Lüdecke
2530210	Management Accounting (p. 313)	2/1	S	4.5	T. Lüdecke
2530232	Financial Intermediation (p. 249)	3	W	4.5	M. Ruckes
2530296	Exchanges (p. 181)	1	S	1.5	J. Franke
2530299	Business Strategies of Banks (p. 256)	2	W	3	W. Müller
2530570	International Finance (p. 310)	2	S	3	M. Uhrig-Homburg, Walter

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.

Conditions
It is obligatory to attend the module *F1 (Finance)* [EE4BWLFBV1].
It is not allowed to choose also the module *F2 (Finance)* [WI4BWLFBV2].
The courses *Asset Pricing* [VLAP], *Valuation* [2530212] and *Derivatives* [2530550] can only be chosen if they have not been chosen in the module *F1 (Finance)* [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.

Remarks
From winter term 2010/11 on the module is not being offered any more. Students can still finish it until winter term 2011/12 or swap to the new module *F3 (Finance)* [WI4BWLFBV11] by written request at the registrar's office.

Module: Finance 3 [WI4BWLFBV11]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530555	Asset Pricing (p. 162)	2/1	S	4.5	M. Uhrig-Homburg, M. Ruckes
2530212	Valuation (p. 539)	2/1	W	4.5	M. Ruckes
2530550	Derivatives (p. 203)	2/1	S	4.5	M. Uhrig-Homburg
2530260	Fixed Income Securities (p. 247)	2/1	W	4.5	M. Uhrig-Homburg
2530565	Credit Risk (p. 320)	2/1	W	4.5	M. Uhrig-Homburg
2530214	Corporate Financial Policy (p. 195)	2/1	S	4.5	M. Ruckes
2530240	Market Microstructure (p. 335)	2/0	W	3	T. Lüdecke
2530210	Management Accounting (p. 313)	2/1	S	4.5	T. Lüdecke
2530232	Financial Intermediation (p. 249)	3	W	4.5	M. Ruckes
2530296	Exchanges (p. 181)	1	S	1.5	J. Franke
2530299	Business Strategies of Banks (p. 256)	2	W	3	W. Müller
2530570	International Finance (p. 310)	2	S	3	M. Uhrig-Homburg, Walter

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.

Conditions
It is only possible to choose this module in combination with the module *F1 (Finance)* [WI4BWLFBV1] and *F2 (Finance)* [WI4BWLFBV2]. The module is passed only after the final partial exams of *F1(Finance) and F2 (Finance)* are additionally passed.
The courses *Asset Pricing* [VLAP], *Valuation* [2530212] and *Derivatives* [2530550] can only be chosen if they have not been chosen in the module *F1 (Finance)* [WI4BWLFBV1] or *F2 (Finance)* [WI4BWLFBV2] 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.

Remarks
From winter term 2010/11 on this new module replaces the old module *F2&F3 (Finance)* [WI4BWLFBV3].
The module has been renamed to *Finance 3*.

Module: Applications of Actuarial Sciences I [WI4BWLFBV4]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530312	Reinsurance (p. 415)	2	S	3	C. Hipp, Schwehr
2530316	Insurance Optimisation (p. 302)	2/2	W	6	C. Hipp
2530303	Insurance Statistics (p. 305)	2/2	W	6	C. Hipp, Michael Schrempp
2530308	Car Insurance (p. 318)	2/2	S	6	M. Schrempp, A. Edalati
N.N.	Life Insurance (p. 375)	2	W	3	M. Vogt
N.N.	Pensions (p. 372)	2	W	3	C. Hipp, Klaus Besserer

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

Conditions
None.

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

Learning Outcomes

Content

Remarks
"*Life and Pensions*" will be replaced by "*Life Insurance*" und "*Pensions*" from winter term 2011/12 on.
"Saving Societies" will not be offered any more.

Module: Applications of Actuarial Sciences II [WI4BWLFBV5]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530312	Reinsurance (p. 415)	2	S	3	C. Hipp, Schwehr
2530316	Insurance Optimisation (p. 302)	2/2	W	6	C. Hipp
2530303	Insurance Statistics (p. 305)	2/2	W	6	C. Hipp, Michael Schrempp
2530308	Car Insurance (p. 318)	2/2	S	6	M. Schrempp, A. Edalati
N.N.	Life Insurance (p. 375)	2	W	3	M. Vogt
N.N.	Pensions (p. 372)	2	W	3	C. Hipp, Klaus Besserer

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

Conditions
It is only possible to choose this module in combination with the module*Applications of Actuarial Sciences I* [WI4BWLFBV4]. The module is passed only after the final partial exam of*Applications of Actuarial Sciences I* is additionally passed.

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

Learning Outcomes

Content

Module: Insurance Management I [WI4BWLFBV6]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530323	Insurance Marketing (p. 301)	3/0	W/S	4.5	U. Werner
2530320	Insurance Accounting (p. 300)	3/0	W	4.5	F. Ludwig
2530324	Insurance Production (p. 303)	3/0	W/S	4.5	U. Werner, Edmund Schwake
26327	Service Management (p. 463)	3/0	W/S	4.5	U. Werner
2530050	Private and Social Insurance (p. 393)	2/0	W	2.5	W. Heilmann, Klaus Besserer
2530350	Current Issues in the Insurance Industry (p. 196)	2/0	S	2.5	W. Heilmann
2530335	Insurance Risk Management (p. 304)	2/0	S	2.5	H. Maser

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

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

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

Learning Outcomes
See German version.

Content
See German version.

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

Module: Insurance Management II [WI4BWLFBV7]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530323	Insurance Marketing (p. 301)	3/0	W/S	4.5	U. Werner
2530320	Insurance Accounting (p. 300)	3/0	W	4.5	F. Ludwig
2530324	Insurance Production (p. 303)	3/0	W/S	4.5	U. Werner, Edmund Schwake
26327	Service Management (p. 463)	3/0	W/S	4.5	U. Werner
2530050	Private and Social Insurance (p. 393)	2/0	W	2.5	W. Heilmann, Klaus Besserer
2530350	Current Issues in the Insurance Industry (p. 196)	2/0	S	2.5	W. Heilmann
2530335	Insurance Risk Management (p. 304)	2/0	S	2.5	H. Maser

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

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

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

Learning Outcomes
See German version.

Content
See German version.

Remarks
The courses *Insurance Marketing* [2530323], *Insurance Production* [2530324], and *Service Management* [26327] are offered on demand, according to the students' wishes. For further information, see: http://insurance.fbv.uni-karlsruhe.de
The module is offered as an extension module to *Insurance Management I* from summer term 2010 on. Students that already began this module have been assigned to the module *Insurance Management I*.

Module: Insurance Statistics [WI4BWLFBV8]

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

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

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530303	Insurance Statistics (p. 305)	2/2	W	6	C. Hipp, Michael Schrempp

Learning Control / Examinations

Conditions
None.

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

Learning Outcomes

Content

Module: Operational Risk Management I [WI4BWLFBV9]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530326	Enterprise Risk Management (p. 229)	3/0	W	4.5	U. Werner
2530328	Multidisciplinary Risk Research (p. 353)	3/0	W/S	4.5	U. Werner
2530353	International Risk Transfer (p. 309)	2/0	S	2.5	W. Schwehr
2530395	Risk Communication (p. 417)	3/0	W/S	4.5	U. Werner
26354	Risk Management of Microfinance and Private Households (p. 418)	3/0	W/S	4.5	U. Werner
2530393	Project Work in Risk Research (p. 399)	3	W/S	4.5	U. Werner, Madalena Salek
2530355	Seminar Public Sector Risk Management (p. 438)	2	S	3	Hochrainer

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

Conditions
It is only possible to choose the course *Enterprise Risk Management* [2530326] if it was not attended in the Bachelor programme.
It is only possible to choose the course *International Risk Transfer* [2530353] if it was not attended in the Bachelor programme.
Good complements to this module are as well the engineering science modules *Understanding and Prediction of Disasters I* [WI4INTER1] and *Safety Science I* [WI4INTER4].
At least 50% of the assessment has to be carried out as a general oral exam or a general written exam (not as seminars).

Recommendations
Interest in interdisciplinary research is assumed.

Learning Outcomes
See German version.

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

Remarks
The courses *Multidisciplinary Risk Research* [2530328], *Risk Communication* [2530395], *Risk Management of Microfinance and Private Households* [26354] and *Project Work in Risk Research* [2530393] are offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
The course *Public Sector Risk Management* [2530355] has been re-included to the module in summer term 2011.

Module: Operational Risk Management II [WI4BWLFBV10]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530326	Enterprise Risk Management (p. 229)	3/0	W	4.5	U. Werner
2530328	Multidisciplinary Risk Research (p. 353)	3/0	W/S	4.5	U. Werner
2530353	International Risk Transfer (p. 309)	2/0	S	2.5	W. Schwehr
2530395	Risk Communication (p. 417)	3/0	W/S	4.5	U. Werner
26354	Risk Management of Microfinance and Private Households (p. 418)	3/0	W/S	4.5	U. Werner
2530393	Project Work in Risk Research (p. 399)	3	W/S	4.5	U. Werner, Madalena Salek
2530355	Seminar Public Sector Risk Management (p. 438)	2	S	3	Hochrainer

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

Conditions
It is only possible to choose this module in combination with the module *Operational Risk Management I* [WI4BWLFBV9]. The module is passed only after the final partial exam of *Operational Risk Management I* is additionally passed.
At least 50% of the assessment has to be carried out as a general oral exam or a general written exam (not as seminars).

Recommendations
Interest in interdisciplinary research is assumed.

Learning Outcomes
See German version.

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

Remarks
The courses *Multidisciplinary Risk Research* [2530328], *Risk Communication* [2530395], *Risk Management of Microfinance and Private Households* [26354] and *Project Work in Risk Research* [2530393] are offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
The course *Public Sector Risk Management* [2530355] has been re-included to the module in summer term 2011.

Module: Strategy, Innovation and Data Analysis [WI4BWLMAR3]

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

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

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2571166	Strategic and Innovative Decision Making in Marketing (p. 508)	2/1	S	4.5	B. Neibecker
2571162	Information Technology and Business Information (p. 296)	2/1	S	4.5	B. Neibecker

Learning Control / Examinations
Assessment consist of a written module exam according to §4(2), 1 SPO. The module exam has a duration of 120 min. and contains topics from the main lecture [2571166] as well as of the lecture [2571162].
The final mark for the module is the average of the marks for each course weighted by the credits of the course.

Conditions
None.

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

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

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

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2572167	Behavioral Approaches in Marketing (p. 545)	2/1	W	4.5	B. Neibecker
2571162	Information Technology and Business Information (p. 296)	2/1	S	4.5	B. Neibecker

Learning Control / Examinations
Assessment consist of a written module exam according to §4(2), 1 SPO. The module exam has a duration of 120 min. and contains topics from the main lecture [2572167] as well as of the lecture [2571162].
The final mark for the module is the average of the marks for each course weighted by the credits of the course.

Conditions
None.

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

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

Module: Strategic Corporate Management and Organization [WI4BWLUO1]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2577904	Organization Theory (p. 369)	2/1	W	6	H. Lindstädt
2577902	Managing Organizations (p. 368)	2/0	W	4	H. Lindstädt
2577908	Modeling Strategic Decision Making (p. 347)	2/1	S	6	H. Lindstädt
2577900	Management and Strategy (p. 537)	2/0	S	4	H. Lindstädt

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

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

Learning Outcomes

Content

Remarks
See German version.

Module: Strategic Decision Making and Organization Theory [WI4BWLUO3]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2577904	Organization Theory (p. 369)	2/1	W	6	H. Lindstädt
2577908	Modeling Strategic Decision Making (p. 347)	2/1	S	6	H. Lindstädt
2561127	Public Management (p. 402)	2/1	W	6	B. Wigger, Assistenten

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

Conditions
None.

Learning Outcomes

Content

Module: Advanced CRM [WI4BWLISM1]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2540508	Customer Relationship Management (p. 197)	2/1	W	4,5	A. Geyer-Schulz
2540506	Personalization and Recommender Systems (p. 373)	2/1	S	4,5	A. Geyer-Schulz
2540518	Social Network Analysis in CRM (p. 483)	2/1	W/S	4,5	B. Hoser
2540531	Business Dynamics (p. 187)	2/1	S	4,5	A. Geyer-Schulz

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

Conditions
None.

Learning Outcomes
The student

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

Content
Besides the foundations of modern customer oriented and service oriented management, developments of CRM systems are lectured together with tools for analysis and optimization of such systems.
An overview of general aspects and concepts of personalization and their importance for service provider and customers is given. Then, different categories of recommendation systems are presented: Ranging from explizit recommendation services like reviews to implicit services like the calcuation of recommendations based on the historic data about products and/or customers.
There exist a trend towards viewing economic systems and social systems as networks. This approach allows for the application of different methods from mathematics, economic sciences, sociology and physics. In CRM, net work analyses may provide benefits calculating customer network values.
CRM processes and marketing campaigns are just two examples of dynamic systems that are characterized by feedback loops between different process steps. By means of the tools of business dynamics such processes can be modelled. Simulations of complex systems allow the analysis and optimization of business processes, marketing campaigns, and organizations.

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

Module: Electronic Markets [WI4BWLISM2]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2540502	Electronic Markets (Principles) (p. 216)	2/1	W	4,5	A. Geyer-Schulz
2540460	Market Engineering: Information in Institutions (p. 334)	2/1	S	4,5	C. Weinhardt, J. Kraemer, C. van Dinther, S. Caton, M. Adam
2561232	Telecommunication and Internet Economics (p. 525)	2/1	W	4,5	K. Mitusch
2540531	Business Dynamics (p. 187)	2/1	S	4,5	A. Geyer-Schulz

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

Conditions
None.

Learning Outcomes
The student

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

Content
What are the conditions that make electronic markets develop and how can one analyse and optimize such markets?
In this module, the selection of the type of organization as an optimization of transaction costs is treated. Afterwards, the efficiency of electronic markets (price, information and allocation efficiency) as well as reasons for market failure are described. Finally, motivational issues 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.
Electronic markets are dynamic systems that are characterized by feedback loops between many different variables. By means of the tools of business dynamics such markets can be modelled. Simulations of complex systems allow the analysis and optimization of markets, business processes, policies, and organizations.
Topics include:

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

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

Module: Market Engineering [WI4BWLISM3]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2540460	Market Engineering: Information in Institutions (p. 334)	2/1	S	4,5	C. Weinhardt, J. Kraemer, C. van Dinther, S. Caton, M. Adam
2590408	Auction Theory (p. 167)	2/2	W	4.5	K. Ehrhart, S. Seifert
2540454	eFinance: Information Engineering and Management for Securities Trading (p. 211)	2/1	W	4.5	C. Weinhardt, R. Riordan
2590458	Computational Economics (p. 193)	2/1	W	4,5	P. Shukla, S. Caton
2520373	Experimental Economics (p. 237)	2/2	S	4,5	S. Berninghaus, Kroll
2540464	eEnergy: Markets, Services, Systems (p. 207)	2/1	S	4,5	C. van Dinther

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

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

Learning Outcomes
The students

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

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

Remarks
The lecture Comptuational Economics was also changed to 4.5 credit points for Computer Science students starting from the winter term 2010/11.
The lecture eEnergy: Markets, Services, Systems [2540464] has been added to the module in the summer term 2011.

Module: Business & Service Engineering [WI4BWLISM4]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2540456	Business Models in the Internet: Planning and Implementation (p. 255)	2/1	S	4,5	C. Weinhardt, C. van Dinther
2540478	Special Topics in Information Engineering & Management (p. 485)	3	W/S	4.5	C. Weinhardt
2540506	Personalization and Recommender Systems (p. 373)	2/1	S	4,5	A. Geyer-Schulz
2540468	Service Innovation (p. 462)	2/1	S	5	G. Satzger, A. Neus

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

Conditions
None.

Learning Outcomes
The student should

- learn to develop and implement new markets with regards to the technological progresses of information and communication technology and the increasing economic networking
- learn to restructure and develop new business processes in markets under those conditions
- understand service competition as a sustainable competitive strategy and understand the effects of service competition on the design of markets, products, processes and services.
- improve his statistics skills and apply them to appropriate cases
- learn to elaborate solutions in a team

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

Remarks
All practical Seminars offered at the IM can be chosen for *Special Topics in Information Engineering & Management*. Please update yourself on www.iism.kit.edu/im/lehre .

Module: Communications & Markets [WI4BWLISM5]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2540462	Communications Economics (p. 190)	2/1	S	4,5	S. Seifert, J. Kraemer
2540460	Market Engineering: Information in Institutions (p. 334)	2/1	S	4,5	C. Weinhardt, J. Kraemer, C. van Dinther, S. Caton, M. Adam
2590408	Auction Theory (p. 167)	2/2	W	4.5	K. Ehrhart, S. Seifert
2540478	Special Topics in Information Engineering & Management (p. 485)	3	W/S	4.5	C. Weinhardt

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

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

Learning Outcomes
The student is able to

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

Content
The module has a focus on applied game-theoretic analysis of information exchange and incentive mechanisms. Single participants in a market make decisions concerning their products, the price determination and competitive 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.

Remarks
All practical Seminars offered at the IM can be chosen for *Special Topics in Information Engineering & Management*. Please update yourself on www.iism.kit.edu/im/lehre .

Module: Service Management [WI4BWLISM6]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2590484	Business and IT Service Management (p. 186)	2/1	W	5	G. Satzger
2590452	Management of Business Networks (p. 330)	2/1	W	4.5	C. Weinhardt, J. Kraemer
2540468	Service Innovation (p. 462)	2/1	S	5	G. Satzger, A. Neus
2540466	eServices (p. 234)	2/1	S	5	C. Weinhardt, G. Satzger

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

Conditions
The course *Business and IT Service Management* [2590484] is compulsory and must be examined
The course *eServices* [2540466] can only be 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.

Module: Information Engineering [WI4BWLISM7]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2540450	Principles of Information Engineering and Management (p. 286)	2/1	W	5	C. Weinhardt, C. van Dinther
2540462	Communications Economics (p. 190)	2/1	S	4,5	S. Seifert, J. Kraemer
2540460	Market Engineering: Information in Institutions (p. 334)	2/1	S	4,5	C. Weinhardt, J. Kraemer, C. van Dinther, S. Caton, M. Adam
2540478	Special Topics in Information Engineering & Management (p. 485)	3	W/S	4.5	C. Weinhardt
2540464	eEnergy: Markets, Services, Systems (p. 207)	2/1	S	4,5	C. van Dinther

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

Conditions
The course *Principles of Information Engineering and Management* [2540450] is compulsory and must be examined.

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.

Remarks
All practical Seminars offered at the IM can be chosen for *Special Topics in Information Engineering & Management*. Please update yourself on www.iism.kit.edu/im/lehre .
The lecture eEnergy: Markets, Services, Systems [2540464] has been added to the module in the summer term 2011.

Module: Industrial Production II [WI4BWLIIP2]

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

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

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2581952	Planning and Management of Industrial Plants (p. 155)	2/2	W	5.5	F. Schultmann
2581962	Emissions into the Environment (p. 218)	2/0	W	3.5	U. Karl
2581995	Material Flow Analysis and Life Cycle Assessment (p. 506)	2/0	W	3.5	L. Schebek

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

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

Recommendations
Skills learned in the compulsory B.Sc. modules of business administration, engineering, operations research and informatics.
The courses are set up in a way that they can be taken independently from each other; therefore it is possible to start this module at any time.
We recommend combining this module with “Industrial Production I” [WW3BWLIIP] (Bachelor) and “Industrial Production III” [WI4BWLIIP6] (Master).

Learning Outcomes

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

Content

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

Module: Industrial Production III [WI4BWLIIP6]

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

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

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2581954	Production and Logistics Management (p. 396)	2/2	S	5.5	M. Fröhling, F. Schultmann
2581975	Computer-based Production Planning and Control, Process Simulation and Supply Chain Management (p. 194)	2/0	S	2	M. Fröhling, F. Schultmann
2581963	The Management of R&D Projects with Case Studies (p. 239)	2/2	W/S	3.5	H. Schmied
2581961	Supply Chain Management with Advanced Planning Systems (p. 513)	2	S	2	M. Göbelt, C. Sürie

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

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

Recommendations
The courses are set up in a way that they can be taken independently from each other; therefore it is possible to start this module at any time.
We recommend combining this module with “Industrial Production I” [WW3BWLIIP] (Bachelor) and “Industrial Production II” [WI4BWLIIP2] (Master).
Skills learned in the compulsory B.Sc. modules of business administration, engineering, operations research and informatics.

Learning Outcomes

- Students describe the tasks concerning general problems of an operative production and logistics management.
- Students describe the planning tasks of supply chain management.
- Students use proficiently approaches to solve general planning problems.
- Students explain the existing interdependencies between planning tasks and applied methods.
- Students describe the mail goals and set-up of software supporting tools in production and logistics management (i.e. APS, PPS-, ERP- and SCM Systems).
- Students discuss the scope of these software tools and their general disadvantages.

Content

- Planning tasks and exemplary methods of production planning and control in supply chain management.
- Supporting software tools in production and logistics management (APS, PPS- and ERP Systems).
- Project management in the field of production and supply chain management.

Module: Basics of Liberalised Energy Markets [WI4BWLIIP4]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2581998	Basics of Liberalised Energy Markets (p. 171)	2/1	W	3.5	W. Fichtner
2581020	Energy Trade and Risk Management (p. 224)	2/1	S	3.5	K. Hufendiek
2581959	Energy Policy (p. 225)	2/0	S	3.5	M. Wietschel
2581022	Gas-Markets (p. 233)	2/0	W	3	A. Pustisek
2581025	Simulation Game in Energy Economics (p. 378)	2/0	W	3	W. Fichtner
2560234	Regulation Theory and Practice (p. 413)	2/1	S	4,5	K. Mitusch
2540464	eEnergy: Markets, Services, Systems (p. 207)	2/1	S	4,5	C. van Dinther

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

Conditions
None.

Learning Outcomes

Content

Module: Energy Industry and Technology [WI4BWLIIP5]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2581003	Energy and Environment (p. 221)	2/1	S	4,5	U. Karl, n.n.
2581958	Strategical Aspects of Energy Economy (p. 507)	2/0	W	3.5	A. Ardone
2581000	Technological Change in Energy Industry (p. 524)	2/0	W	3	M. Wietschel
2581001	Heat Economy (p. 565)	2/0	S	3	W. Fichtner
2581002	Energy Systems Analysis (p. 226)	2/0	W	3	A. Eßer-Frey
2581006	Efficient Energy Systems and Electric Mobility (p. 208)	2/0	S	3,5	R. McKenna, P. Jochem

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

Conditions
None.

Learning Outcomes

Content

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

5.2 Economics

Module: Applied Strategic Decisions [WI4VWL2]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2521369	Game Theory II (p. 495)	2/2	W	4.5	S. Berninghaus
2520525	Game Theory I (p. 494)	2/2	S	4.5	S. Berninghaus
2590408	Auction Theory (p. 167)	2/2	W	4.5	K. Ehrhart, S. Seifert
2540460	Market Engineering: Information in Institutions (p. 334)	2/1	S	4,5	C. Weinhardt, J. Kraemer, C. van Dinther, S. Caton, M. Adam
2520373	Experimental Economics (p. 237)	2/2	S	4,5	S. Berninghaus, Kroll

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

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

Recommendations
The student should have basic knowledge of game theory.

Learning Outcomes
The student

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

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

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

Module: Economic Policy II [WW4VWL3]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2561257	Economic integration in Europe (p. 235)	2	W	4	J. Kowalski
2560236	Innovationtheory and -policy (p. 299)	2/1	S	5	I. Ott
2560254	International Economic Policy (p. 312)	2/1	S	5	J. Kowalski

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.

Conditions
None.

Learning Outcomes

Content

Module: Network Economics [WI4VWL4]

Coordination: Kay Mitusch
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Economics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26240	Competition in Networks (p. 581)	2/1	W	4,5	K. Mitusch
2560234	Regulation Theory and Practice (p. 413)	2/1	S	4,5	K. Mitusch
2560230	Transport Economics (p. 528)	2/1	S	4,5	G. Liedtke, E. Szimba
2561232	Telecommunication and Internet Economics (p. 525)	2/1	W	4,5	K. Mitusch
2520527	Advanced Topics in Economic Theory (p. 146)	2/1	S	4.5	C. Puppe, M. Hillebrand, K. Mitusch

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 offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.
The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

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

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

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 monopolies 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.

Module: Environmental Economics [WI4VWL5]

Coordination: Kay Mitusch
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Economics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2521547	Environmental Economics and Sustainability (p. 534)	2/1	W	5	R. Walz
2560548	Environmental and Ressource Policy (p. 532)	2	S	4	R. Walz
2581003	Energy and Environment (p. 221)	2/1	S	4,5	U. Karl, n.n.
24140	Environmental Law (p. 535)	2	W	3	I. Spiecker genannt Döhmann
2560230	Transport Economics (p. 528)	2/1	S	4,5	G. Liedtke, E. Szimba

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.

Conditions
None.

Recommendations
Knowledge in the area of microeconomics and of the content of the course *Economics I: Microeconomics* [2600012], respectively, is required.

Learning Outcomes

Content

Remarks
The course *Environmental and Ressource Policy* [2560548] has been reduced to 4 CP.

Module: Economic Policy [WI4VWL6]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2560280	Economic Policy (p. 584)	2/1	S	5	A. Schaffer
2561257	Economic integration in Europe (p. 235)	2	W	4	J. Kowalski
2560236	Innovationtheory and -policy (p. 299)	2/1	S	5	I. Ott

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.

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

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

Module: Allocation and Equilibrium [WI4VWL7]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2520527	Advanced Topics in Economic Theory (p. 146)	2/1	S	4.5	C. Puppe, M. Hillebrand, K. Mitusch
2520517	Welfare Economics (p. 587)	2/1	S	4.5	C. Puppe
25549	Theory of Business Cycles (p. 317)	2/1	W	4.5	M. Hillebrand

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module 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 submission of the term paper is only admitted until the end of the following semester in which the last exam of the Economics-Module was absolved. It does not apply for term papers which are already taken in the Seminar Module. For more information, please visit the homepage of the Chair (http://vwl1.ets.kit.edu/).

Conditions
None.

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

Learning Outcomes

Content

Module: Macroeconomic Theory [WI4VWL8]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2520543	Theory of Economic Growth (p. 564)	2/1	S	4,5	M. Hillebrand
25549	Theory of Business Cycles (p. 317)	2/1	W	4.5	M. Hillebrand

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module 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 submission of the term paper is only admitted until the end of the following semester in which the last exam of the Economics-Module was absolved. It does not apply for term papers which are already taken in the Seminar Module. For more information, please visit the homepage of the Chair (http://vwl1.ets.kit.edu/).

Conditions
None.

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

Learning Outcomes

Content

Module: Social Choice Theory [WI4VWL9]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2520517	Welfare Economics (p. 587)	2/1	S	4.5	C. Puppe
2520525	Game Theory I (p. 494)	2/2	S	4.5	S. Berninghaus
25537	Decision Theory and Objectives in Applied Politics (p. 230)	2/1	W	4.5	Tangian
25539	Mathematical Theory of Democracy (p. 340)	2/1	S	4.5	Tangian

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module 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 submission of the term paper is only admitted until the end of the following semester in which the last exam of the Economics-Module was absolved. It does not apply for term papers which are already taken in the Seminar Module. For more information, please visit the homepage of the Chair (http://vwl1.ets.kit.edu/).

Conditions
None.

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

Learning Outcomes

Content

Module: Innovation and growth [WW4VWLIWW1]

Coordination: Ingrid Ott
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Economics

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2520543	Theory of Economic Growth (p. 564)	2/1	S	4,5	M. Hillebrand
2560236	Innovationtheory and -policy (p. 299)	2/1	S	5	I. Ott
2561503	Theory of endogenous growth (p. 220)	2/1	W	4,5	I. Ott

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.

Conditions
None.

Recommendations
Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. In addition, an interest in quantitative-mathematical modeling is required.

Learning Outcomes
Students shall be given the ability to

- know the basic techniques for analyzing static and dynamic optimization models that are applied in the context of micro- and macroeconomic theories
- understand the important role of innovation to the overall economic growth and welfare
- identify the importance of alternative incentive mechanisms for the emergence and dissemination of innovations
- explain, in which situations market interventions by the state, for example taxes and subsidies, can be legitimized, and evaluate them in the light of economic welfare

Content
The module includes courses that deal with issues of innovation and growth in the context of micro-and macroeconomic theories. The dynamic analysis makes it possible to analyze the consequences of individual decisions over time, and sheds light on the tension between static and dynamic efficiency in particular. In this context is also analyzed, which policy is appropriate to carry out corrective interventions in the market and thus increase welfare in the presence of market failure.

Remarks
The module is introduced in WS 2010/11.

5.3 Informatics

Module: Informatics [WI4INFO1]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2511102	Algorithms for Internet Applications (p. 148)	2/1	W	5	H. Schmeck
2511030	Applied Informatics I - Modelling (p. 152)	2/1	W	5	A. Oberweis, R. Studer, S. Agarwal
2511032	Applied Informatics II - IT Systems for e-Commerce (p. 153)	2/1	S	5	S. Tai
2511400	Complexity Management (p. 191)	2/1	S	5	D. Seese
2511200	Database Systems (p. 199)	2/1	S	5	A. Oberweis, Dr. D. Sommer
2511206	Software Engineering (p. 477)	2/1	W	5	A. Oberweis, D. Seese
2511500	Service Oriented Computing 1 (p. 464)	2/1	W	5	S. Tai
2511300	Knowledge Management (p. 586)	2/1	W	5	R. Studer
2511504	Cloud Computing (p. 189)	2/1	W	5	S. Tai, Kunze
2511202	Database Systems and XML (p. 200)	2/1	W	5	A. Oberweis
2511212	Document Management and Groupware Systems (p. 205)	2	S	4	S. Klink
2511100	Efficient Algorithms (p. 209)	2/1	S	5	H. Schmeck
2511600	Enterprise Architecture Management (p. 228)	2/1	W	5	T. Wolf
2511402	Intelligent Systems in Finance (p. 307)	2/1	S	5	D. Seese
2511404	IT Complexity in Practice (p. 332)	2/1	W	5	D. Seese, Kreidler
2511302	Knowledge Discovery (p. 316)	2/1	W	5	R. Studer
2511214	Management of IT-Projects (p. 331)	2/1	S	5	R. Schätzle
2511210	Business Process Modelling (p. 349)	2/1	W	5	A. Oberweis, M. Mevius
2511106	Nature-inspired Optimisation Methods (p. 355)	2/1	W	5	S. Mostaghim, P. Shukla
2511104	Organic Computing (p. 366)	2/1	S	5	H. Schmeck, S. Mostaghim
2590458	Computational Economics (p. 193)	2/1	W	4,5	P. Shukla, S. Caton
2511216	Capability maturity models for software and systems engineering (p. 414)	2	S	4	R. Kneuper
2511304	Semantic Web Technologies I (p. 424)	2/1	W	5	R. Studer, S. Rudolph, A. Harth
2511306	Semantic Web Technologies II (p. 425)	2/1	S	5	E. Simperl, A. Harth, S. Rudolph, Daniel Oberle
2511308	Service Oriented Computing 2 (p. 465)	2/1	S	5	R. Studer, S. Agarwal, B. Norton
2511208	Software Technology: Quality Management (p. 481)	2/1	S	5	A. Oberweis
25700sp	Special Topics of Efficient Algorithms (p. 487)	2/1	W/S	5	H. Schmeck
SBI	Special Topics of Enterprise Information Systems (p. 486)	2/1	W/S	5	A. Oberweis
KompMansp	Special Topics of Complexity Management (p. 488)	2/1	W/S	5	D. Seese
SSEsp	Special Topics of Software- and Systemsengineering (p. 489)	2/1	W/S	5	A. Oberweis, D. Seese
25860sem	Special Topics of Knowledge Management (p. 490)	2/1	W/S	5	R. Studer
2511602	Strategic Management of Information Technology (p. 509)	2/1	S	5	T. Wolf
2511502	Web Service Engineering (p. 576)	2/1	S	5	C. Zirpins

2511204	Workflow-Management (p. 588)	2/1	S	5	A. Oberweis
25810	Practical Seminar Knowledge Discovery (p. 459)	2	S	4	R. Studer
PraBI	Computing Lab Information Systems (p. 384)	2	W/S	4	A. Oberweis, D. Seese, R. Studer
25700p	Advanced Lab in Efficient Algorithms (p. 385)	3	W/S	4	H. Schmeck
25762p	Computing Lab in Intelligent Systems in Finance (p. 386)	3	W/S	4	D. Seese
25818	Computing Lab in Complexity Management (p. 387)	3	W/S	4	D. Seese
25820	Lab Class Web Services (p. 390)	2	W	4	S. Tai, C. Zirpins
25740p	Ecxercises in Knowlegde Management (p. 391)	3	W/S	4	R. Studer
2511218	n.n. (p. 151)	2/0	W	4	R. Kneuper

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.

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* [2511102], *Applied Informatics I - Modelling* [2511030], *Applied Informatics II - IT Systems for e-Commerce* [2511032], *Complexity Management* [2511400], *Database Systems* [2511200], *Software Engineering* [2511206], *Service-oriented Computing I* [2511500] and *Knowledge Management* [2511300].
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.

Module: Emphasis in Informatics [WI4INFO2]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2511102	Algorithms for Internet Applications (p. 148)	2/1	W	5	H. Schmeck
2511030	Applied Informatics I - Modelling (p. 152)	2/1	W	5	A. Oberweis, R. Studer, S. Agarwal
2511032	Applied Informatics II - IT Systems for e-Commerce (p. 153)	2/1	S	5	S. Tai
2511400	Complexity Management (p. 191)	2/1	S	5	D. Seese
2511200	Database Systems (p. 199)	2/1	S	5	A. Oberweis, Dr. D. Sommer
2511500	Service Oriented Computing 1 (p. 464)	2/1	W	5	S. Tai
2511206	Software Engineering (p. 477)	2/1	W	5	A. Oberweis, D. Seese
2511300	Knowledge Management (p. 586)	2/1	W	5	R. Studer
2511202	Database Systems and XML (p. 200)	2/1	W	5	A. Oberweis
2511212	Document Management and Groupware Systems (p. 205)	2	S	4	S. Klink
2511100	Efficient Algorithms (p. 209)	2/1	S	5	H. Schmeck
2511600	Enterprise Architecture Management (p. 228)	2/1	W	5	T. Wolf
2511402	Intelligent Systems in Finance (p. 307)	2/1	S	5	D. Seese
2511404	IT Complexity in Practice (p. 332)	2/1	W	5	D. Seese, Kreidler
2511302	Knowledge Discovery (p. 316)	2/1	W	5	R. Studer
2511214	Management of IT-Projects (p. 331)	2/1	S	5	R. Schätzle
2511210	Business Process Modelling (p. 349)	2/1	W	5	A. Oberweis, M. Mevius
2511106	Nature-inspired Optimisation Methods (p. 355)	2/1	W	5	S. Mostaghim, P. Shukla
2511104	Organic Computing (p. 366)	2/1	S	5	H. Schmeck, S. Mostaghim
2590458	Computational Economics (p. 193)	2/1	W	4,5	P. Shukla, S. Caton
2511216	Capability maturity models for software and systems engineering (p. 414)	2	S	4	R. Kneuper
2511304	Semantic Web Technologies I (p. 424)	2/1	W	5	R. Studer, S. Rudolph, A. Harth
2511306	Semantic Web Technologies II (p. 425)	2/1	S	5	E. Simperl, A. Harth, S. Rudolph, Daniel Oberle
2511308	Service Oriented Computing 2 (p. 465)	2/1	S	5	R. Studer, S. Agarwal, B. Norton
2511208	Software Technology: Quality Management (p. 481)	2/1	S	5	A. Oberweis
SBI	Special Topics of Enterprise Information Systems (p. 486)	2/1	W/S	5	A. Oberweis
25700sp	Special Topics of Efficient Algorithms (p. 487)	2/1	W/S	5	H. Schmeck
KompMansp	Special Topics of Complexity Management (p. 488)	2/1	W/S	5	D. Seese
SSEsp	Special Topics of Software- and Systemsengineering (p. 489)	2/1	W/S	5	A. Oberweis, D. Seese
25860sem	Special Topics of Knowledge Management (p. 490)	2/1	W/S	5	R. Studer
2511602	Strategic Management of Information Technology (p. 509)	2/1	S	5	T. Wolf
2511502	Web Service Engineering (p. 576)	2/1	S	5	C. Zirpins
2511204	Workflow-Management (p. 588)	2/1	S	5	A. Oberweis
PraBI	Computing Lab Information Systems (p. 384)	2	W/S	4	A. Oberweis, D. Seese, R. Studer

25700p	Advanced Lab in Efficient Algorithms (p. 385)	3	W/S	4	H. Schmeck
25762p	Computing Lab in Intelligent Systems in Finance (p. 386)	3	W/S	4	D. Seese
25818	Computing Lab in Complexity Management (p. 387)	3	W/S	4	D. Seese
25810	Practical Seminar Knowledge Discovery (p. 459)	2	S	4	R. Studer
25820	Lab Class Web Services (p. 390)	2	W	4	S. Tai, C. Zirpins
25740p	Ecxercises in Knowlegde Management (p. 391)	3	W/S	4	R. Studer
2511504	Cloud Computing (p. 189)	2/1	W	5	S. Tai, Kunze
2511218	n.n. (p. 151)	2/0	W	4	R. Kneuper

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.

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

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.

Module: Electives in Informatic [WI4INFO3]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2511102	Algorithms for Internet Applications (p. 148)	2/1	W	5	H. Schmeck
2511030	Applied Informatics I - Modelling (p. 152)	2/1	W	5	A. Oberweis, R. Studer, S. Agarwal
2511032	Applied Informatics II - IT Systems for e-Commerce (p. 153)	2/1	S	5	S. Tai
2511400	Complexity Management (p. 191)	2/1	S	5	D. Seese
2511200	Database Systems (p. 199)	2/1	S	5	A. Oberweis, Dr. D. Sommer
2511500	Service Oriented Computing 1 (p. 464)	2/1	W	5	S. Tai
2511206	Software Engineering (p. 477)	2/1	W	5	A. Oberweis, D. Seese
2511300	Knowledge Management (p. 586)	2/1	W	5	R. Studer
2511202	Database Systems and XML (p. 200)	2/1	W	5	A. Oberweis
2511212	Document Management and Groupware Systems (p. 205)	2	S	4	S. Klink
2511100	Efficient Algorithms (p. 209)	2/1	S	5	H. Schmeck
2511600	Enterprise Architecture Management (p. 228)	2/1	W	5	T. Wolf
2511402	Intelligent Systems in Finance (p. 307)	2/1	S	5	D. Seese
2511404	IT Complexity in Practice (p. 332)	2/1	W	5	D. Seese, Kreidler
2511302	Knowledge Discovery (p. 316)	2/1	W	5	R. Studer
2511214	Management of IT-Projects (p. 331)	2/1	S	5	R. Schätzle
2511210	Business Process Modelling (p. 349)	2/1	W	5	A. Oberweis, M. Mevius
2511106	Nature-inspired Optimisation Methods (p. 355)	2/1	W	5	S. Mostaghim, P. Shukla
2511104	Organic Computing (p. 366)	2/1	S	5	H. Schmeck, S. Mostaghim
2590458	Computational Economics (p. 193)	2/1	W	4,5	P. Shukla, S. Caton
2511216	Capability maturity models for software and systems engineering (p. 414)	2	S	4	R. Kneuper
2511304	Semantic Web Technologies I (p. 424)	2/1	W	5	R. Studer, S. Rudolph, A. Harth
2511306	Semantic Web Technologies II (p. 425)	2/1	S	5	E. Simperl, A. Harth, S. Rudolph, Daniel Oberle
2511308	Service Oriented Computing 2 (p. 465)	2/1	S	5	R. Studer, S. Agarwal, B. Norton
2511208	Software Technology: Quality Management (p. 481)	2/1	S	5	A. Oberweis
SBI	Special Topics of Enterprise Information Systems (p. 486)	2/1	W/S	5	A. Oberweis
25700sp	Special Topics of Efficient Algorithms (p. 487)	2/1	W/S	5	H. Schmeck
KompMansp	Special Topics of Complexity Management (p. 488)	2/1	W/S	5	D. Seese
SSEsp	Special Topics of Software- and Systemsengineering (p. 489)	2/1	W/S	5	A. Oberweis, D. Seese
25860sem	Special Topics of Knowledge Management (p. 490)	2/1	W/S	5	R. Studer
2511602	Strategic Management of Information Technology (p. 509)	2/1	S	5	T. Wolf
2511502	Web Service Engineering (p. 576)	2/1	S	5	C. Zirpins
2511204	Workflow-Management (p. 588)	2/1	S	5	A. Oberweis
PraBI	Computing Lab Information Systems (p. 384)	2	W/S	4	A. Oberweis, D. Seese, R. Studer

25700p	Advanced Lab in Efficient Algorithms (p. 385)	3	W/S	4	H. Schmeck
25762p	Computing Lab in Intelligent Systems in Finance (p. 386)	3	W/S	4	D. Seese
25810	Practical Seminar Knowledge Discovery (p. 459)	2	S	4	R. Studer
25818	Computing Lab in Complexity Management (p. 387)	3	W/S	4	D. Seese
25820	Lab Class Web Services (p. 390)	2	W	4	S. Tai, C. Zirpins
25740p	Ecxercises in Knowlegde Management (p. 391)	3	W/S	4	R. Studer
2511504	Cloud Computing (p. 189)	2/1	W	5	S. Tai, Kunze
2511218	n.n. (p. 151)	2/0	W	4	R. Kneuper

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.

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

Recommendations
Knowledge of the content of the module *Emphasis in Informatics* [WI4INFO2] is helpful.

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.

5.4 Operations Research

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

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2550486	Facility Location and Strategic Supply Chain Management (p. 496)	2/1	S	4.5	S. Nickel
2550488	Tactical and Operational Supply Chain Management (p. 517)	2/1	W	4.5	S. Nickel
2550480	Operations Research in Supply Chain Management (p. 362)	2/1	S	4.5	S. Nickel
2550495	Operations Research in Health Care Management (p. 361)	2/1	S	4.5	S. Nickel
2550493	Hospital Management (p. 319)	2/0	W/S	2	S. Nickel, Hansis
2550498	Practical seminar: Health Care Management (with Case Studies) (p. 392)	2/1/2	W/S	7	S. Nickel
2550497	Software Laboratory: OR Models II (p. 478)	2/1	S	4.5	S. Nickel
n.n.	Software Laboratory: Simulation (p. 480)	2/1	S	4.5	S. Nickel
n.n.	Software Laboratory: SAP APO (p. 479)	2/1	S	4.5	S. Nickel
2550494	Production Planning and Scheduling (p. 397)	2/1	S	4.5	J. Kalcsics

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

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

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

Learning Outcomes
The student

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

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

Remarks
Some lectures and courses are offered irregularly.
The planned lectures and courses for the next three years are announced online (http://www.ior.kit.edu).

Module: Mathematical Programming [WI4OR6]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25138	Mixed Integer Programming I (p. 253)	2/1	S	4.5	O. Stein
25140	Mixed Integer Programming II (p. 254)	2/1	W	4.5	O. Stein
25128	Special Topics in Optimization I (p. 491)	2/1	W/S	4.5	O. Stein
25126	Special Topics in Optimization II (p. 492)	2/1	W/S	4.5	O. Stein
2550484	Graph Theory and Advanced Location Models (p. 265)	2/1	W	4.5	S. Nickel
2550497	Software Laboratory: OR Models II (p. 478)	2/1	S	4.5	S. Nickel
2550111	Nonlinear Optimization I (p. 357)	2/1	S	4.5	O. Stein
2550113	Nonlinear Optimization II (p. 358)	2/1	S	4.5	O. Stein
2550134	Global Optimization I (p. 260)	2/1	W	4.5	O. Stein
2550136	Global Optimization II (p. 261)	2/1	W	4.5	O. Stein

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

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

Learning Outcomes
The student

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

Remarks
The lectures are partly offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu).
For the lectures of Prof. Stein a grade of 30 % of the exercise course has to be fulfilled. The description of the particular lectures is more detailed.

Module: Stochastic Modelling and Optimization [WI4OR7]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2550679	Markov Decision Models I (p. 503)	2/1/2	W	5	K. Waldmann
2550682	Markov Decision Models II (p. 504)	2/1/2	S	4.5	K. Waldmann
2550674	Quality Control I (p. 405)	2/1/2	W	4.5	K. Waldmann
25659	Quality Control II (p. 406)	2/1/2	S	4.5	K. Waldmann
25687	Optimization in a Random Environment (p. 364)	2/1/2	W/S	4.5	K. Waldmann
2550662	Simulation I (p. 471)	2/1/2	W	4.5	K. Waldmann
2550665	Simulation II (p. 472)	2/1/2	S	4.5	K. Waldmann
25688	OR-oriented modeling and analysis of real problems (project) (p. 365)	1/0/3	W/S	4.5	K. Waldmann

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

Conditions
None.

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

Content
see courses

5.5 Statistics

Module: Mathematical and Empirical Finance [WI4STAT1]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2521331	Stochastic Calculus and Finance (p. 502)	2/1	W	4,5	S. Rachev
2521359	Financial Time Series and Econometrics (p. 248)	2/1	W	5	S. Rachev
2520381	Advanced Econometrics of Financial Markets (p. 145)	2/1	S	5	S. Rachev
2520357	Portfolio and Asset Liability Management (p. 382)	2/1	S	5	S. Rachev
25350/1	Finance and Banking (p. 250)	2/2	W	5	K. Vollmer
2520355	Bank Management and Financial Markets, Applied Econometrics (p. 170)	2/2	S	5	K. Vollmer

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

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

Learning Outcomes

Content

Module: Statistical Methods in Risk Management [WI4STAT2]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2521353	Statistical Methods in Financial Risk Management (p. 497)	2/1	W	4,5	S. Rachev
2520337	Stochastic and Econometric Models in Credit Risk Management (p. 501)	2/2	S	5	S. Rachev
2520357	Portfolio and Asset Liability Management (p. 382)	2/1	S	5	S. Rachev
2520342	Operational Risk and Extreme Value Theory (p. 360)	2/2	W	5	S. Rachev
2520375	Data Mining (p. 198)	2	W	5	G. Nakhaeizadeh
2520317	Multivariate Methods (p. 354)	2/2	S	5	W. Heller

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

Conditions
The lecture *Statistical Methods in Financial Risk Management* [2521353] is mandatory.

Learning Outcomes

Content

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

Module: Risk Management and Econometrics in Finance [WI4STAT3]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2521353	Statistical Methods in Financial Risk Management (p. 497)	2/1	W	4,5	S. Rachev
2521359	Financial Time Series and Econometrics (p. 248)	2/1	W	5	S. Rachev
2520381	Advanced Econometrics of Financial Markets (p. 145)	2/1	S	5	S. Rachev

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

Conditions
None.

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

Learning Outcomes

Content

5.6 Engineering Sciences

Module: Selected Chapters from Production Engineering I [WI4INGMB1]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2149657	Manufacturing Engineering (p. 246)	4/1	W	9	V. Schulze
2150660	Integrated Production Planning (p. 306)	4/2	S	9	Lanza, Gisela
2149901	Machine Tools and Industrial Handling II (p. 580)	2/1	W	4,5	Munzinger
21692	International Production and Logistics (p. 311)	2	S	3	Lanza
2149669	Materials and Processes in Automotive Lightweight Construction (p. 339)	2	W	4	Haepp
2149667	Quality Management (p. 404)	2	W	4	Lanza, Gisela
2150690	Production Systems and Production Technology in Major Assembly Production (p. 398)	2	S	4	Stauch
21690sem	Seminar paper “Production Engineering” (p. 458)	2	W/S	3	V. Schulze, Lanza, Munzinger

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

Conditions
None.

Recommendations
It is recommended to attend or to have successfully attended at least one of the basic lectures *Manufacturing Engineering*, *Integrated Production Planning*, and *Machine Tools I/II*.

Learning Outcomes
The student

- has thorough knowledge of the subject matters covered by the production engineering modules (manufacturing engineering, organisation and planning, machine tools and robots),
- is able to use this knowledge in a targeted and skilful way for an efficient production engineering

Content
This module from the field of engineering science provides thorough knowledge of production engineering, including advanced courses on selected aspects of production engineering in addition to manufacturing engineering, machine tools and handling technology and organisation and planning. Students will be given hands-on demonstrations by means of examples from industry.

Module: Selected Chapters from Production Engineering II [WI4INGMB2]

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

ECTS Credits	Cycle	Duration
18	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2149657	Manufacturing Engineering (p. 246)	4/1	W	9	V. Schulze
2150660	Integrated Production Planning (p. 306)	4/2	S	9	Lanza, Gisela
2149901	Machine Tools and Industrial Handling II (p. 580)	2/1	W	4,5	Munzinger
21692	International Production and Logistics (p. 311)	2	S	3	Lanza
2149669	Materials and Processes in Automotive Lightweight Construction (p. 339)	2	W	4	Haepp
2149667	Quality Management (p. 404)	2	W	4	Lanza, Gisela
2150690	Production Systems and Production Technology in Major Assembly Production (p. 398)	2	S	4	Stauch
21690sem	Seminar paper “Production Engineering” (p. 458)	2	W/S	3	V. Schulze, Lanza, Munzinger

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.

Conditions
None.

Recommendations
It is recommended to attend or to have successfully attended at least one of the basic lectures *Manufacturing Engineering*, *Integrated Production Planning*, and *Machine Tools I/II*.

Learning Outcomes
The student

- has thorough knowledge of the subject matters covered by the production engineering modules (manufacturing engineering, organisation and planning, machine tools and robots),
- is able to use this knowledge in a targeted and skilful way for an efficient production engineering

Content
This module from the field of engineering science provides thorough knowledge of production engineering, including advanced courses on selected aspects of production engineering in addition to manufacturing engineering, machine tools and handling technology and organisation and planning. Students will be given hands-on demonstrations by means of examples from industry

Module: Selected Chapters from Production Engineering III [WI4INGMB3]

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

ECTS Credits	Cycle	Duration
27	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2149657	Manufacturing Engineering (p. 246)	4/1	W	9	V. Schulze
2150660	Integrated Production Planning (p. 306)	4/2	S	9	Lanza, Gisela
2149901	Machine Tools and Industrial Handling II (p. 580)	2/1	W	4,5	Munzinger
21692	International Production and Logistics (p. 311)	2	S	3	Lanza
2149669	Materials and Processes in Automotive Lightweight Construction (p. 339)	2	W	4	Haepp
2149667	Quality Management (p. 404)	2	W	4	Lanza, Gisela
2150690	Production Systems and Production Technology in Major Assembly Production (p. 398)	2	S	4	Stauch
21690sem	Seminar paper “Production Engineering” (p. 458)	2	W/S	3	V. Schulze, Lanza, Munzinger

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

Conditions
None.

Recommendations
It is recommended to attend or to have successfully attended at least one of the basic lectures *Manufacturing Engineering*, *Integrated Production Planning*, and *Machine Tools I/II*.

Learning Outcomes
The student

- has thorough knowledge of the subject matters covered by the production engineering modules (manufacturing engineering, organisation and planning, machine tools and robots),
- is able to use this knowledge in a targeted and skilful way for an efficient production engineering

Content
This module from the field of engineering science provides thorough knowledge of production engineering, including advanced courses on selected aspects of production engineering in addition to manufacturing engineering, machine tools and handling technology and organisation and planning. Students will be given hands-on demonstrations by means of examples from industry.

Module: Introduction to Logistics [WI4INGMB20]

Coordination: Kai Furmans
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Engineering Science

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2117051	Material Flow in Logistic Systems (p. 338)	3/1	W	6	K. Furmans
2118090	Quantitative Methods for Supply Chain Risk Management (p. 408)	3/1	W	6	Cardeneo
2118083	IT for Facility Logistics (p. 315)	3/1	S	6	Thomas
2118097	Warehouse and Distribution Systems (p. 322)	2	S	4	Christian Huber
2117056	Airport Logistics (p. 329)	2	W	4	Richter
2117061	Safety Engineering (p. 467)	2	W	4	Kany
21064	Industrial Application of Technological Logistics instancing Crane Systems (p. 156)	2	W	4	Golder
2118089	Industrial Application of Material Handling Systems in Sorting and Distribution Systems (p. 157)	2	S	4	Föller
2118085	Automotive Logistics (p. 328)	2	S	4	K. Furmans
2118094	Information Systems and Supply Chain Management (p. 295)	2	S	4	Kilger
2117500	Energy efficient intralogistic systems (p. 222)	2	W	4	Schönung
2117081	Technical Logistics I, basics (p. 518)	2/1	W	4	M. Mittwollen
2117082	Technical Logistics I, basics and systems (p. 519)	3/1	W	6 (ggf. kontextabhängig)	M. Mittwollen

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.
To improve the overall grade of the module up to one grading scale (0.3) there might be taken an optional term paper in the field of the IFL. The term paper may not be convalidated in the seminar module.

Conditions
It is obligatory to choose one of the following courses:

- *Material Flow in Logistic Systems*
- *Technical Logistics I*
- *Quantitative Risk Management of Logistic Systems*
- Out of [2117081] *Technische Logistik I, Grundlagen* and [2117082] *Technische Logistik I, Grundlagen und Systeme* only one of these both is allowed to be taken.

Note: In case one of the courses has been taken already within the Bachelor's module *Introduction to Technical Logistics* [WW3INGMB13], a different course has to be chosen here.

Learning Outcomes
The student

- acquires an overview of different logistic questions in practice,
- is able to model logistic systems with adequate accuracy by using simple models,

- is able to handle analytical methods for a performance evaluation of logistic systems,
- is able to identify cause and effects within logistic systems.

Content
The module *Introduction to Logistics* provides well-founded knowledge in main questions of logistics. In this module, focuses on the acquisition of theoretical basics linked with exemplary practice questions are laid. To gain a deeper understanding, the course is accompanied by exercises and further improved by case studies.

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

Module: Technical Logistics and Logistic Systems [WI4INGMB11]

Coordination: Kai Furmans
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Engineering Science

ECTS Credits	Cycle	Duration
18	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2118078	Logistics - Organisation, Design, and Control of Logistic Systems (p. 326)	3/1	S	6	K. Furmans
2117051	Material Flow in Logistic Systems (p. 338)	3/1	W	6	K. Furmans
21060	Analytical Models for Material Flow (p. 150)	3/1	W	6	K. Furmans
21062	Supply Chain Management (p. 512)	3/1	W	6	Alicke
2118090	Quantitative Methods for Supply Chain Risk Management (p. 408)	3/1	W	6	Cardeneo
2118083	IT for Facility Logistics (p. 315)	3/1	S	6	Thomas
2118097	Warehouse and Distribution Systems (p. 322)	2	S	4	Christian Huber
2117056	Airport Logistics (p. 329)	2	W	4	Richter
2118085	Automotive Logistics (p. 328)	2	S	4	K. Furmans
2117061	Safety Engineering (p. 467)	2	W	4	Kany
21064	Industrial Application of Technological Logistics instancing Crane Systems (p. 156)	2	W	4	Golder
2118089	Industrial Application of Material Handling Systems in Sorting and Distribution Systems (p. 157)	2	S	4	Föller
2118094	Information Systems and Supply Chain Management (p. 295)	2	S	4	Kilger
2117500	Energy efficient intralogistic systems (p. 222)	2	W	4	Schönung
2117081	Technical Logistics I, basics (p. 518)	2/1	W	4	M. Mittwollen
2117082	Technical Logistics I, basics and systems (p. 519)	3/1	W	6 (ggf. kontextabhängig)	M. Mittwollen
2118081	Technical Logistics II, selected application examples (p. 521)	2/1	S	4	M. Mittwollen
2149610	Global Production and Logistics - part 1: Global Production (p. 262)	2	W	4	Lanza
2149600	Global Production and Logistics - part 2: Global Logistics (p. 263)	2	S	4	K. Furmans

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.
To improve the overall grade of the module up to one grading scale (0.3) there might be taken an optional term paper in the field of the IFL. The term paper may not be convalidated in the seminar module.

Conditions
It is obligatory to choose two of the following courses:

- *Logistics - Organisation, Design, and Control of Logistic Systems*
- *Material Flow in Logistic Systems*
- *Technical Logistics I*
- *Analytical Models for Material Flow*
- *IT for Facility Logistics*
- *Supply Chain Management*
- *Quantitative Methods for Supply Chain Risk Management*
- Out of [2117081] *Technische Logistik I*, *Grundlagen* and [2117082] *Technische Logistik I, Grundlagen und Systeme* only one of these both is allowed to be taken.

Learning Outcomes
The student

- acquires comprehensive and well-founded knowledge about the main questions of logistics, an overview of different logistic questions in practice and knows the functionality and components of conveyor technology systems,
- is able to illustrate logistic systems with adequate accuracy by using simple models,
- is able to handle analytical methods for a performance evaluation of logistic systems,
- is able to realize coherences within logistic systems,
- is able to evaluate logistic systems by using the learnt methods.

Content
The module *Technical Logistics and Logistic Systems* provides comprehensive and well-founded insights into main topics of logistics. Within the framework of the lectures, the interaction between several components of logistic systems will be shown. The module focuses on technical characteristics of conveyor technique as well as on methods for illustrating and evaluating logistics systems. To gain a deeper understanding, the course is accompanied by exercises and further improved by case studies.

Remarks
See German version.

Module: Automotive Engineering [WI4INGMB5]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2113805	Basics of Automotive Engineering I (p. 267)	4	W	6	F. Gauterin, Unrau
2114835	Basics of Automotive Engineering II (p. 268)	2	S	3	F. Gauterin, Unrau
2115817	Project Workshop-Automative Engineering (p. 400)	3	W/S	4.5	F. Gauterin
21814	Fundamentals for Design of Motor-Vehicle Bodies I (p. 280)	1	W	1.5	Bardehle
21840	Fundamentals for Design of Motor-Vehicle Bodies II (p. 281)	1	S	1.5	Bardehle
2114093	Fluid Power Systems (p. 251)	2	S	3	M. Geimer
2114092	CAN-Bus Release Control (p. 185)	2	S	3	M. Geimer

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.

Conditions
None.

Recommendations
Knowledge of the content of the courses *Engineering Mechanics I* [2161208], *Engineering Mechanics II* [8001092] and *Basics of Automotive Engineering I* [2113805], *Basics of Automotive Engineering II* [2114835] is helpful.

Learning Outcomes
The student

- knows the most important components of a vehicle,
- knows and understands the functioning and the interaction of the individual components,
- knows the basics of dimensioning the components.

Content

Module: Handling Characteristics of Motor Vehicles [WI4INGMB6]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2113806	Vehicle Comfort and Acoustics I (p. 244)	2	W	3	F. Gauterin
2114825	Vehicle Comfort and Acoustics II (p. 245)	2	S	3	F. Gauterin
2113807	Handling Characteristics of Motor Vehicles I (p. 241)	2	W	3	Unrau
2114838	Handling Characteristics of Motor Vehicles II (p. 242)	2	S	3	F. Gauterin
2115817	Project Workshop-Automative Engineering (p. 400)	3	W/S	4.5	F. Gauterin
2113816	Vehicle Mechatronics I (p. 243)	2	W	3	Ammon
21850	Driving Dynamics Evaluation within the Global Vehicle Simulation (p. 240)	2/0	S	3	Schick

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.

Conditions
None.

Recommendations
Knowledge of the content of the courses *Engineering Mechanics I* [2161208], *Engineering Mechanics II* [2162226] and *Basics of Automotive Engineering I* [2113805], *Basics of Automotive Engineering II* [2114835] is helpful.

Learning Outcomes
The student

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

Content

Module: Vehicle Development [WI4INGMB14]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2115817	Project Workshop-Automative Engineering (p. 400)	3	W/S	4.5	F. Gauterin
2113816	Vehicle Mechatronics I (p. 243)	2	W	3	Ammon
21812	Fundamentals in the Development of Commercial Vehicles I (p. 282)	1	W	1.5	Zürn
21844	Fundamentals in the Development of Commercial Vehicles II (p. 283)	1	S	1.5	Zürn
21810	Fundamentals in the Development of Passenger Vehicles I (p. 284)	1	W	1.5	Frech
21842	Fundamentals in the Development of Passenger Vehicles II (p. 285)	1	S	1.5	Frech
2114843	Basics and Methods for Integration of Tires and Vehicles (p. 279)	2	S	3	Leister
2114095	Simulation of coupled systems (p. 470)	2	S	3	M. Geimer

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.

Conditions
None.

Recommendations
Knowledge of the content of the courses *Engineering Mechanics I* [2161208], *Engineering Mechanics II* [2162226] and *Basics of Automotive Engineering I* [2113805], *Basics of Automotive Engineering II* [2114835] is helpful.

Learning Outcomes
The student

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

Content

Module: Mobile Machines [WI4INGMB15]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2114093	Fluid Power Systems (p. 251)	2	S	3	M. Geimer
2114095	Simulation of coupled systems (p. 470)	2	S	3	M. Geimer
2114092	CAN-Bus Release Control (p. 185)	2	S	3	M. Geimer
2113073	Mobile Machines (p. 346)	4	W	6	M. Geimer
21812	Fundamentals in the Development of Commercial Vehicles I (p. 282)	1	W	1.5	Zürn
21844	Fundamentals in the Development of Commercial Vehicles II (p. 283)	1	S	1.5	Zürn

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.

Conditions
None.

Recommendations
Knowledge of Fluid Power Systems are helpful, otherwise it is recommended to take the course *Fluid Power Systems* [2114093].

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.

Module: Combustion Engines [WI4INGMB16]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2133101	Combustion Engines A (p. 541)	4/2	W	9	Spicher
2134135	Combustion Engines B (p. 542)	2/1	S	5	Spicher
2134137	Engine Measurement Technologies (p. 352)	2	S	4	Bernhardt
21112	Supercharging of Internal Combustion Engines (p. 166)	2	S	4	Golloch
21114	Simulation of Spray and Mixture Formation in Internal Combustion Engines (p. 474)	2	W	4	Baumgarten
21134	Methods in Analyzing Internal Combustion (p. 343)	2	S	4	Wagner
2133109	Motor Fuels for Combustion Engines and their Verifications (p. 179)	2	W	4	Volz

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* [2133101]: 6
- *Combustion Engines B* [2134135]: 4
- all the rest: 3

Conditions
The course *Combustion Engines A [2133101]* is obligatory.

Recommendations
Knowledge in the area of thermodynamics is helpful.

Learning Outcomes

Content

Module: Engine Development [WI4INGMB17]

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

ECTS Credits	Cycle	Duration
18	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2133101	Combustion Engines A (p. 541)	4/2	W	9	Spicher
2134135	Combustion Engines B (p. 542)	2/1	S	5	Spicher
21112	Supercharging of Internal Combustion Engines (p. 166)	2	S	4	Golloch
21114	Simulation of Spray and Mixture Formation in Internal Combustion Engines (p. 474)	2	W	4	Baumgarten
21134	Methods in Analyzing Internal Combustion (p. 343)	2	S	4	Wagner
2133109	Motor Fuels for Combustion Engines and their Verifications (p. 179)	2	W	4	Volz
2134138	Internal Combustion Engines and Exhaust Gas Aftertreatment Technology (p. 272)	2	S	4	Lox
2134137	Engine Measurement Technologies (p. 352)	2	S	4	Bernhardt

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

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

Recommendations
Knowledge in the area of thermodynamics is helpful.

Learning Outcomes

Content

Module: Specific Topics in Material Science [WI4INGMB18]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2178643	Constitution and Properties of Wear Resistant Materials (p. 163)	2	S	4	Ulrich
2177601	Constitution and Properties of Protective Coatings (p. 164)	2	W	4	Ulrich
2125755	Introduction in Ceramics (p. 212)	2	W	4	M. Hoffmann
2173560	Experimental Lab Class in Welding Technology, in Groups (p. 238)	3	W	1	V. Schulze
21575	Foundry Technology (p. 259)	2	S	4	Wilhelm
21754	Principles of Ceramic and Powder Metallurgy Processing (p. 270)	2	W	4	Oberacker
21642	Laser Application in Automotive Engineering (p. 323)	2	S	4	Schneider
21640	Laser Materials Processing (p. 324)	3	W/S	1	Schneider
2181612	Physical Basics of Laser Technology (p. 377)	2/1	W	5	Schneider
2174596	Polymerengineering II (p. 381)	2	S	4	P. Elsner
2173590	Polymerengineering I (p. 380)	2	W	4	P. Elsner
21751	Practical Course in Engineering Ceramics (p. 388)	2	W	1	Porz
21562	Failure Analysis (p. 420)	2	W	4	Poser-Keppler
21565/21570	Welding Technology I/II (p. 422)	2	W/S	4	Spies
2126775	Structural and Functional Ceramics (p. 510)	2	S	4	M. Hoffmann
2177618	Superhard Thin Film Materials (p. 511)	2	W	4	Ulrich
2174576	Systematic Selection of Materials (p. 515)	2/1	S	5	Wanner
21715	Failure of Structural Materials: Fatigue and Creep (p. 554)	2	W	4	Gruber
21711	Failure of Structural Materials: Deformation and Fracture (p. 555)	2	W	4	Weygand
2174574	Materials of Leightweight Construction (p. 577)	2	S	4	Weidenmann
2173553	Material Science and Engineering III (p. 578)	4/1	W	6	Wanner
2126749	High Performance Powder Metallurgy Materials (p. 403)	2	S	4	R. Oberacker

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

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].

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

Learning Outcomes

Content

Module: Virtual Engineering [WI4INGMB22]

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

ECTS Credits	Cycle	Duration
18	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2121352	Virtual Engineering I (p. 561)	2/3	W	6	J. Ovtcharova
2122378	Virtual Engineering II (p. 562)	2/1	S	4	
2121370	Virtual Engineering for Mechatronic Products (p. 560)	3/0	W	4	J. Ovtcharova, S. Rude
2123364	Product, Process and Ressource Integration in the Automotive Development (p. 395)	2/1	W/S	4	S. Mbang
2122387	Computer Integrated Planning of New Products (p. 410)	2/0	S	4	R. Kläger
2185264	Simulation Methods in Product Development Process (p. 473)	2/1	W	4.5	J. Ovtcharova, A. Albers, T. Böhlke
2122371	Efficient Creativity - Processes and Methods within the Automotive Industry (p. 210)	2	S	4	Lamberti

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).

Conditions
None.

Learning Outcomes

Content

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

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

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

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19026	Design Basics in Highway Engineering (p. 175)	1/1	S	3	R. Roos
19065	Design and Construction Highways (p. 232)	1/1	S	3	R. Roos
19301s	Operation and Maintenance Highways (p. 178)	2	S	3	R. Roos

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.

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

Module: Highway Engineering [WI4INGBGU2]

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

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

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19065	Design and Construction Highways (p. 232)	1/1	S	3	R. Roos
19301s	Operation and Maintenance Highways (p. 178)	2	S	3	R. Roos
19302	Environmental Impact of Roads (p. 536)	1	S	1.5	R. Roos
19303s	Special Topics in Highway Engineering (p. 177)	1	S	1.5	R. Roos

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.

Conditions
The successful completion of the course *Design Basics in Highway Engineering* [19026] is assumed. This course may be attended in the module *Design, Construction, Operation and Maintenance Highways* or be already completed in a previous study programme.
The participation in the project Integrated Planning within the branch Highway Engineering or writing a student research paper is obligatory.

Learning Outcomes

Content

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

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19316	EDV in Highway Engineering (p. 206)	1/1	W	3	M. Zimmermann
19315	Safety Management in Highway Engineering (p. 466)	1	W	2	M. Zimmermann
19314	Seminar in Highway Engineering - Mitigation of an accident black spot (p. 431)	2	S	1,5	M. Zimmermann
VLBGU	Laws concerning Traffic and Roads (p. 546)	2	S	3	A. Kuder

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.

Conditions
The successful completion of the course *Design Basics in Highway Engineering* [19026] is assumed. This course may be attended in the module *Design, Construction, Operation and Maintenance Highways* or be already completed in a previous study programme.

Learning Outcomes

Content

Module: Public Transportation Operations [WI4INGBGU4]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19321	Railway Logistics, Management and Operating - Part II (p. 213)	2	S	3	E. Hohnecker
19327w	Operating Models in Railway Engineering (p. 348)	1	W	1,5	E. Hohnecker
19327s	Public Transit in Cities and Regions (p. 421)	2	S	3	E. Hohnecker
19320	Customer Orientation in Public Transport (p. 321)	1	S	1,5	E. Hohnecker
19307s	Construction and Maintenance of Railway Infrastructure (p. 172)	1	S	1.5	E. Hohnecker, H. Müller
19325	Law in Public Transport (p. 411)	1	W	1,5	R. Schweinsberg

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.

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

Module: Project in Public Transportation [WI4INGBGU5]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19323	Project in Public Transportation I (p. 549)	4	S	4	E. Hohnecker
19324	Project in Public Transportation II (p. 550)	2	W	2	E. Hohnecker
19324	Economics in Public Transport (p. 583)	1	W	1	E. Hohnecker
19314	Transport Policy (p. 147)	2	W/S	2	H. Zemlin
19313	Planning and Operation of Public Transport Systems (p. 379)	2	S	2	W. Weißkopf

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.

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

Module: Guided Systems Engineering [WI4INGBGU6]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
23346	Electrical Rail Vehicles (p. 215)	2	S	3	G. Clos
19322	Mechanical Models in Railway Engineering (p. 342)	1	S	1,5	E. Hohnecker
19307s	Construction and Maintenance of Railway Infrastructure (p. 172)	1	S	1.5	E. Hohnecker, H. Müller
19307w	Station and Rail Transport Facilities (p. 547)	2/2	W	3	E. Hohnecker
19308	Freight Transport (p. 287)	1	W	1,5	B. Chlond
19326	Development and Concept of Track-Led Systems (p. 231)	1	W	1,5	E. Hohnecker

Learning Control / Examinations

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

Module: Logistics and Management of Guided Systems [WI4INGBGU7]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19066	Basics of Ground Born Guided Systems (p. 278)	3/1	S	6	M. Weigel
19307w	Station and Rail Transport Facilities (p. 547)	2/2	W	3	E. Hohnecker

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.

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

Learning Outcomes

Content

Remarks
see German Version

Module: Transportation Systems [WI4INGBGU8]

Coordination: Dirk Zumkeller
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Engineering Science

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19027	Basics in Transport Planning and Traffic Engineering (p. 553)	1/1	S	3	P. Vortisch, B. Chlond
19301w	Transport Planning Methods (p. 548)	1/1	W	3	P. Vortisch
19062	Transport System Planning (p. 551)	2/1	S	4,5	P. Vortisch
19308	Freight Transport (p. 287)	1	W	1,5	B. Chlond

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.

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
The students

- know and understand the fundamental principles of the transportation system
- will learn the systemic perspective from the transportation field against the perspectives of inndividuals or enterprises
- will thus be able to integrate both perspectives in the planning and optimization of processes

Content
The logistics optimizes processes from the perspective of enterprises. This is in conflict with the ideas of an optimised overall system. This module deals with the superior perspective of the transport system and such thus offers the chance to incorporate and understand both perspectives. The courses lay their emphasis more on transport planning field than on traffic engineering.

The module addresses itself to students in logistics who besides the perspective from the enterprises should be aware of the societal perspective (transport system).

Module: Transportation Ia [WI4INGBGU9]

Coordination: Dirk Zumkeller
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Engineering Science

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19027	Basics in Transport Planning and Traffic Engineering (p. 553)	1/1	S	3	P. Vortisch, B. Chlond
19301w	Transport Planning Methods (p. 548)	1/1	W	3	P. Vortisch
19303w	Traffic Engineering and Traffic Telematics (p. 552)	1/1	W	3	B. Chlond

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.

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
The students

- will have basic knowledge about the methodologies of transportation planning and traffic engineering from the perspective of the practioners (planners and engineers),
- will know the relevant aspects form the transportation sector in order to work in the management of transport authorities or the consulting sector.
- will be able, to analyse, to assess and to develop planning concepts from both perspectives.

Content
The transportation discipline deals with issues in the transport sector which range from planning concepts judged by overall societal criteria to technical problems of the organisation of flows of traffic. Alongside engineering and scientific methods, understanding from the social sciences (economics, ecology, empirical social research) needs to be integrated into the development of approaches to solutions for these problems. Therefore the courses are interdisciplinary.

Within the module all areas (transport planning methodology, knowledge about potential measures for influencing behaviour, the fundamentals of traffic engineering) will be dealt with.

Module: Transportation Ib [WI4INGBGU10]

Coordination: Dirk Zumkeller
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Engineering Science

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19301w	Transport Planning Methods (p. 548)	1/1	W	3	P. Vortisch
19062	Transport System Planning (p. 551)	2/1	S	4,5	P. Vortisch
19303w	Traffic Engineering and Traffic Telematics (p. 552)	1/1	W	3	B. Chlond

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.

Conditions
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].

Learning Outcomes
The students

- will have basic knowledge about the methodologies of transportation planning and traffic engineering from the perspective of the practioners (planners and engineers),
- will know the relevant aspects form the transportation sector in order to work in the management of transport authorities or the consulting sector.
- will be able, to analyse, to assess and to develop planning concepts from both perspectives

Content
The transportation discipline deals with issues in the transport sector which range from planning concepts judged by overall societal criteria to technical problems of the organisation of flows of traffic. Alongside engineering and scientific methods, understanding from the social sciences (economics, ecology, empirical social research) needs to be integrated into the development of approaches to solutions for these problems. Therefore the courses are interdisciplinary.

Within the module relevant areas (transport planning methodology, knowledge about potential measures for influencing behaviour, the fundamentals of traffic engineering) will be dealt with.

Interest in the transportation sector will be required.

Module: Transportation II [WI4INGBGU11]

Coordination: Dirk Zumkeller
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Engineering Science

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19308	Freight Transport (p. 287)	1	W	1,5	B. Chlond
19062	Transport System Planning (p. 551)	2/1	S	4,5	P. Vortisch
19313	Planning and Operation of Public Transport Systems (p. 379)	2	S	2	W. Weißkopf
19305	Simulation Methods for Transport Modelling (p. 475)	1	W	1,5	P. Vortisch, S. Schnittger
19309	Application of Simulation Tools (p. 476)	0/1	S	1,5	P. Vortisch, M. Kagerbauer

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.

Conditions
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.
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
The students

- will have specialized knowledge in certain fields either of transportation planning or traffic engineering.
- will have applied relevant planning or traffic engineering software
- will be able to apply these knowledge in accordance to his/her profile in (planner or traffic engineer, specialization in transit) in the professional practice.

Content
The module is oriented at those who want to specialise in transport and like to work in this field. The courses have to be understood as an amendmend to the fundamental courses and include e.g. the application of software or the relevant legal framework for public transport / transit planning. Besides the courses from the Institute of Verkehrswesen other courses can be chosen from nearby disciplines such as “Spatial Planning”, “Highway and Railroad Engineering”, “Vehicle Construction” if this makes sense. In order to choose the relevant and appropriate combination of courses a consultation is heavily recommended. It is also necessary to agree the courses with the institute.

Module: Environmental Management [WI4INGBGU12]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19245	Material Flux Analyses - River Basin Management (p. 505)	2	W	3	S. Fuchs
19058	Principles of Bioengineering (p. 271)	1/1	S	3	J. Winter
19241	Reaction Mechanisms in Different Ecosystems (p. 409)	2	S	3	J. Winter
19260	Legislation of Water, Soil and Waste (p. 572)	2	S	3	E. Wolf
19246	Environment and Hygiene (p. 571)	1	S	1,5	H. Würdemann
19057/58	Seminar in Freshwater Ecology (p. 258)	2	S	1,5	S. Fuchs
19243	Field Course in Freshwater Ecology (p. 257)	2	S	1,5	S. Fuchs

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)
- 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.

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].

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

Learning Outcomes
The students develop system thinking and gain applicable knowledge and tools in regard to engineering methods.

Content

Module: Water Supply and Sanitation [WI4INGBGU13]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19057/58	Urban Water Resource Management and Ecological Engineering (p. 469)	2/1	W	4,5	S. Fuchs, J. Winter
19054	Process Engineering in Water Quality Management (p. 544)	2	S	3	E. Hoffmann
19243/44	Design of Wastewater Treatment Plants and Biosolids Reclaiming Systems (Design of Urban Water and Wastewater Management Systems) (p. 173)	1/1	W	3	E. Hoffmann
19248	Design and Planning of Urban Drainage Systems (p. 174)	1	S	1,5	S. Fuchs
19249	Semi- and Decentral Systems (p. 204)	1	S	1,5	E. Hoffmann, S. Fuchs
19054p	Laboratory - Process Engineering in Water Quality Management (p. 389)	2	S	1,5	E. Hoffmann
19059	Process Engineering in Waste Management (p. 543)	2	S	3	J. Winter

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)
- 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.

Conditions
None.

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

Learning Outcomes

Content

- Operation in the field of urban waste management
- Particular emphasis in regard to the Millenium Development

Module: Control Engineering I [WI4INGETIT1]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2300155	System Dynamics and Control Engineering (p. 516)	2/1	S	4.5	S. Hohmann
23180	Optimisation of Dynamic Systems (p. 363)	2/1	W	4.5	S. Hohmann

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

Conditions
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].

Recommendations
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.

Learning Outcomes
The students

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

Remarks
The cycle for the lecture *System Dynamics and Control Engineering [23155]* has been changed from winterterm into summerterm.

Module: Control Engineering II [WI4INGETIT2]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
23177	Control of Linear Multivariable Systems (p. 412)	3/1	W	6	M. Kluwe
23160	Automation of Discrete Event and Hybrid Systems (p. 169)	2/0	S	3	M. Kluwe

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

Conditions
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.

Learning Outcomes
The students

- have deeper knowledge in the field of control 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 continiuous and time discrete models are considered and methods for the analysis and the control design with different goals (decoupling, robustness) 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.

Module: Sensor Technology I [WI4INGETIT3]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
23231	Sensors (p. 460)	2	W	3	W. Menesklou
23232	Experimental Laboratories in Sensors and Actuators (p. 383)	4	S	6	W. Menesklou
23209	Systematic Product Development in Sensor Technology (p. 514)	1/1	W	3	Ivers-Tiffée, Riegel
23240	Sensor Systems (Integrated Sensor Actuator Systems) (p. 461)	2	S	3	Wersing
23233/23234	Seminar: Sensorik (p. 455)	2	W/S	3	W. Menesklou
21881	Micro-Actuators (p. 344)	2	S	3	Kohl

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

Conditions
The course *Sensor Technology* [23231] is obligatory and has to be attended. The elected courses must not be credited in the 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.

Recommendations
Knowledge of electrical engineering is assumed. Therefore it is recommended to attend the courses *Electrical Engineering II* [23224] beforehand.

Learning Outcomes
The student

- acquires fundamental principles in materials science and device technology of sensors.
- applies materials and sensors from the viewpoint of an application or development engineer.

Content
The operating principles of the most important sensors are taught. The student will learn to use the acquired knowledge for key issues relating to select and use sensors. Module *Sensor Technology I* gives an overview of the basic sensor principles. Module *Sensor Technology II* goes into specific topics of sensors and actuators further.

Module: Sensor Technology II [WI4INGETIT5]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
23232	Experimental Laboratories in Sensors and Actuators (p. 383)	4	S	6	W. Menesklou
23209	Systematic Product Development in Sensor Technology (p. 514)	1/1	W	3	Ivers-Tiffée, Riegel
23240	Sensor Systems (Integrated Sensor Actuator Systems) (p. 461)	2	S	3	Wersing
23233/23234	Seminar: Sensorik (p. 455)	2	W/S	3	W. Menesklou
21881	Micro-Actuators (p. 344)	2	S	3	Kohl

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

Conditions
It is only possible to choose this module in combination with the module *Sensor Technology I* [WI4INGETIT3]. The module is passed only after the final partial exam of *Sensor Technology I* is additionally passed.

Recommendations
Knowledge of electrical engineering is assumed. Therefore it is recommended to attend the courses *Electrical Engineering II* [23224] beforehand.

Learning Outcomes
The student

- acquires fundamental principles in materials science and device technology of sensors.
- applies materials and sensors from the viewpoint of an application or development engineer.

Content
The operating principles of the most important sensors are taught. The student will learn to use the acquired knowledge for key issues relating to select and use sensors. Sensor module I gives an overview of the basic sensor principles. Sensor module II goes into specific topics of sensors and actuators further.

Module: Electrical Power Engineering [WI4INGETIT4]

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

ECTS Credits	Cycle	Duration
18	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
23372/23374	Power Transmission and Power Network Control (p. 227)	2/1	S	4,5	T. Leibfried
23381	Windpower (p. 582)	2/0	W	3	Lewald
23385	Lectures on HVDC and FACTS – Benefits of Power Electronics for Security and Sustainability of Power Supply (p. 289)	2/0	W	3	Retzmann
23380	Photovoltaic Systems Technology (p. 376)	2/0	S	3	Schmidt
23360/23362	High-Voltage Technology I (p. 292)	2/1	W	4.5	Badent
23361/23363	High-Voltage Technology II (p. 293)	2/1	S	4.5	Badent
23392/23394	High-Voltage Test Technique (p. 291)	2/1	W	4,5	Badent

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.

Conditions
The course *Power Transmission and Power Network Control* [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.

Remarks
The course *Lectures on HVDC and FACTS – Benefits of Power Electronics for Security and Sustainability of Power Supply* [23385] is not offered any more. For exams please contact the institute.
The course *High-Voltage Technology I* [23360] is now offered in winter term, *High-Voltage Technology II* [23361] in summer term.
The module is not offered any more. Please see German version for details.

Module: Fuels, Environment and Global Development [WI4INGCV2]

Coordination: Georg Schaub
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Engineering Science

ECTS Credits	Cycle	Duration
18	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
22305	Fuels I: Fundamentals, Liquid Fuels, Petroleum Processing, Bio Fuels (p. 183)	2/1	W	6	G. Schaub
22303	Fuels II: Gases and Solids (p. 184)	2/1	S	6	Reimert
22501	Combustion Technology 1 (Basics) (p. 274)	2/1	S	6	Bockhorn
22507	Combustion Related Environmental Protection (p. 540)	2	S	4	Bockhorn
22319	Cycles and Global Development (p. 223)	2/0	W	4	G. Schaub

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.

Conditions
None.

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

Learning Outcomes

Content

Remarks
The module is not offered any more. It can be completed in winter term 2010/11. Afterwards student have to contact the co-ordinator in order to finish the module.

Module: High-Voltage Technology [WI4INGETIT6]

Coordination: Thomas Leibfried, Bernd Hoferer
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject:

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
23360/23362	High-Voltage Technology I (p. 292)	2/1	W	4.5	Badent
23361/23363	High-Voltage Technology II (p. 293)	2/1	S	4.5	Badent

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.

Conditions
None.

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.

Remarks
The module is new in winter term 2010/11 and replaces the former module *Electrical Power* [WI4INGETIT4].
The course *High-Voltage Technology I* [23360] is now offered in winter term, *High-Voltage Technology II* [23361] in summer term.

Module: Generation and transmission of renewable power [WI4INGETIT7]

Coordination: Thomas Leibfried, Bernd Hoferer
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject:

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
23372/23374	Power Transmission and Power Network Control (p. 227)	2/1	S	4,5	T. Leibfried
23371/23373	Power Network Analysis (p. 176)	2/2	W	6	T. Leibfried
23381	Windpower (p. 582)	2/0	W	3	Lewald
23380	Photovoltaic Systems Technology (p. 376)	2/0	S	3	Schmidt
23392/23394	High-Voltage Test Technique (p. 291)	2/1	W	4,5	Badent

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place at the beginning of the recess period. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the weighted average of the grades for each course and truncated after the first decimal.

Conditions
It is only possible to choose this module in combination with the module *High-Voltage Technology* [WI4INGETIT6]. The module is passed only after the final partial exam of *High-Voltage Technology* is additionally passed.
The courses Power Transmission and Power Network Control [23372/23374] and *Power Network Analysis [23371/23373]* are obligatory. *Power Network Analysis* can also be taken within the Bachelor's programme.

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.

Remarks
The module is new in winter term 2010/11 and replaces parts of the former module *Electrical Power* [WI4INGETIT4].
Credits of the course *Power Transmission and Power Network Control* have been changed to 4,5. Credits of the course *High-Voltage Test Technique* have been changed to 4,5.
The course *Power Network Analysis [23371/23373]* is new in summer term 2011.

Module: Principles of Food Process Engineering [WI4INGCV3]

Coordination: Volker Gaukel
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Engineering Science

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
22213	Principles of Process Engineering referring to Food I (p. 275)	2/0	W	4	V. Gaukel
22214	Principles of Process Engineering referring to Food II (p. 276)	2/0	S	4	V. Gaukel
22205/6	Quality Management of Food Processing (p. 407)	1/1	S	3	Schuchmann
22207	Food Science and Functionality (p. 325)	2	W	4	Watzl

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.

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.

Learning Outcomes

Content

Module: Specialization in Food Process Engineering [WI4INGCV4]

Coordination: Volker Gaukel
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Engineering Science

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
22205/6	Quality Management of Food Processing (p. 407)	1/1	S	3	Schuchmann
22207	Food Science and Functionality (p. 325)	2	W	4	Watzl
22209	Microbiology of Food (p. 345)	2	W	4	Franz
22215	Product Design (p. 416)	2	S	4	Schuchmann
22218	Modern Measurement Techniques for Process Optimization (p. 350)	2	S	4	Regier
22417	Scale up in Biology and Engineering (p. 419)	2	W	4	Hausmann
6602	Fundamentals of Food Chemistry (p. 273)	2	W/S	4	Loske
22229	The Making of Emulsions and Dispersions (p. 219)	2		3	Köhler

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.

Conditions
It is only possible to choose this module in combination with the module *Principles of Food Process Engineering* [WI4INGCV3].
The module is passed only after the final partial exam of *Principles of Food Process Engineering* is additionally passed.
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

Remarks
The course *The Making of Emulsions and Dispersions* [22229] was added in summer term 2011.

Module: Water Chemistry [WI4INGCV5]

Coordination: F.H. Frimmel
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Engineering Science

ECTS Credits	Cycle	Duration
18	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
22601	Chemical Technology of Water (p. 188)	2	W	4	F. Frimmel
22602	Excercises in Chemical Technology of Water (p. 530)	1	W	2	F. Frimmel
22603	Scientific Bases for Examination and Assessement of Water Quality (p. 356)	2	W	4	F. Frimmel
22618	Fundamentals of Waste Water Treatment (p. 266)	2	S	4	n.N.
22612	Oxidation Processes in Drinking Water Technology (p. 370)	2	S	4	F. Frimmel
22611	Sorption Processes in Water Treatment (p. 482)	2	S	4	Höll
22605	Membrane Separation in Water Treatment (p. 165)	1	W	2	F. Frimmel
22664	Laboratory Work “Water” (p. 575)	2	W	4	F. Frimmel, G. Abbt-Braun

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 *Laboratory Work “Water”* [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.

Conditions
The courses *Chemical Technology of Water* [22601] and *Excercises in Chemical Technology of Water* [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

Remarks
This module is not offered any more in favour of the new modules Water Chemistry I [WI4INGCV6] and II [WI4INGCV7]. Please see German version for details.

Module: Water Chemistry I [WI4INGCV6]

Coordination: F.H. Frimmel
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Engineering Science

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

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
22601	Chemical Technology of Water (p. 188)	2	W	4	F. Frimmel
22602	Excercises in Chemical Technology of Water (p. 530)	1	W	2	F. Frimmel
22664	Laboratory Work “Water” (p. 575)	2	W	4	F. Frimmel, G. Abbt-Braun

Learning Control / Examinations
The assessment is a general oral examination according to §4(2), 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 examination 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.

Conditions
None.

Learning Outcomes
The student
- has knowledge of types and sum of the water constituents and their interaction with each other and with the water molecules,
- knows and understands the basics of water chemistry and the most important methods for the treatment of different types of raw water.

Content
This module gives the basis to understand the most important methods of raw water treatment.
Therefore types and sum of water constituents and their interaction with each other and with water molecules are introduced.
The effects of the different treatment and purification methods are shown

Remarks
The module is new in summer term 2011 and replaces parts of the old module *Water Chemistry* [WI4INGCV5].

Module: Water Chemistry II [WI4INGCV7]

Coordination: F.H. Frimmel
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Engineering Science

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
22603	Scientific Bases for Examination and Assessement of Water Quality (p. 356)	2	W	4	F. Frimmel
22618	Fundamentals of Waste Water Treatment (p. 266)	2	S	4	n.N.
22612	Oxidation Processes in Drinking Water Technology (p. 370)	2	S	4	F. Frimmel
22605	Membrane Separation in Water Treatment (p. 165)	1	W	2	F. Frimmel

Learning Control / Examinations

Conditions
It is only possible to choose this module in combination with the module *Water Chemistry I* [WI4INGCV6]. The module is passed only after the final partial exam of *Water Chemistry I* is additionally passed.

Learning Outcomes
The student

- has knowledge of types and sum of the water constituents and their interaction with each other and with the water molecules,
- knows and understands the basics of water chemistry and the most important methods for the treatment of different types of raw water.
- knows about the different types of water treatment and water purification methods to convert, reduce or concentrate water constituents,

Content
The effects of the different treatment and purification methods are shown and it is explained how they can convert, reduce or concentrate water constituents.

Remarks
The module is new in summer term 2011 and replaces parts of the old module *Water Chemistry* [WI4INGCV5].

Module: Understanding and Prediction of Disasters I [WI4INGINTER1]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
04055	Engineering Seismology (p. 297)	3/1	S	5	Wenzel/Sokolov
19055	Hydraulic Engineering and Water Ressource Management I (p. 573)	2/2	W	6	F. Nestmann
19207	(p. 574)	2/1	S	4.5	B. Lehmann
19207	River Engineering and Ecology I (p. 269)	2	W	3	Dister
19213	River Engineering and Ecology II (p. 252)	1/1	S	3	Dister
19203	Morphodynamics of Rivers and Streams (p. 351)	1/1	W	3	F. Nestmann, B. Lehmann
19201	Foundations of Hydrological Planning (p. 294)	3/1	W	6	Ihringer
19212	Environment Communication (p. 533)	2/1	S	3	Kämpf

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

Conditions
None.

Learning Outcomes
See German version.

Content
See German version.

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

Module: Understanding and Prediction of Disasters II [WI4INGINTER2]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
04055	Engineering Seismology (p. 297)	3/1	S	5	Wenzel/Sokolov
19055	Hydraulic Engineering and Water Ressource Management I (p. 573)	2/2	W	6	F. Nestmann
19207	(p. 574)	2/1	S	4.5	B. Lehmann
19207	River Engineering and Ecology I (p. 269)	2	W	3	Dister
19213	River Engineering and Ecology II (p. 252)	1/1	S	3	Dister
19203	Morphodynamics of Rivers and Streams (p. 351)	1/1	W	3	F. Nestmann, B. Lehmann
19201	Foundations of Hydrological Planning (p. 294)	3/1	W	6	Ihringer
19212	Environment Communication (p. 533)	2/1	S	3	Kämpf

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

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

Learning Outcomes
See German version.

Content
See German version.

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

Module: Understanding and Prediction of Disasters III [WI4INGINTER3]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
04055	Engineering Seismology (p. 297)	3/1	S	5	Wenzel/Sokolov
19055	Hydraulic Engineering and Water Ressource Management I (p. 573)	2/2	W	6	F. Nestmann
19207	(p. 574)	2/1	S	4.5	B. Lehmann
19207	River Engineering and Ecology I (p. 269)	2	W	3	Dister
19213	River Engineering and Ecology II (p. 252)	1/1	S	3	Dister
19203	Morphodynamics of Rivers and Streams (p. 351)	1/1	W	3	F. Nestmann, B. Lehmann
19201	Foundations of Hydrological Planning (p. 294)	3/1	W	6	Ihringer
19212	Environment Communication (p. 533)	2/1	S	3	Kämpf

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

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

Learning Outcomes
See German version.

Content
See German version.

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

Module: Safety Science I [WI4INGINTER4]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2581962	Emissions into the Environment (p. 218)	2/0	W	3.5	U. Karl
19523	Contaminated Land Investigation, Evaluation and Remediation (p. 149)	2	W	4	Bieberstein et al.
09031	Design and Construction of Landfills for Municipal and Special Waste (p. 202)	2	W	4	Egloffstein
19621	Assessment of Development Planning (p. 161)	1/1	S	3	Kämpf
19404	Safety in Construction (p. 468)	1	S	1.5	Hirschberger, Sittinger
21562	Failure Analysis (p. 420)	2	W	4	Poser-Keppler
22308	Introduction to Process Safety in the Chemical Industry (p. 154)	2	S	4	Schmidt
2118090	Quantitative Methods for Supply Chain Risk Management (p. 408)	3/1	W	6	Cardeneo
20101	Fire safety in buildings (p. 182)	2	S	2	P. Pannier

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

Conditions
None.

Learning Outcomes
See German version.

Content
See German version.

Remarks
In agreement with the coordinator of the module other suitable courses than the ones displayed can be taken.
The course *Brandschutz im Hochbau* [20101] has been included in summer term 2011.

Module: Safety Science II [WI4INGINTER5]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2581962	Emissions into the Environment (p. 218)	2/0	W	3.5	U. Karl
19523	Contaminated Land Investigation, Evaluation and Remediation (p. 149)	2	W	4	Bieberstein et al.
09031	Design and Construction of Landfills for Municipal and Special Waste (p. 202)	2	W	4	Egloffstein
19621	Assessment of Development Planning (p. 161)	1/1	S	3	Kämpf
19404	Safety in Construction (p. 468)	1	S	1.5	Hirschberger, Sittinger
21562	Failure Analysis (p. 420)	2	W	4	Poser-Keppler
22308	Introduction to Process Safety in the Chemical Industry (p. 154)	2	S	4	Schmidt
2118090	Quantitative Methods for Supply Chain Risk Management (p. 408)	3/1	W	6	Cardeneo
20101	Fire safety in buildings (p. 182)	2	S	2	P. Pannier

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

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

Learning Outcomes
See German version.

Content
See German version.

Remarks
In agreement with the coordinator of the module other suitable courses than the ones displayed can be taken.
The module is offered as an extension module to *Safety Science I* from winter term 2010/11 on. Students that already began the double module can be assigned to the two single modules.
The course *Brandschutz im Hochbau* [17427] has been included in summer term 2011.

Module: Safety Science III [WI4INGINTER6]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2581962	Emissions into the Environment (p. 218)	2/0	W	3.5	U. Karl
19523	Contaminated Land Investigation, Evaluation and Remediation (p. 149)	2	W	4	Bieberstein et al.
09031	Design and Construction of Landfills for Municipal and Special Waste (p. 202)	2	W	4	Egloffstein
19621	Assessment of Development Planning (p. 161)	1/1	S	3	Kämpf
19404	Safety in Construction (p. 468)	1	S	1.5	Hirschberger, Sittinger
21562	Failure Analysis (p. 420)	2	W	4	Poser-Keppler
22308	Introduction to Process Safety in the Chemical Industry (p. 154)	2	S	4	Schmidt
2118090	Quantitative Methods for Supply Chain Risk Management (p. 408)	3/1	W	6	Cardeneo
20101	Fire safety in buildings (p. 182)	2	S	2	P. Pannier

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

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

Learning Outcomes
See German version.

Content
See German version.

Remarks
In agreement with the coordinator of the module other suitable courses than the ones displayed can be taken.
The module is offered as an extension module to *Safety Science I and II* from winter term 2010/11 on. Students that already began the triple module can be assigned to the three single modules.
The course *Brandschutz im Hochbau* [17427] has been included in summer term 2011.

Module: Combustion Engines I [WI4INGMB18]

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

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

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2133101	Combustion Engines A (p. 541)	4/2	W	9	Spicher

Learning Control / Examinations
The assessment of the module is carried out by a written examination about the lecture *Combustion Engines A* [2133101] (according to Section 4(2), 1 of the examination regulation). The grade of the module corresponds to the grade of this examination.

Conditions
None.

Learning Outcomes

Content

Module: Combustion Engines II [WI4INGMB19]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2134135	Combustion Engines B (p. 542)	2/1	S	5	Spicher
21112	Supercharging of Internal Combustion Engines (p. 166)	2	S	4	Golloch
2133109	Motor Fuels for Combustion Engines and their Verifications (p. 179)	2	W	4	Volz
2134138	Internal Combustion Engines and Exhaust Gas Aftertreatment Technology (p. 272)	2	S	4	Lox
21134	Methods in Analyzing Internal Combustion (p. 343)	2	S	4	Wagner
2134137	Engine Measurement Technologies (p. 352)	2	S	4	Bernhardt
21114	Simulation of Spray and Mixture Formation in Internal Combustion Engines (p. 474)	2	W	4	Baumgarten

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.

Conditions
It is only possible to choose this module in combination with the module *Combustion Engines I* [WI4INGMB18]. The module is passed only after the final partial exam of *Combustion Engines I* is additionally passed.
The course *Combustion Engines B* [2134135] has to be attended.

Recommendations
Basic skills in the subject of Thermodynamics are recommended.

Learning Outcomes

Content

Module: Manufacturing Engineering [WI4INGMB23]

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

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

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2149657	Manufacturing Engineering (p. 246)	4/1	W	9	V. Schulze

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 grading scale (0.3) there might be taken an optional term paper in the field of the the wbk. The term paper may not be convalidated in the seminar module.

Conditions
None.

Learning Outcomes

Content

Remarks
New module in winter term 2010/11.

Module: Integrated Production Planning [WI4INGMB24]

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

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

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2150660	Integrated Production Planning (p. 306)	4/2	S	9	Lanza, Gisela

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 grading scale (0.3) there might be taken an optional term paper in the field of the wbk. The term paper may not be convalidated in the seminar module.

Conditions
None.

Learning Outcomes

Content

Remarks
New module in winter term 2010/11.

Module: Specialization in Production Engineering [WI4INGMB22]

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

ECTS Credits	Cycle	Duration
9	Every term	

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2149667	Quality Management (p. 404)	2	W	4	Lanza, Gisela
2149669	Materials and Processes in Automotive Lightweight Construction (p. 339)	2	W	4	Haepp
2150681	Metal Forming (p. 531)	2	S	4	Herlan
2150683	Instrumentation and Control Technologies for Production Systems (p. 500)	2	S	4	Gönnheimer
2149655	Gear Cutting Technology (p. 559)	2	W	4	Felten
neu	(p. 168)	2	S	4	J. Fleischer

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 grading scale (0.3) there might be taken an optional term paper in the field of the wbk. The term paper may not be convalidated in the seminar module.

Conditions
It is only possible to choose this module in combination with the module *Manufacturing Engineering* [WI4INGMB23] **or**/**and** *Integrated Production Planning* [WI4INGMB24] **or**/**and** *Werkzeugmaschinen und Handhabungstechnik* [WI4INGMB32]. The module is passed only after the final partial exam of one of the above modules is additionally passed.

Learning Outcomes

Content

Remarks
New module in winter term 2010/11.
The course *Machine Tools and Industrial Handling I* [2149900] is not being offered anymore.

Module: Material Flow in Logistic Systems [WW4INGMB25]

Coordination: Kai Furmans
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Engineering Science

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

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2117051	Material Flow in Logistic Systems (p. 338)	3/1	W	6	K. Furmans
2118097	Warehouse and Distribution Systems (p. 322)	2	S	4	Christian Huber
2117056	Airport Logistics (p. 329)	2	W	4	Richter
2118085	Automotive Logistics (p. 328)	2	S	4	K. Furmans

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 grading scale (0.3) there might be taken an optional term paper in the field of the IFL. The term paper may not be convalidated in the seminar module.

Conditions
The course Material *Flow in Logistic Systems* [21051] is compulsory and must be examined.
Note: In case the courses has been examined already within the Bachelor's module *Introduction to Technical Logistics* [WW3INGMB13], this module cannot be taken any more. Alternatively the modules [WW4INGMB26], [WW4INGMB27] und [WW4INGMB28] can be taken.

Learning Outcomes
The student

- acquires comprehensive and well-founded knowledge on the main topics of logistics, an overview of different logistic questions in practice and knows the functionality of material handling systems,
- is able to illustrate logistic systems with adequate accuracy by using simple models,
- is able to realize coherences within logistic systems,
- is able to evaluate logistic systems by using the learnt methods.

Content
The module *Material Flow in Logistic Systems* provides comprehensive and well-founded basics for the main topics of logistics. Within the lectures, the interaction between several components of logistic systems will be shown. The module focuses on technical characteristics of material handling systems as well as on methods for illustrating and evaluating logistics systems. To gain a deeper understanding, the course is accompanied by exercises and case studies.

Remarks
The module is first offered in winter term 2010/11 and replaces parts of *Technical Logistics and Logistic Systems* [WI4INGMB11].

Module: Material Flow in networked Logistics Systems [WW4INGMB26]

Coordination: Kai Furmans
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Engineering Science

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

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
21060	Analytical Models for Material Flow (p. 150)	3/1	W	6	K. Furmans
2118097	Warehouse and Distribution Systems (p. 322)	2	S	4	Christian Huber
2117056	Airport Logistics (p. 329)	2	W	4	Richter
2118085	Automotive Logistics (p. 328)	2	S	4	K. Furmans

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.
To improve the overall grade of the module up to one grading scale (0.3) there might be taken an optional term paper in the field of the IFL. The term paper may not be convalidated in the seminar module.

Conditions
The module can only be taken after successful completion of the lecture *Material Flow in Logistic Systems* [21051]. The lecture ist part of the following modules: *Introduction to Technical Logistics* [WW3INGMB13] (Bachelor), *Introduction to Logistics* (Master) [WI4INGMB20] and *Material Flow in Logistic Systems* (Master) [WW4INGMB25].
The course *Analytical Models for Material Flow* [21060] is compulsory and must be examined.

Learning Outcomes
The student

- acquires in-depth knowledge on the main topics of logistics, gets an overview of different logistic questions in practice,
- is able to evaluate logistic systems by using the learnt methods,
- is able to analyze and explain the phenomena of industrial material and value streams.

Content
The module *Material Flow in networked Logistic Systems* provides in-depth basics for the main topics of logistics and industrial material and value streams. The obligatory lecture focuses on queuing methods to model production systems. To gain a deeper understanding, the course is accompanied by exercises.

Remarks
The module is first offered in winter term 2010/11 and replaces parts of *Technical Logistics and Logistic Systems* [WI4INGMB11].

Module: Technical Logistics [WW4INGMB27]

Coordination: Kai Furmans
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Engineering Science

ECTS Credits	Cycle	Duration
9	Every 2nd term, Winter Term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2117081	Technical Logistics I, basics (p. 518)	2/1	W	4	M. Mittwollen
2117082	Technical Logistics I, basics and systems (p. 519)	3/1	W	6 (ggf. kontextabhängig)	M. Mittwollen
2118081	Technical Logistics II, selected application examples (p. 521)	2/1	S	4	M. Mittwollen
2118086	Technical Logistics II, selected application examples plus project (p. 522)	3/1	S	6 (ggf. kontextabhängig)	M. Mittwollen
2118083	IT for Facility Logistics (p. 315)	3/1	S	6	Thomas
2118097	Warehouse and Distribution Systems (p. 322)	2	S	4	Christian Huber
2117061	Safety Engineering (p. 467)	2	W	4	Kany
21064	Industrial Application of Technological Logistics instancing Crane Systems (p. 156)	2	W	4	Golder
2118089	Industrial Application of Material Handling Systems in Sorting and Distribution Systems (p. 157)	2	S	4	Föller
2117500	Energy efficient intralogistic systems (p. 222)	2	W	4	Schönung

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.
To improve the overall grade of the module up to one grading scale (0.3) there might be taken an optional term paper in the field of the IFL. The term paper may not be convalidated in the seminar module.

Conditions
The module can only be taken after successful completion of the lecture *Material Flow in Logistic Systems* [21051]. The lecture ist part of the following modules: *Introduction to Technical Logistics* [WW3INGMB13] (Bachelor), *Introduction to Logistics* (Master) [WI4INGMB20] and *Material Flow in Logistic Systems* (Master) [WW4INGMB25].
The lecture *Technical Logistics I, basics* [2117081] *or Technical Logistics I, basics and systems* [2117082] has to be chosen.

Learning Outcomes
The student

- acquires well-founded knowledge on the main topics of technical logistics
- gets an overview of different applications of technical logistics in practice,
- acquires expertise and understanding about functionality of material handling systems.

Content
The module *Technical Logistics* provides in-depth basics on the main topics of technical logistics. The module focuses on technical characteristics of material handling technology. To gain a deeper understanding, the course is accompanied by exercises.

Remarks
The module is first offered in winter term 2010/11 and replaces parts of *Technical Logistics and Logistic Systems* [WI4INGMB11].

Module: Logistics in Value Chain Networks [WW4INGMB28]

Coordination: Kai Furmans
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Engineering Science

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2118078	Logistics - Organisation, Design, and Control of Logistic Systems (p. 326)	3/1	S	6	K. Furmans
21062	Supply Chain Management (p. 512)	3/1	W	6	Alicke
2118090	Quantitative Methods for Supply Chain Risk Management (p. 408)	3/1	W	6	Cardeneo
2118097	Warehouse and Distribution Systems (p. 322)	2	S	4	Christian Huber
2117056	Airport Logistics (p. 329)	2	W	4	Richter
2118085	Automotive Logistics (p. 328)	2	S	4	K. Furmans
2118094	Information Systems and Supply Chain Management (p. 295)	2	S	4	Kilger

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.
To improve the overall grade of the module up to one grading scale (0.3) there might be taken an optional term paper in the field of the IFL. The term paper may not be convalidated in the seminar module.

Conditions
The module can only be taken after successful completion of the lecture *Material Flow in Logistic Systems* [21051]. The lecture ist part of the following modules: *Introduction to Technical Logistics* [WW3INGMB13] (Bachelor), *Introduction to Logistics* (Master) [WI4INGMB20] and *Material Flow in Logistic Systems* (Master) [WW4INGMB25].
One of the lectures

- *Logistics – Organization, Design and Control of Logistic Systems* [2118078]
- *Supply Chain Management* [21062]
- *Quantitative Methods for Supply Chain Risk Management* [2118090]

is compulsory and must be examined.

Learning Outcomes
The student

- is able to plan logistic systems and evaluate their performance,
- can use approaches of Supply Chain Management within the operational practice,
- identifies, analyses and evaluates risks within logistic systems.

Content
The module *Logistics in value chain networks* provides basics for the main topics of logistics. Within the lecture basic methods for planning and running logistic systems are introduced. Furthermore special issues like supply chain management and risks in logistic systems are focused. To gain a deeper understanding, the course is accompanied by exercises.

Remarks
The module is first offered in winter term 2010/11 and replaces parts of *Technical Logistics and Logistic Systems* [WI4INGMB11].

Module: Virtual Engineering A [WW4INGMB29]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2121352	Virtual Engineering I (p. 561)	2/3	W	6	J. Ovtcharova
2121370	Virtual Engineering for Mechatronic Products (p. 560)	3/0	W	4	J. Ovtcharova, S. Rude
2123364	Product, Process and Ressource Integration in the Automotive Development (p. 395)	2/1	W/S	4	S. Mbang
2122387	Computer Integrated Planning of New Products (p. 410)	2/0	S	4	R. Kläger
2122371	Efficient Creativity - Processes and Methods within the Automotive Industry (p. 210)	2	S	4	Lamberti

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

Conditions
The course *Virtual Engineering I* [2121352] is compulsory modules and must be examined.

Learning Outcomes
The students should:

- have basic knowledge about the industrial application of Information Technology in product development,
- have understanding about current and future application of information systems in product development processes in the context of Product Lifecycle Management and Virtual Engineering,
- be able to operate current CAx- and PLM-systems in the product development process
- understands demands and relevance of interconnected IT-systems and respective methods for product development

Content
The Module Virtual Engineering A gives an overview about product development processes, beginning with requirement engineering, verification of manufacturing feasibility and virtual operation in the scope of Digital Factory. The guest-lectures contained in this module complete the content of the lecture with introducing current product development processes focusing on automotive industry.

Remarks
The module is first offered in winter term 2010/11 and replaces parts of *Virtual Engineering* [WI4INGMB22].

Module: Virtual Engineering B [WW4INGMB30]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2122378	Virtual Engineering II (p. 562)	2/1	S	4	
2121370	Virtual Engineering for Mechatronic Products (p. 560)	3/0	W	4	J. Ovtcharova, S. Rude
2123364	Product, Process and Ressource Integration in the Automotive Development (p. 395)	2/1	W/S	4	S. Mbang
2122387	Computer Integrated Planning of New Products (p. 410)	2/0	S	4	R. Kläger
2122371	Efficient Creativity - Processes and Methods within the Automotive Industry (p. 210)	2	S	4	Lamberti
2123375	Virtual Reality Practical Course (p. 563)	3	S	4	J. Ovtcharova

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

Conditions
The course *Virtual Engineering II* [2122378] is compulsory module and must be examined.

Recommendations
We recommend to attend/visit the courses *Engineering I* [2121352] before *Virtual Engineering II* [2122378]

Learning Outcomes
The students should:

- have basic knowledge about industrial practice of Information Technology in the field of product development,
- have basic knowledge about innovative visualization techniques like Virtual Reality and feasible application of Virtual Mock-Ups (VMU) for validating product properties.
- Is able to estimate potentials and risks of current Virtual Reality Systems in product development.
- understands demands and relevance of interconnected IT-systems and respective methods for product development

Content
The module Virtual Engineering B communicates basics of Virtual Reality applications and their fields of application for validating product properties and for supporting product development processes.
Optional courses of this module complete the content with practical application of VR techniques in product development (Virtual Reality Exercise), respectively current product development processes focusing on automotive industries are introduced.

Remarks
The module is first offered in winter term 2010/11 and replaces parts of *Virtual Engineering* [WI4INGMB22].

Module: Global Production and Logistics [WI4INGMB31]

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

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2149610	Global Production and Logistics - part 1: Global Production (p. 262)	2	W	4	Lanza
2149600	Global Production and Logistics - part 2: Global Logistics (p. 263)	2	S	4	K. Furmans
2118085	Automotive Logistics (p. 328)	2	S	4	K. Furmans
2118094	Information Systems and Supply Chain Management (p. 295)	2	S	4	Kilger
2149667	Quality Management (p. 404)	2	W	4	Lanza, Gisela
2150690	Production Systems and Production Technology in Major Assembly Production (p. 398)	2	S	4	Stauch
2149666	(p. 214)	2	S	4	Weisbecker

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 grading scale (0.3) there might be taken an optional term paper in the field of the IFL or the wbk. The term paper may not be convalidated in the seminar module.

Conditions
It is only possible to choose this module in combination with the module *Manufacturing Engineering* [WI4INGMB23] **or**/**and** *Integrated Production Planning* [WI4INGMB24] **or**/**and** *Logistics in Value Chain Networks* [WW4INGMB28] **or**/**and** *Werkzeugmaschinen und Handhabungstechnik* [WI4INGMB32]. The module is passed only after the final partial exam of one of the above modules is additionally passed.
It is obligatory to choose the lectures *Global Production and Logistics – part 1: Global Production* [2149610] and *part 2: Global Logistics [*2149600].

Recommendations
The module should be combined with the module: *Logistic in Value Chain Networks* [WW4INGMB28] (in this case the module *Material flow in Logistic Systems* is not obligatory).

Learning Outcomes
The student

- acquires basic knowledge on the main topics of global production and logistics,
- will achieve a sound knowledge about planning and operations of global supply chains and will be able to use simple models for planning,
- will achieve a sound knowledge about planning global production networks

Content
The module Global Production and Logistics provides comprehensive and well-founded basics for the main topics of global production and logistics. The lectures aim to show opportunities and market conditions for global enterprises. Part 1 focuses on foreign trade theory, legal and economic backgrounds, opportunities and risks of international production. Part 2 focuses on the structure of international logistics, their modeling, design and analysis. The threats in international logistics are discussed in case studies.

Remarks
New module in winter term 2010/11.

Module: Machine Tools an Industrial Handling [WI4INGMB32]

Coordination: Jürgen Fleischer
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Engineering Science

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

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2149900	Machine Tools an Industrial Handling (p. 579)	4/2	W	9	J. Fleischer

Learning Control / Examinations
The assessment is carried out as written exam of 120 min (according to Section 4(2),1 of the examination regulation) of the course of this module. The assessment procedures are described for each course of the module seperately. The overall grade of the module is the grade for the written exam. To improve the overall grade of the module up to one grading scale (0.3) there might be taken an optional term paper in the field of the wbk. The term paper may not be convalidated in the seminar module.

Conditions
None.

Learning Outcomes
The student

- has knowledge about the application of machine tools.
- comprehends the assembly and the operation purpose of the major components of a machine tool.
- is able to apply methods of selection and assessment of production machines to new tasks.
- is able to assess the dimensioning of a machine tool.

Content
The module overviews the assembly, dimensioning and application of machine tools and industrial handling. A consolidated and practice oriented knowledge is imparted about the choice, dimensioning and assessment of production machines. At first, the major components of machine tools are explained systematically. At this, the characteristics of dimensioning of machine tools are described in detail. Finally, the application of machine tools is demonstrated by means of example machines of the manufacturing processes turning, milling, grinding, massive forming, sheet metal forming and toothing.

Remarks
The module is new in summer term 2011.

Module: Unscheduled Engineering Module [WI4INGAPL]

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

ECTS Credits	Cycle	Duration
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 and at least 6 hours per week. The examination may contain presentations, experiments, laboratories, term papers, etc. At least 50 percent of the module examination has to be in the form of a written or an oral examination (according to Section 4 (2), 1 or 2 of the examination regulation).

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

Conditions
None.

Learning Outcomes

Content

5.7 Law

Module: Commercial Law [WI4JURA2]

Coordination: Peter Sester
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Law

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24504	Advanced Civil Law (p. 180)	2/0	S	3	T. Dreier, P. Sester
24011	Commercial and Corporate Law (p. 288)	2/0	W	3	P. Sester
24506/24017	Exercises in Civil Law (p. 394)	2/0	W/S	3	P. Sester, T. Dreier

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

Conditions
None.

Learning Outcomes
The student

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

Content
The focus is on special types of contract as well as on complex legal set-ups in the area of company law.

Module: Intellectual Property Law [WI4JURA4]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24812	Internet Law (p. 314)	2/0	S	3	T. Dreier
24121	Copyright (p. 538)	2/0	W	3	T. Dreier
24574	Patent Law (p. 371)	2/0	S	3	N.N.
24136/24609	Trademark and Unfair Competition Law (p. 333)	2/0	W/S	3	Y. Matz, P. Sester
24583	Computer Contract Law (p. 558)	2/0	W	3	M. Bartsch
24815	Basic Principles of Patent Law (p. 277)	2/0	W/S	3	K. Melullis
24357	Seminar: Software Patents (p. 456)	2	W	3	R. Reussner, M. Kuperberg, K. Melullis

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

Conditions
None.

Learning Outcomes

Content

Module: Private Business Law [WI4JURA5]

Coordination: Peter Sester
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Law

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24650	Civil Law for Advanced (p. 556)	2/0	S	3	P. Sester
24671	Law of Contracts (p. 557)	2/0	S	3	P. Sester
24167	Employment Law I (p. 158)	2	W	3	A. Hoff
24668	Employment Law II (p. 159)	2	S	3	A. Hoff
24168	Tax Law I (p. 498)	2/0	W	3	D. Dietrich
24646	Tax Law II (p. 499)	2/0	S	3	D. Dietrich

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

Conditions
None.

Recommendations
For the courses

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

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

Learning Outcomes
The student

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

Content

Module: Public Business Law [WI4JURA6]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24632	Telecommunications Law (p. 526)	2/0	S	3	I. Spiecker genannt Döhmann
24082	Public Media Law (p. 359)	2	W	3	C. Kirchberg
24666	European and International Law (p. 236)	2/0	S	3	I. Spiecker genannt Döhmann
24140	Environmental Law (p. 535)	2	W	3	I. Spiecker genannt Döhmann
24018	Data Protection Law (p. 201)	2/0	W	3	I. Spiecker genannt Döhmann

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

Conditions
None.

Learning Outcomes

Content

5.8 Sociology

Module: Sociology [WI4SOZ1]

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

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
thSoz	Theoretical Sociology (p. 527)	2	W/S	2	G. Nollmann, Pfadenhauer, Pfaff, Haupt, Grenz, Eisewicht
spezSoz	Special Sociology (p. 493)	2	W/S	4	G. Nollmann, Pfadenhauer, Pfaff, Haupt, Grenz, Eisewicht, Kunz
SozSem	Projectseminar (p. 401)	2	W/S	4	Bernart, Kunz, Pfaff, Haupt, Grenz, Eisewicht

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

Conditions
The projecseminar can only be taken after successful completion of the courses *Theoretical Sociology* and *Special Sociology.*

Recommendations
Knowledge of Statistics 1 and Statistics 2 is required.

Learning Outcomes
The student

- Gains theoretical and methodical knowledge of social processes and structures.
- Is able to apply his/her gained knowledge practically.
- Is able to present his/her work results in a precise and clear way.

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

In addition the module contains courses on sociological methods that are essential to answer the above questions scientifically.

5.9 General Modules

Module: Seminar Module [WW4SEM]

Coordination: Studiendekan (Fak. f. Wirtschaftswissenschaften)
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject:

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
SemAIFB1	Seminar in Enterprise Information Systems (p. 426)	2	W/S	3	R. Studer, A. Oberweis, T. Wolf, R. Kneuper
SemAIFB2	Seminar Efficient Algorithms (p. 427)	2	W/S	3	H. Schmeck
SemAIFB3	Seminar Complexity Management (p. 437)	2	W/S	3	D. Seese
SemAIFB4	Seminar Knowledge Management (p. 441)	2	W	3	R. Studer
2590470	Seminar Service Science, Management & Engineering (p. 439)	2	W/S	3	C. Weinhardt, G. Satzger, R. Studer, S. Tai
2530293	Seminar in Finance (p. 432)	2	W/S	3	M. Uhrig-Homburg, M. Ruckes
SemFBV1	Seminar in Insurance Management (p. 442)	2	W/S	3	U. Werner
SemFBV2	Seminar in Operational Risk Management (p. 443)	2	W/S	3	U. Werner
SemFBV3	Seminar in Risk Theory and Actuarial Science (p. 450)	2	W/S	3	C. Hipp
2577915	Seminar: Management and Organization (p. 457)	2	W/S	3	H. Lindstädt
2577916	Seminar: Management accounting for industrial engineers (p. 453)	2	W/S	3	M. Wouters
2577919	„Good Governance“ at German Corporations (p. 264)	4	W/S	6	T. Reitmeyer, Th. Reitmeyer
2572197	Seminar in strategic and behavioral marketing (p. 444)	2	W	3	B. Neibecker
25196	Master Seminar in Entrepreneurship, Innovation and International Marketing (p. 337)	2	W/S	3	Gaul
SemIIP	Seminar in Ergonomics (p. 445)	2	W/S	3	A. Wollert, C. Harbring
SemIIP2	Seminar in Industrial Production (p. 435)	2	W/S	3	F. Schultmann, M. Fröhling, M. Hiete
SemEW	Seminar Energy Economics (p. 428)	2	W/S	3	W. Fichtner, P. Jochem, A. Eßer-Frey, M. Genoese
2540510	Master Seminar in Information Engineering and Management (p. 336)	2	W	3	A. Geyer-Schulz
SemIW	Seminar Information Engineering and Management (p. 436)	2	W/S	3	C. Weinhardt
2585420/2586420	Topics of Sustainable Management of Housing and Real Estate (p. 160)	2	W/S	3	T. Lützkendorf
SemWIOR4	Seminar in Game and Decision Theory (p. 451)	2	W/S	3	S. Berninghaus
SemWIOR3	Seminar in Experimental Economics (p. 447)	2	W/S	3	S. Berninghaus
SemWIOR2	Seminar Economic Theory (p. 585)	2	W/S	3	C. Puppe
SemIWW2	Seminar in International Economy (p. 433)	2/0	W/S	3	J. Kowalski
SemIWW3	(p. 434)	2	W/S	3	I. Ott
2560130	Seminar Public Finance (p. 429)	2	W/S	3	B. Wigger, Assistenten

2560263	Seminar on Network Economics (p. 449)	2	W/S	3	K. Mitusch
2561209	(p. 452)		W/S	3	
2550491	Seminar in Discrete Optimization (p. 446)	2	W/S	3	S. Nickel
2550131	Seminar in Continous Optimization (p. 448)	2	W/S	3	O. Stein
SemWIOR1	Seminar Stochastic Models (p. 440)	2	W/S	3	K. Waldmann
SemING	Seminar in Engineering Science (p. 298)	2	W/S	3	Fachvertreter ingenieurwissenschaftlicher Fakultäten
SemIFL	Seminar Conveying Technology and Logistics (p. 430)	2	W/S	3	K. Furmans
21690sem	Seminar paper “Production Engineering” (p. 458)	2	W/S	3	V. Schulze, Lanza, Munzinger
SemMath	Seminar in Mathematics (p. 341)	2	W/S	3	Fachvertreter der Fakultät für Mathematik
RECHT	Seminar: Legal Studies (p. 454)	2	W/S	3	Inst. ZAR
SQ HoC1	Elective “Culture - Policy - Science - Technology” (p. 568)	meist 2	W/S	3	House of Competence
SQ HoC2	Elective “Workshops for Competence and Creativity” (p. 567)	meist 2	W/S	3	House of Competence
SQ HoC3	Elective Foreig Languages (p. 566)	2-4	W/S	2-4	House of Competence
SQ HoC5	Elective “Tutor Programmes” (p. 570)	k.A.	W/S	2 / 3	House of Competence
SQ HoC4	Elective “Personal Fitness & Emotional Competence” (p. 569)	k.A.	W/S	2-3	House of Competence

Learning Control / Examinations
The modul examination consists of two seminars and of at least one key qualification (KQ) course (according to §4 (3), 3 of the examintaion regulation). 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 KQ courses are not included.

Conditions
The course specific preconditions must be observed.

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

Learning Outcomes
The student

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

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

Remarks
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.
The available places are listed on the internet: http://www.wiwi.kit.edu/2361.php.

Module: Master Thesis [WI4THESIS]

Coordination: Der Vorsitzende des Prüfungsausschusses
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject:

ECTS Credits	Cycle	Duration
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 examiner has to be involved in the degree programme. Involved in the degree programme are the persons that coordinate a module or a lecture of the degree programme.
The regular processing time takes six months. On a reasoned request of the student, the examination board can extend the processing time of a maximum of three 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.

Conditions
Prerequisite for admission to the Master thesis is that 50 percent of the credit points has to be completed.
A written confirmation of the examinor about supervising the Master Thesis is required.
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: Advanced Econometrics of Financial Markets [2520381]

Coordinators: Svetlozar Rachev
Part of the modules: Risk Management and Econometrics in Finance (p. 72)[WI4STAT3], Mathematical and Empirical Finance (p. 70)[WI4STAT1]

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

Learning Control / Examinations
The assessment of this course consists of a written examination (following §4(2), 1 SPO) and of possible additional assignments during the course (following §4(2), 3 SPO).

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.

Literature
Campbell, Lo, McKinlay: The Econometrics of Financial Markets. Princeton University Press.

Course: Advanced Topics in Economic Theory [2520527]

Coordinators: Clemens Puppe, Marten Hillebrand, Kay Mitusch
Part of the modules: Allocation and Equilibrium (p. 56)[WI4VWL7], Network Economics (p. 53)[WI4VWL4]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content
The focus of the course is the modern economic theory of (general) equilibrium. The course is divided into three parts. The first part introduces the microeconomic foundations of general equilibrium á la Debreu (”The Theory of Value”, 1959) and Hildenbrand/Kirman (”Equilibrium Analysis”,1988). The second part considers dynamic (stochastic) equilibrium models with a particular focus on the overlapping generations model which lie at the heart of modern macroeconomics. The third part deals with asymmetric information and introduces the basic models based on Akerlof’s “Market for Lemons.” The course is largely based on the textbook “Microeconomic Theory” (Chapters 1-5, 10, 13-20) by A.Mas-Colell, M.D.Whinston, and J.R.Green

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

Course: Transport Policy [19314]

Coordinators: H. Zemlin
Part of the modules: Project in Public Transportation (p. 93)[WI4INGBGU5]

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

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.

Conditions
See module descrition.

Learning Outcomes

Content

Course: Algorithms for Internet Applications [2511102]

Coordinators: Hartmut Schmeck
Part of the modules: Emphasis in Informatics (p. 62)[WI4INFO2], Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3]

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

Learning Control / Examinations
The assessment consists of a written exam (60 min) (according to Section 4(2), 1 of the examination regulation) and an additional written examination (called “bonus exam”, 45 min) (according Section 4(2), 3 of the examination regulation).
The grade of this course is the achieved grade in the written examination. If this grade is at least 4.0 and at most 1.3, a passed bonus exam will improve it by one grade level (i.e. by 0.3 or 0.4).

Conditions
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.

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

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

Literature

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

Elective literature:

- Further references will be given in the course.

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

Coordinators: Bieberstein et al.
Part of the modules: Safety Science II (p. 119)[WI4INGINTER5], Safety Science I (p. 118)[WI4INGINTER4], Safety Science III (p. 120)[WI4INGINTER6]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

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

Course: Analytical Models for Material Flow [21060]

Coordinators: Kai Furmans
Part of the modules: Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11], Material Flow in networked Logistics Systems (p. 127)[WW4INGMB26]

ECTS Credits	Hours per week	Term	Instruction language
6	3/1	Winter term	de

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

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

Learning Outcomes
This course provides methods and models focused on the quantitative analysis of material handling systems with stochastic and queueing models. Many phenomena of industrial material handling and value streams can be explained with the models that the students use in this course.

Content

- Operational analysis
- Queueing systems
- Open queueing system networks
- Closed queueing system networks
- Modeling of production systems
- Discrete time queuing systems

Literature
Elective 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: n.n. [2511218]

Coordinators: Ralf Kneuper
Part of the modules: Emphasis in Informatics (p. 62)[WI4INFO2], Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3]

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

Learning Control / Examinations
The assessment of this course is a written or (if necessary) oral examination according to §4(2) of the examination regulation.

Conditions
None.

Learning Outcomes
The students have a full understanding of the foundations of the analysis and management of requirements as part of the development process of software and systems. They know the main terminology and approaches of this topic, and are able to express requirements themselves using different description methods.

Content
The analysis and management of requirements is a central task in the development of software and systems, addressing the border between the application discipline and computer science. The adequate performance of this task has a decisive influence on the whether or not a development project will be successful. The lecture provides an introduction to this topic, using the syllabus for the “Certified Professional for Requirements Engineering” (CPRE) as a guideline.
Lecture structure:
1. Introduction and overview, motivation
2. Identifying requirements
3. Documenting requirements (in natural language or using a modelling language such as UML)
4. Verification and validation of requirements
5. Management of requirements
6. Tool support

Literature
Literature will be given in the lecture.

Course: Applied Informatics I - Modelling [2511030]

Coordinators: Andreas Oberweis, Rudi Studer, Sudhir Agarwal
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

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

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

Conditions
None.

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

Content
In the context of complex information systems, modelling is of central importance, e.g. – in the context of systems to be developed – for a better understanding of their functionality or in the context of existing systems for supporting maintenance and further development.
Modelling, in particular modelling of information systems, forms the core part of this lecture. The lecture is organized in two parts. The first part mainly covers the modelling of static 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.

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.

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

Coordinators: Stefan Tai
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

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

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

Conditions
Knowledge of content of the courses *Foundations of Informatics I* [2511010] and *Foundations of Informatics II* [2511012] is expected.

Learning Outcomes
The student learns about IT methods and systems in support of modern electronic commerce. The student should be able to select, 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.

Literature
Tba in the lecture.

Course: Introduction to Process Safety in the Chemical Industry [22308]

Coordinators: Schmidt
Part of the modules: Safety Science II (p. 119)[WI4INGINTER5], Safety Science I (p. 118)[WI4INGINTER4], Safety Science III (p. 120)[WI4INGINTER6]

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

Learning Control / Examinations

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: Planning and Management of Industrial Plants [2581952]

Coordinators: Frank Schultmann
Part of the modules: Industrial Production II (p. 47)[WI4BWLIIP2]

ECTS Credits	Hours per week	Term	Instruction language
5.5	2/2	Winter term	de

Learning Control / Examinations
The examination will be in form of a written exam acc. to §4(2), 1 ER. Exams are offered in every semester and can be re-examined at every ordinary examination date.

Conditions
This course is compulsory in module “Industrial Production II” [WI4BWLIIP2].

Learning Outcomes

- Students shall be able to describe the tasks of plant management.
- Students shall be proficient in using selected methods of investment and cost estimates.
- Students shall be able to consider necessary processing and logistical requirements of designing industrial plants.
- Students shall be able to discuss interdependencies between capacity planning, process design and plant optimization.
- Students shall be proficient in discussing and applying selected methods of quality management, plant maintenance and plant dismantling.

Content
Industrial plant management incorporates a complex set of tasks along the entire life cycle of an industrial plant, starting with the initiation and erection up to operating and dismantling.
During this course students will get to know special characteristics of industrial plant management. Students will learn important methods to plan, realize and supervise the supply, start-up, maintenance, optimisation and shut-down of industrial plants. Alongside, students will have to handle the inherent question of choosing between technologies and evaluating each of them. This course pays special attention to the specific characteristics of plant engineering, commissioning and investment.

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

Literature
will be announced in the course

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

Coordinators: Golder
Part of the modules: Introduction to Logistics (p. 76)[WI4INGMB20], Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11], Technical Logistics (p. 128)[WW4INGMB27]

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

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

Conditions
None.

Learning Outcomes
At the end of the course, the student should be able to configure cranes in an optimal technical and economic way and become acquainted with the relevant technical rules.

Content

- Basics of modern crane construction
- Characteristics of application, classification
- Configuration, dimensioning, consideration of costs
- Relevant rules and standards
- Modern concepts of crane control and drives

Course: Industrial Application of Material Handling Systems in Sorting and Distribution Systems [2118089]

Coordinators: Föller
Part of the modules: Introduction to Logistics (p. 76)[WI4INGMB20], Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11], Technical Logistics (p. 128)[WW4INGMB27]

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

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

Conditions
None.

Learning Outcomes
The course provides basics of sorting techniques.

Content

- Operation characteristics, classification, configuration, dimensioning, cost consideration, sorting systems
- Relevant regulations, modern control and drive concepts

Course: Employment Law I [24167]

Coordinators: Alexander Hoff
Part of the modules: Private Business Law (p. 138)[WI4JURA5]

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

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

Conditions
None.

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

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

Literature
tba at the beginning of the course.

Course: Employment Law II [24668]

Coordinators: Alexander Hoff
Part of the modules: Private Business Law (p. 138)[WI4JURA5]

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

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

Conditions
None.

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

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

Literature
Tba at the beginning of the course.

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

Coordinators: Thomas Lützkendorf
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

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

Conditions
None.

Learning Outcomes

- Students autonomously compile a paper treating of a marked-off subject within the area of real estate economics respectively sustainable construction, and present their results within the seminar.
- Therefore they master the principles of scientific writing, especially research, reasoning and citation, as well as handling information suspiciously.
- Through own and observed experiences they develop the ability to hold scientific presentations, including technical, formal, 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: Assessment of Development Planning [19621]

Coordinators: Kämpf
Part of the modules: Safety Science I (p. 118)[WI4INGINTER4], Safety Science II (p. 119)[WI4INGINTER5], Safety Science III (p. 120)[WI4INGINTER6]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Asset Pricing [2530555]

Coordinators: Marliese Uhrig-Homburg, Martin E. Ruckes
Part of the modules: Finance 2 (p. 25)[WI4BWLFBV2], Finance 1 (p. 24)[WI4BWLFBV1], F2&F3 (Finance) (p. 26)[WI4BWLFBV3], Finance 3 (p. 27)[WI4BWLFBV11]

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

Learning Control / Examinations

Conditions
None.

Recommendations
We strongly recommend knowledge of the basic topics in investments (bachelor course), which will be necessary to be able to follow the course.

Learning Outcomes
The objective of this course is to become familiar with advanced concepts in asset pricing (in particular the stochastic discount factor model). The second half of the course will put a focus on empirical questions related to the previous part. We strongly recommend knowledge of the basic topics in investments (bachelor course), which will be necessary to be able to follow the course.

Content
This lecture deals with the valuation of risky cash flows. A stochastic discount model and a central equation will be introduced, which form the basis of nearly every valuation model in finance. That includes the valuation of stocks, bonds and derivatives. The first part of the lecture will present the theory, the second part covers empirical questions related to this approach.

Literature
Basic literature

- Asset pricing / Cochrane, J.H. - Rev. ed., Princeton Univ. Press, 2005.
- The econometrics of financial markets / Campbell, J.Y., Lo, A.W., MacKinlay, A.C. - 2. printing, with corrections, Princeton Univ. Press, 1997.

Elective literature

- Investments / Bodie, Z., Kane, A., Marcus, A.J. - 8. ed., McGraw-Hill, 2009.

Course: Constitution and Properties of Wear Resistant Materials [2178643]

Coordinators: Ulrich
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

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

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

Conditions
The course *Material Science I* [21760] has to be completed beforehand.

Recommendations
Basic knowledge of natural science and knowledge of the content *Material Science II* [21782] is recommended.

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

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

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

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

Literature
Elective literature:

- F.-W. Bach: Moderns Surface Technology, Wiley-VCH, Weinheim, 2006

Course: Constitution and Properties of Protective Coatings [2177601]

Coordinators: Ulrich
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

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

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

Conditions
None.

Recommendations
The module *Emphasis Material Science* [WI3INGMB9] should be completed successfully beforehand.
Basic knowledge of physics, chemistry and material science is assumed.

Learning Outcomes
The student

- has a specific knowledge of different parts of Material Science
- is able to apply this knowledge in practice

Content
After a presentation of a general overview, concepts of surface modification (optimization of constitution and surface reactions) as well as innovative coating concepts (dispersion, composite and gradient coatings, multilayers, solid solution strengthened, metastable and nanocrystalline coatings) will be handled. Realizing this coating concepts different coating materials will be employed: metallic alloys, hard alloys, metallic, covalent and ionic hard materials, as well as ceramic and new metastable materials.

In the second part of the lecture, different methods to modify the surface will be presented: (i) mechanical: rolling, milling, blasting (ii) thermal: fusion, thermal treatment, quenching, (iii) thermo-chemical: diffusion, quenching, and (iv) ion implantation. Also deposition methods will be considered: (mechanical, thermal-mechanical, electro-chemical, CVD,PVD).
Thereafter different methods to characterize composites and thin films with respect to their constitution and micro structure (elemental composition, phases, crystal structure), properties (hardness, adhesion, toughness) and tribological behavior will be presented.

At the end of the lecture, the status quo of industrial protective coatings for tool and components as well as the latest developments in the field of protective coatings will be discussed.

Literature
Elective literature:
F.-W. Bach: Modern Surface Technology, Wiley-VCH, Weinheim, 2006

Course: Membrane Separation in Water Treatment [22605]

Coordinators: F.H. Frimmel
Part of the modules: Water Chemistry (p. 112)[WI4INGCV5], Water Chemistry II (p. 114)[WI4INGCV7]

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

Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes
Starting with the physical and chemical basics of membrane separation, this lecture gives a detailed overview on operation and function of the membrane plants used in water treatment.

Content
1. Principles of membrane separation
2. Membrane manufacturing and membrane characteristics
3. Membrane configuration and membrane modules
4. Membrane plants in practice
5. Latest developments and trends

Literature
Elective 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: Supercharging of Internal Combustion Engines [21112]

Coordinators: Golloch
Part of the modules: Engine Development (p. 85)[WI4INGMB17], Combustion Engines (p. 84)[WI4INGMB16], Combustion Engines II (p. 122)[WI4INGMB19]

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

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

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

Learning Outcomes

Content

Course: Auction Theory [2590408]

Coordinators: Karl-Martin Ehrhart, Stefan Seifert
Part of the modules: Applied Strategic Decisions (p. 51)[WI4VWL2], Market Engineering (p. 42)[WI4BWLISM3], Communications & Markets (p. 44)[WI4BWLISM5]

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

Learning Control / Examinations
The assessment of this course is a written examination (following §4(2), 1 SPO) of 80 mins.
The exam is offered each semester.

Conditions
None.

Recommendations
We suggest to attend either Game Theory I or Economics of Uncertainty beforehand.

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)
- and multi-attributive auctions.

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: [neu]

Coordinators: Jürgen Fleischer
Part of the modules: Specialization in Production Engineering (p. 125)[WI4INGMB22]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Remarks
The course is new in summer term 2011.

Course: Automation of Discrete Event and Hybrid Systems [23160]

Coordinators: Mathias Kluwe
Part of the modules: Control Engineering II (p. 103)[WI4INGETIT2]

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

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

Conditions
The prior attendance of the course *System Dynamics and Control Engineering* [23155] is assumed.

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, control 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

Literature

- Cassandras, C. G., Lafortune, S.: Introduction to Discrete Event Systems, Kluwer Academic, Boston, 1999

Elective literature:

- Abel, D.: Petri-Netze für Ingenieure, Springer Verlag Berlin, 1990

Course: Bank Management and Financial Markets, Applied Econometrics [2520355]

Coordinators: Karl-Heinz Vollmer
Part of the modules: Mathematical and Empirical Finance (p. 70)[WI4STAT1]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

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: Basics of Liberalised Energy Markets [2581998]

Coordinators: Wolf Fichtner
Part of the modules: Basics of Liberalised Energy Markets (p. 49)[WI4BWLIIP4]

ECTS Credits	Hours per week	Term	Instruction language
3.5	2/1	Winter term	en

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

Conditions
None.

Learning Outcomes

Content
1. The European liberalisation process
1.1 The concept of a competitive market
1.2 The regulated market
1.3 Deregulation in Europe
2. Pricing and investments in a liberalised power market
2.1 Merit order
2.2 Prices and investments
2.3 Market flaws and market failure
2.4 Regulation in liberalised markets
2.5 Additional regulation mechanisms
3. The power market and the corresponding submarkets
3.1 List of submarkets
3.2 Types of submarkets
3.3 Market rules
4. Risk management
4.1 Uncertainties in a liberalised market
4.2 Investment decisions under uncertainty
4.3 Estimating future electricity prices
4.4 Portfolio management
5. Market power
5.1 Defining market power
5.2 Indicators of market power
5.3 Reducing market power
6. Market structures in the value chain of the power sector

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

Literature
Elective literature:
Power System Economics; Steven Stoft, IEEE Press/Wiley-Interscience Press, 0-471-15040-1

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

Coordinators: Eberhard Hohnecker, H. Müller
Part of the modules: Public Transportation Operations (p. 92)[WI4INGBGU4], Guided Systems Engineering (p. 94)[WI4INGBGU6]

ECTS Credits	Hours per week	Term	Instruction language
1.5	1	Summer term	de

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.

Conditions
See module description.
See module description.

Learning Outcomes

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

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

Coordinators: Erhard Hoffmann
Part of the modules: Water Supply and Sanitation (p. 101)[WI4INGBGU13]

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

Learning Control / Examinations
See module description.

Conditions
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.

Learning Outcomes

Content
Elements of a Sewage Treatment Plant

- Pretreatment
- Treatment of sludge
- Mechanical stage
- Fat retention

Literature
Elective 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: Design and Planning of Urban Drainage Systems [19248]

Coordinators: Stephan Fuchs
Part of the modules: Water Supply and Sanitation (p. 101)[WI4INGBGU13]

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

Learning Control / Examinations
See module description.

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

Learning Outcomes

Content

- Drainage systems -> principles and elements
- Stormwater treatment -> design and planning

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

Course: Design Basics in Highway Engineering [19026]

Coordinators: Ralf Roos
Part of the modules: Design, Construction, Operation and Maintenance Highways (p. 89)[WI4INGBGU1]

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

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.

Conditions
See corresponding module information.

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

Content

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

Media
Lecture notes are provided for download (infomation will be made available in the lecture)

Course: Power Network Analysis [23371/23373]

Coordinators: Thomas Leibfried
Part of the modules: Generation and transmission of renewable power (p. 109)[WI4INGETIT7]

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

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

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

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

Content
In its first part, this lecture introduces the High-Voltage technology and its basics. Especially, the reasons for the necessity for the power transmission with high voltages are given. Basic electrical configurations and stresses occurring at multi dielectric systems are presented. Finally the first chapter deals with discharge phenomena.
The second chapter deals with the three phase system. Especially, the mathematical treatment of three phase systems and the introduction of component systems are contained in this chapter.
The third and very comprehensive chapter deals with the transmission and distribution of electric energy. Firstly, the laws of power transmission via transmission lines are presented. Then, the stability of electric power systems and possibilities to increase the power transmission capacity are discussed. Finally, the physics of energy distribution in the medium and low voltage grid is shown.
The fourth chapter deals with the Calculation of electric power networks and systems. Firstly, the preparatory steps for the calculation of the power network are shown. After discussing the basic network analysis methods, the load flow calculation are shown. Especially, the method of current iteration and the Newton Raphson method are presented and the algorithms of the individual methods are shown using an example.
The fifth chapter deals with methods for the calculation of the 3 phase short circuit. Thereby, it is distinguished between the short circuit nearby the generator and far from the generator.
In the sixth chapter the unsymmetrical faults in power networks and their calculation are discussed. Therefore, the symmetrical components are introduced as a first step. Then, the circuits in symmetrical components of all important power network equipment are presented. The chapter closes with the mathematical treatment of unsymmetrical short circuits using the symmetrical component method.
To accompany the lecture, a collection of problems can be downloaded. During lecture hall exercises their solutions will be discussed.

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

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

Remarks
The credits have been changed to 6.

Course: Special Topics in Highway Engineering [19303s]

Coordinators: Ralf Roos
Part of the modules: Highway Engineering (p. 90)[WI4INGBGU2]

ECTS Credits	Hours per week	Term	Instruction language
1.5	1	Summer term	de

Learning Control / Examinations
See module description.

Conditions
See corresponding module information.

Learning Outcomes

Content

Course: Operation and Maintenance Highways [19301s]

Coordinators: Ralf Roos
Part of the modules: Design, Construction, Operation and Maintenance Highways (p. 89)[WI4INGBGU1], Highway Engineering (p. 90)[WI4INGBGU2]

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

Learning Control / Examinations
See module description.

Conditions
See corresponding module information.

Learning Outcomes

Content

Course: Motor Fuels for Combustion Engines and their Verifications [2133109]

Coordinators: Volz
Part of the modules: Engine Development (p. 85)[WI4INGMB17], Combustion Engines (p. 84)[WI4INGMB16], Combustion Engines II (p. 122)[WI4INGMB19]

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

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

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

Learning Outcomes

Content

Course: Advanced Civil Law [24504]

Coordinators: Thomas Dreier, Peter Sester
Part of the modules: Commercial Law (p. 136)[WI4JURA2]

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

Learning Control / Examinations
Assessment will consist of written exams within *Privatrechtliche Übung* following §4, Abs. 2, 3 of the examination regulation.

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

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

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

Media
Transparencies/Slides

Literature
Tba at the beginning of the course.
Elective literature:
tba at the beginning of the course

Course: Exchanges [2530296]

Coordinators: Jörg Franke
Part of the modules: F2&F3 (Finance) (p. 26)[WI4BWLFBV3], Finance 2 (p. 25)[WI4BWLFBV2], Finance 3 (p. 27)[WI4BWLFBV11]

ECTS Credits	Hours per week	Term	Instruction language
1.5	1	Summer term	de

Learning Control / Examinations

Conditions
None.

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

Content

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

Literature
Elective literature:
Educational material will be offered within the lecture.

Course: Fire safety in buildings [20101]

Coordinators: P. Pannier
Part of the modules: Safety Science I (p. 118)[WI4INGINTER4], Safety Science II (p. 119)[WI4INGINTER5], Safety Science III (p. 120)[WI4INGINTER6]

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

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

Conditions
None.

Learning Outcomes
The student
• knows in terms of fire protection requirements and properties of common building materials, components and systems for building services.
• applys the requirements of building regulations and other guidelines and regulations on building materials, components and escape routes correctly.
• has knowledge about the planning and to detect on-site problems and weaknesses in relation the fire-protection. He /she is able to find solutions.

Content
Requirement, history, legal basis, fire doctrine, protection goal, rescue equipment, areas for firefighters, building caregories, building materials, components, building services, smoke- and fire zones, escape routes, fire safety on construction sites, rescue and extinguishing measures, fire risk, fire protection concepts

Media
The images shown in the lecture and necessary guidelines etc. will be completed a week in advance to download on the KIT-student portal.
In addition further documents will be issued in the lectures.
A bibliography and links to further sources are available on the KIT-student portal.

Literature
Landesbauordnung Baden-Württemberg (LBO)
Allgemeine Ausführungsverordnung des Wirtschaftsministeriums zur Landesbauordnung (LBOAVO)
and according to the bibliography
Literature is available on the KIT-student portal an in the KIT-libraries. The acquisition is not required.

Remarks
The lecture takes place friday from 11:30 am - 1:00 pm in an auditorium at the faculty of architecture, building 20:40.
Practical experience is illustrated by a practical one-day seminar (internship) at the national fire service college in Bruchsal, followed by a fire extinguisher training (date as specified). Temporal compensation is given by the fact, that there will be no lectures on long weekends.

Course: Fuels I: Fundamentals, Liquid Fuels, Petroleum Processing, Bio Fuels [22305]

Coordinators: Georg Schaub
Part of the modules: Fuels, Environment and Global Development (p. 107)[WI4INGCV2]

ECTS Credits	Hours per week	Term	Instruction language
6	2/1	Winter term	de

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.

Conditions
It is recommended to attend the course *Reaction Engineering I* [22114] beforehand.

Learning Outcomes

Content

Literature
Elective 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: Fuels II: Gases and Solids [22303]

Coordinators: Reimert
Part of the modules: Fuels, Environment and Global Development (p. 107)[WI4INGCV2]

ECTS Credits	Hours per week	Term	Instruction language
6	2/1	Summer term	de

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.

Conditions
It is recommended to attend the course *Reaction Engineering I* [22114] beforehand.

Learning Outcomes

Content

Literature
Elective 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: CAN-Bus Release Control [2114092]

Coordinators: Marcus Geimer
Part of the modules: Automotive Engineering (p. 80)[WI4INGMB5], Mobile Machines (p. 83)[WI4INGMB15]

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

Learning Control / Examinations
Assessment for the module *Mobile Machines*: See module description.
Assessment for the module *Automotive Engineering*: The assessment consists of an oral exam (20 min) taking place in the recess period (according to Section 4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
Basic knowledge of electrical engineering is recommended. Programming skills are also helpful.

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

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

Content

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

Literature
Elective literature:

- 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: Business and IT Service Management [2590484]

Coordinators: Gerhard Satzger
Part of the modules: Service Management (p. 45)[WI4BWLISM6]

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

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

Conditions
None.

Learning Outcomes
Students understand the importance of “servitization” for organizations, the challenges for the management of service-oriented enterprises and the interdependence of business and IT services.
Students learn standard concepts and methods of service-oriented management and are able to apply them in practical case studies.
Student get familiar with current research and tools and are able to critically evaluate them.
Students practice to communicate in English and to work on solutions in teams.

Content
The rapid development of information and communication technology transforms many enterprises towards service-oriented structures: with new digital services, new business models and SOA-based process structures within larger service networks. Thus, strategic and operative management of service-oriented enterprises increasingly gains importance. In this course, we want to systematically acquire relevant know-how and apply this to real word examples. Particular focus will be on the interdependence of business, IT and legal aspects.
The course will be taught in English. It should provide ample opportunity for active participation of students. The course will integrate presentations of experts from business practice as well as a comprehensive case study (”en bloc” for 1 day) in which students will actively work on the strategic service-oriented shift of an enterprise.

Media
Presentation (pdf)

Literature
Fitzsimmons J./Fitzsimmons, M., Service Management, Operations, Strategy and Information Technology, 6. ed., 2007
Maister, David H., Managing The Professional Service Firm, 1997
Teboul, J. , Service is Front Stage: Positioning services for value advantage, 2006
Grönroos, Service Management and Marketing, 2007

Course: Business Dynamics [2540531]

Coordinators: Andreas Geyer-Schulz
Part of the modules: Advanced CRM (p. 39)[WI4BWLISM1], Electronic Markets (p. 40)[WI4BWLISM2]

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

Learning Control / Examinations
The assessment consists of an 1h written examination following SPO §4, Abs. 2, 1 and of assignments during the course as an "Erfolgskontrolle anderer Art" following SPO § 4, Abs. 2, 3.
The written examination is offered every semester.

Conditions
None.

Learning Outcomes
Students

- aquire the system thinking worldview for economics
- utilize different methods and tools to map the structure of complex economic systems
- are able to relate dynamic effects to these structures
- learn how to simulate systems within the computer for testing purposes
- use simulation results to improve models
- can independently as well as in teams model, analyze, and optimize business processes and applications
- know how to offer business dynamics as a consulting service and work together with client teams

Content
Corporate growth, the diffusion of new technologies, business processes, project management, product development, service quality management — all these are examples for application areas of business dynamics. They all are dynamic systems that are characterized by feedback loops between many different variables. By means of the tools of business dynamics such systems can be modelled. Simulations of complex systems allow the analysis, the goal centered design, as well as the optimization of markets, business processes, policies, and organizations.

Media

- Slides
- System Dynamics Software Vensim PLE: http://www.vensim.com/venple.html

Literature
John D. Sterman. Business Dynamics: Systems Thinking and Modeling for a Complex World. McGraw-Hill, 2000.

Remarks
Currently, the course is not offered.

Course: Chemical Technology of Water [22601]

Coordinators: F.H. Frimmel
Part of the modules: Water Chemistry (p. 112)[WI4INGCV5], Water Chemistry I (p. 113)[WI4INGCV6]

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

Learning Control / Examinations
See module description.

Conditions
See corresponding module information.

Learning Outcomes
The student has a basic knowledge of water chemistry and knows the most important methods for the treatment of different raw waters for drinking and process water purposes.

Content
1. Water: hydrological cycle, physical and chemical characteristics
2. Water as solvent
3. Acid / Base systems
4. Redox reactions
5. Contents and assessment
6. Water treatment, part I (Sieving, sedimentation, flotation, filtration, membrane separation, flocculation)
7. Water treatment, part II (Adsorption, ion exchange, gas transfer, deacidification, softening, oxidation, disinfection)

Literature
Elective 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: Cloud Computing [2511504]

Coordinators: Stefan Tai, Kunze
Part of the modules: Emphasis in Informatics (p. 62)[WI4INFO2], Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3]

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

Learning Control / Examinations

Conditions
None.

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

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

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

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

Course: Communications Economics [2540462]

Coordinators: Stefan Seifert, Jan Kraemer
Part of the modules: Communications & Markets (p. 44)[WI4BWLISM5], Information Engineering (p. 46)[WI4BWLISM7]

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

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

Conditions
None.

Learning Outcomes
The student

- understands the basics of game theory with focus on industrial economy,
- analyses the telecommunication industry concerning network economy and digital goods
- formalises and evaluates economically complex aspects of the current regulation

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

Literature

- J.-J. Laffont, J. Tirole (2000): *Competition in Telecommunications*, MIT Press.
- 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
- Steger, U., Büdenbender, U., Feess, E., Nelles, D. (2008): *Die Regulierung elektrischer Netze: Offene Fragen und Lösungsansätze*, Springer
- Varian, Hal (2006): “Intermediate microeconomics: a modern approach”, 7th edition (international student edition), Norton

Course: Complexity Management [2511400]

Coordinators: Detlef Seese
Part of the modules: Emphasis in Informatics (p. 62)[WI4INFO2], Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3]

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

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

Conditions
None.

Recommendations
A basic knowledge in informatics is suitable.

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

Content
Complexity is one of the biggest challenges of our time. Central questions are: - Why humans often fail in complex situations? - What is complexity? -What are reasons for complexity? - Which parameters are essential to control complexity? - How systems have to be designed to reduce their complexity and to enable management of complexity?
The lecture gives a survey on fundamental results and handles the following topics: - Understanding of the difficulties produced by complex systems and complex processes - Foundations: modelling complex systems, complexity theory, descriptive, structural and parametric complexity, dynamic systems, topology, dimension, non-linearity, chaos, randomness and emerging structures, human shortcomings, simulation - Complexity of products and production - Complexity of markets - How to improve complexity management? - Decision support by intelligent use of IT

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

Literature

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

Elective literature:

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

- W. Metzler: Nichtlineare Dynamik und Chaos, Teubner Studienbücher Mathematik, Stuttgart 1998
- G. Frizelle, H. Richards (eds.): Tackling industrial complexity: the ideas that make a difference. University of Cambridge, Institute of Manufacturing 2002
- W. Bick, S. 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.
The course “Complexity Management” will not be offered any more from summer term 2016 on. The examination will be offered latest until summer term 2015 (repeaters only).

Course: Computational Economics [2590458]

Coordinators: Pradyumn Kumar Shukla, Simon Caton
Part of the modules: Market Engineering (p. 42)[WI4BWLISM3], Emphasis in Informatics (p. 62)[WI4INFO2], Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3]

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

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

Conditions
None.

Learning Outcomes
The student

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

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

Media

- Lecture slides and exercises as pdf-files.

Literature

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

Elective literature:

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

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

Course: Computer-based Production Planning and Control, Process Simulation and Supply Chain Management [2581975]

Coordinators: Magnus Fröhling, Frank Schultmann
Part of the modules: Industrial Production III (p. 48)[WI4BWLIIP6]

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

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

Conditions
None.

Learning Outcomes

- Students shall be able to discuss problems arising out of IT-based PPS, process simulations and Supply Chain Management.
- Students shall be able to apply general approaches to solve the addressed problems.

Content
Following an introduction into the structure, the history and still existing 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 planning models on the other hand. Finally, commercially available, industry-specific software tools are presented and discussed, which focus on production planning (PP) and materials management (MM) in the SAP ERP system.
Furthermore, process engineering software tools are presented and discussed in the light of integration into production planning as well as tools to simulate material flows and supply chains (with respect to Advanced Planning Systems).

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

Literature
will be announced in the course

Course: Corporate Financial Policy [2530214]

Coordinators: Martin E. Ruckes
Part of the modules: Finance 2 (p. 25)[WI4BWLFBV2], F2&F3 (Finance) (p. 26)[WI4BWLFBV3], Finance 3 (p. 27)[WI4BWLFBV11]

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

Learning Control / Examinations

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

Literature
Elective literature:
Tirole, J. (2006): The Theory of Corporate Finance. Princeton University Press.

Course: Current Issues in the Insurance Industry [2530350]

Coordinators: Wolf-Rüdiger Heilmann
Part of the modules: Insurance Management II (p. 31)[WI4BWLFBV7], Insurance Management I (p. 30)[WI4BWLFBV6]

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

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

Conditions
For the understanding of this course knowledge of *Private and Social Insurance* [2530050] is required.

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

Content
Current topics in insurance markets.

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

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

Course: Customer Relationship Management [2540508]

Coordinators: Andreas Geyer-Schulz
Part of the modules: Advanced CRM (p. 39)[WI4BWLISM1]

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

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

The course is considered successfully taken, if at least 50 out of 100 points are acquired in the written exam. In this case, all additional points (up to 25) from excersise work will be added. The grades of this lecture are assigned following the table below:

Grade	Minimum points
1.0	113
1.3	106
1.7	99
2.0	92
2.3	85
2.7	78
3.0	71
3.3	64
3.7	57
4.0	50
4.7	40
5.0	0

Conditions
None.

Learning Outcomes
The students

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

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

Media
Slides, Audio, Reader

Literature
Christian Grönroos. Service Management and Marketing : A Customer Relationship Management Approach. Wiley, Chichester, 2nd edition, 2000.
Elective literature:
Jill Dyché. The CRM Handbook: A Business Guide to Customer Relationship Management. Addison-Wesley, Boston, 2nd edition, 2002.
Ronald S. Swift. Accelerating Customer Relationships: Using CRM and 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: Data Mining [2520375]

Coordinators: Gholamreza Nakhaeizadeh
Part of the modules: Statistical Methods in Risk Management (p. 71)[WI4STAT2]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content
Part one: Data Mining
Why Data Mining?

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

Part two: Examples of application of Data Mining

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

Literature
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: Database Systems [2511200]

Coordinators: Andreas Oberweis, Dr. D. Sommer
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

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

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

Conditions
Knowledge of course *Applied Informatics I - Modelling* [2511030] is expected.

Learning Outcomes
Students

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

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

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

Media
Slides, Access to internet resources

Literature
Elective literature:

- 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: Database Systems and XML [2511202]

Coordinators: Andreas Oberweis
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

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

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

Conditions
None.

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

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

Media
Slides, access to internet resources.

Literature

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

Course: Data Protection Law [24018]

Coordinators: Indra Spiecker genannt Döhmann
Part of the modules: Public Business Law (p. 139)[WI4JURA6]

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

Learning Control / Examinations
Assessment will consist of a written exam (following §4(2), 1 SPO).

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

Literature
Will be announced in the course.
Elective 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: Design and Construction of Landfills for Municipal and Special Waste [09031]

Coordinators: Egloffstein
Part of the modules: Safety Science II (p. 119)[WI4INGINTER5], Safety Science I (p. 118)[WI4INGINTER4], Safety Science III (p. 120)[WI4INGINTER6]

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

Learning Control / Examinations

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#eh

Course: Derivatives [2530550]

Coordinators: Marliese Uhrig-Homburg
Part of the modules: Finance 1 (p. 24)[WI4BWLFBV1], Finance 3 (p. 27)[WI4BWLFBV11], Finance 2 (p. 25)[WI4BWLFBV2], F2&F3 (Finance) (p. 26)[WI4BWLFBV3]

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

Learning Control / Examinations

Conditions
None.

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

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

Media
Slides, Exercises/Exercise sheets

Literature

- Hull (2005): Options, Futures, & Other Derivatives, Prentice Hall, 6th Edition

Elective literature:
Cox/Rubinstein (1985): Option Markets, Prentice Hall

Course: Semi- and Decentral Systems [19249]

Coordinators: Erhard Hoffmann, Stephan Fuchs
Part of the modules: Water Supply and Sanitation (p. 101)[WI4INGBGU13]

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

Learning Control / Examinations
See module description.

Conditions
Recommended: prior attendace of *Design of Wastewater Treatment Plants and Biosolids Reclaiming Systems (Design of Urban Water and Wastewater Management Systems)* [19243/44] and *Material Flux Analyses - River Basin Management* [19245]

Learning Outcomes

Content

- Ecological and economic aspects of sustainable sanitation systems
- Quantity and quality of domestic wastewater flows
- Nutrient recovery

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

Course: Document Management and Groupware Systems [2511212]

Coordinators: Stefan Klink
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

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

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

Conditions
None.

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

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

Media
Slides, access to internet resources.

Literature

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

Elective literature:
Further literature is given in each lecture individually.

Course: EDV in Highway Engineering [19316]

Coordinators: Matthias Zimmermann
Part of the modules: Safety, Computing and Law in Highway Engineering (p. 91)[WI4INGBGU3]

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

Learning Control / Examinations
See module description.

Conditions
See corresponding module information.

Learning Outcomes

Content

Course: eEnergy: Markets, Services, Systems [2540464]

Coordinators: Clemens van Dinther
Part of the modules: Market Engineering (p. 42)[WI4BWLISM3], Information Engineering (p. 46)[WI4BWLISM7], Basics of Liberalised Energy Markets (p. 49)[WI4BWLIIP4]

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

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

Conditions
None.

Learning Outcomes
The student

- understands the tasks and basic structure of the energy economy, in particular concerning electricity markets,
- understands the change in the energy economy and the necessity for the development of a Smart Grid,
- knows the market mechanisms in the energy market and their role in coordination and allocation of electric energy,
- is able to describe the relation between OTC, spot and balancing energy markets,
- knows the regulation specifications for energy markets and can reflect them critically,
- is able to model smart grid mechanisms and to evaluate them by simulation based methods.

Content
Scope of the lecture *eEnergy: Markets, Services, Systems* is economics and information management in energy markets. Integration of the growing number of renewable energy sources imposes new challenges on energy markets and the power system. To improve coordination between supply and demand it is necessary to interlink centralized and decentralized generators as well as consumers by means of ICT. Current electricity networks are extended by intelligent IT components thus incorporating the “Smart Grid”. Existing market structures for electricity have to be adjusted for a successful implementation of demand side management and integration of an increasing number of renewable energy producers as well as electric vehicles. Apart from regulatory and economic concepts, methods for modeling and analysis of energy markets are introduced and explained during the course.
The lecture is structured as follows:

1. **Electricity Markets**
   Market Models, EEX (spot and futures market), OTC Trading, Market Coupling
2. **Regulation**
   Charges and Incentives, Network Congestion (Management)
3. **Demand Side Management**
   Smart Meters, Tariffs, Price Elasticity, Storage Systems, Electric Mobility
4. **Modeling and Analysis of Energy Markets**

Media

- Powerpoint
- eLearning Plattform Ilias

Literature

- Erdmann G, Zweifel P. *Energieökonomik, Theorie und Anwendungen*. Berlin Heidelberg: Springer; 2007.
- Grimm V, Ockenfels A, Zoettl G. Strommarktdesign: Zur Ausgestaltung der Auktionsregeln an der EEX *. *Zeitschrift für Energiewirtschaft*. 2008:147-161.
- Stoft S. *Power System Economics: Designing Markets for Electricity*. IEEE; 2002.,
- Ströbele W, Pfaffenberger W, Heuterkes M. *Energiewirtschaft: Einführung in Theorie und Politik*. 2nd ed. München: Oldenbourg Verlag; 2010:349.

Remarks
The lecture is offered the first time in the summer term 2011.
The lecture has also been added in the IIP Module “Basics of Liberalised Energy Markets”.

Course: Efficient Energy Systems and Electric Mobility [2581006]

Coordinators: Russell McKenna, Patrick Jochem
Part of the modules: Energy Industry and Technology (p. 50)[WI4BWLIIP5]

ECTS Credits	Hours per week	Term	Instruction language
3,5	2/0	Summer term	en

Learning Control / Examinations

Conditions
None.

Learning Outcomes

- Understand the concept of energy efficiency as applied to specific systems
- Obtain an overview of the current trends in energy efficiency
- Be able to determine and evaluate alternative methods of energy efficiency improvement
- Overview of technical and economical stylized facts on electric mobility
- Judging economical, ecological and social impacts through electric mobility

Content
This lecture series combines two of the most central topics in the field of energy economics at present, namely energy efficiency and electric mobility. The objective of the lecture is to provide an introduction and overview to these two subject areas, including theoretical as well as practical aspects, such as the technologies, political framework conditions and broader implications of these for national and international energy systems.
The energy efficiency part of the lecture provides an introduction to the concept of energy efficiency, the means of affecting it and the relevant framework conditions. Further insights into economy-wide measurements of energy efficiency, and associated difficulties, are given with recourse to several practical examples. The problems associated with market failures in this area are also highlighted, including the Rebound Effect. Finally and by way of an outlook, perspectives for energy efficiency in diverse economic sectors are examined.
The electric mobility part of the lecture examines all relevant issues associated with an increased penetration of electric vehicles including their technology, their impact on the electricity system (power plants and grid), their environmental impact as well as their optimal integration in the future private electricity demand (i.e. smart grids and V2G). Besides technical aspects the user acceptance and behavioral aspects are also discussed.

Remarks
This course started in summer term 2011.

Course: Efficient Algorithms [2511100]

Coordinators: Hartmut Schmeck
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

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

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.

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

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

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

Media

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

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)
Elective literature:
will be announced in class

Course: Efficient Creativity - Processes and Methods within the Automotive Industry [2122371]

Coordinators: Lamberti
Part of the modules: Virtual Engineering (p. 88)[WI4INGMB22], Virtual Engineering B (p. 131)[WW4INGMB30], Virtual Engineering A (p. 130)[WW4INGMB29]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: eFinance: Information Engineering and Management for Securities Trading [2540454]

Coordinators: Christof Weinhardt, Ryan Riordan
Part of the modules: Market Engineering (p. 42)[WI4BWLISM3]

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

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

Conditions
None.

Learning Outcomes
The students

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

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

Media

- Powerpoint presentations
- recorded lecture available on the internet

Literature

- 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

Elective literature:

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

Course: Introduction in Ceramics [2125755]

Coordinators: M. J. Hoffmann
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

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

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

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

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

Content
The course is arranged in the following units:

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

Literature
Elective literature:

- H. Salmang, H. Scholze, „Keramik“, Springer-Verlag
- Kingery, Bowen, Uhlmann, „Introduction To Ceramics“, Wiley-Verlag

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

Coordinators: Eberhard Hohnecker
Part of the modules: Public Transportation Operations (p. 92)[WI4INGBGU4]

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

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.

Conditions
See module description.

Learning Outcomes

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

Literature
Elective literature:
Pachl: Systemtechnik des Schienenverkehrs, Teubner-Verlag, Stuttgart

Course: [2149666]

Coordinators: Weisbecker
Part of the modules: Global Production and Logistics (p. 132)[WI4INGMB31]

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

Learning Control / Examinations
The assessment consists of an oral exam (20 min) taking place during the recess period (according to Section 4(2), 1 or 2) of the examination regulation).
The examination takes place every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes

Content

Remarks
The credits were changed to 4 CP.

Course: Electrical Rail Vehicles [23346]

Coordinators: Gerhard Clos
Part of the modules: Guided Systems Engineering (p. 94)[WI4INGBGU6]

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

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.

Conditions
See module description.
See module description.

Learning Outcomes

Content
traction modi; engines; power supply; electrical elements in signalling / operation

Literature
Elective literature:
Steimel: Elektrische Triebfahrzeuge und ihre Energieversorgung, Oldenbourg-Verlag, München

Course: Electronic Markets (Principles) [2540502]

Coordinators: Andreas Geyer-Schulz
Part of the modules: Electronic Markets (p. 40)[WI4BWLISM2]

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

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

The course is considered successfully taken, if at least 50 out of 100 points are acquired in the written exam. In this case, all additional points (up to 25) from excersise work will be added. The grades of this lecture are assigned following the table below:

Grade	Minimum points
1.0	113
1.3	106
1.7	99
2.0	92
2.3	85
2.7	78
3.0	71
3.3	64
3.7	57
4.0	50
4.7	40
5.0	0

Conditions
None.

Learning Outcomes
The student

- has an overview about the different organizational form and their efficiency,
- names 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.

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.
Elective 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: Emissions into the Environment [2581962]

Coordinators: Ute Karl
Part of the modules: Industrial Production II (p. 47)[WI4BWLIIP2], Safety Science II (p. 119)[WI4INGINTER5], Safety Science I (p. 118)[WI4INGINTER4], Safety Science III (p. 120)[WI4INGINTER6]

ECTS Credits	Hours per week	Term	Instruction language
3.5	2/0	Winter term	de

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

Conditions
None.

Learning Outcomes
The student should identify problems of industrial pollution control.
The student knows solutions to these problems and their ways of application.

Content
The course will provide an overview of sources of air pollution, waste and municipal waste; methods to monitor and to reduce/manage pollutant flows; regulatory framework on national and international level.
A Air pollution control

- Indtroduction and definitions
- Sources an dpoluutants
- Regulatory framework
- Emission monitoring
- Air pollution control measures

B Waste management and Recycling

- Introduction and regulatory framework
- Statistics and logistics
- Recycling and disposal
- Waste treatment

C Waste water treatment

- Municipal waste water treatment systems
- Sewage sludge disposal

Media
Media will be provided on learning platform.

Literature
Elective literature:
A compilation of documents is made available on the web.

Course: The Making of Emulsions and Dispersions [22229]

Coordinators: Köhler
Part of the modules: Specialization in Food Process Engineering (p. 111)[WI4INGCV4]

ECTS Credits	Hours per week	Term	Instruction language
3	2		de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Theory of endogenous growth [2561503]

Coordinators: Ingrid Ott
Part of the modules: Innovation and growth (p. 59)[WW4VWLIWW1]

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

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.
Students will be given the opportunity of writing and presenting a short paper during the lecture time to achieve a bonus on the exam grade. If the mandatory credit point exam is passed, the awarded bonus points will be added to the regular exam points. A deterioration is not possible by definition, and a grade does not necessarily improve, but is very likely to (not every additional point improves the total number of points, since a grade can not become better than 1). The voluntary elaboration of such a paper can not countervail a fail in the exam.

Conditions
None.

Recommendations
Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. In addition, an interest in quantitative-mathematical modeling is required.

Learning Outcomes
Students shall be given the ability to understand, analyze and evaluate selected models of endogenous growth theory.

Content

- Basic models of endogenous growth
- Human capital and economic growth
- Modelling of technological progress
- Diversity Models
- Schumpeterian growth
- Directional technological progress
- Diffusion of technologies

Media

- lecture slides
- exercises

Literature
Excerpt:

- Acemoglu, D. (2008): Introduction to modern economic growth. Princeton University Press, New Jersey.
- Aghion, P., Howitt, P. (2009): Economics of growth, MIT-Press, Cambridge/MA.
- Barro, R.J., Sala-I-Martin, X. (2003): Economic Growth. MIT-Press, Cambridge/MA.
- Sydsaeter, K., Hammond, P. (2008): Essential mathematics for economic analysis. Prentice Hall International, Harlow.
- Sydsæter, K., Hammond, P., Seierstad, A., Strom, A., (2008): Further Mathematics for Economic Analysis, Second Edition, Pearson Education Limited, Essex.

Course: Energy and Environment [2581003]

Coordinators: Ute Karl, n.n.
Part of the modules: Environmental Economics (p. 54)[WI4VWL5], Energy Industry and Technology (p. 50)[WI4BWLIIP5]

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

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

Conditions
None.

Learning Outcomes

Content

Course: Energy efficient intralogistic systems [2117500]

Coordinators: Schönung
Part of the modules: Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11], Introduction to Logistics (p. 76)[WI4INGMB20], Technical Logistics (p. 128)[WW4INGMB27]

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

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

Conditions
Knowledge of Electrical Engineering and Technical Mechanics is recommended.

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

Content
The main focuses of the course are:

- processes in Intralogistic systems
- evaluation of energy consumption of conveyors
- modeling of conveying systems
- methods for energy savings
- approaches for energy efficiency increasing of continuous and discontinuous conveyors
- dimensioning energy efficient drives
- new approaches for resource efficient conveying systems.

Course: Cycles and Global Development [22319]

Coordinators: Georg Schaub
Part of the modules: Fuels, Environment and Global Development (p. 107)[WI4INGCV2]

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

Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes

Content

Literature
Elective literature:
Schlesinger W.H.: Biogeochemistry, an Analysis of Global Change, Academic Press 1997.

Course: Energy Trade and Risk Management [2581020]

Coordinators: Kai Hufendiek
Part of the modules: Basics of Liberalised Energy Markets (p. 49)[WI4BWLIIP4]

ECTS Credits	Hours per week	Term	Instruction language
3.5	2/1	Summer term	de

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

Conditions
None.

Learning Outcomes

Content

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

Course: Energy Policy [2581959]

Coordinators: Martin Wietschel
Part of the modules: Basics of Liberalised Energy Markets (p. 49)[WI4BWLIIP4]

ECTS Credits	Hours per week	Term	Instruction language
3.5	2/0	Summer term	de

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

Conditions
None.

Learning Outcomes

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

Literature
Will be anounced in the lecture.

Course: Energy Systems Analysis [2581002]

Coordinators: Anke Eßer-Frey
Part of the modules: Energy Industry and Technology (p. 50)[WI4BWLIIP5]

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

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

Conditions
None.

Learning Outcomes

Content

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

Remarks
Since 2011 the lecture is offered in winter term. Exams can still be taken in summer term.

Course: Power Transmission and Power Network Control [23372/23374]

Coordinators: Thomas Leibfried
Part of the modules: Electrical Power Engineering (p. 106)[WI4INGETIT4], Generation and transmission of renewable power (p. 109)[WI4INGETIT7]

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

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

Conditions
The course *Power Network Analysis* [23371] has to be completed successfully beforehand.

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.

Literature
Will be announced in the lecture notes.

Remarks
The credits have been reduced to 4,5 in summer term 2011.

Course: Enterprise Architecture Management [2511600]

Coordinators: Thomas Wolf
Part of the modules: Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3], Emphasis in Informatics (p. 62)[WI4INFO2]

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

Learning Control / Examinations
The assessment of this course is a written or (if necessary) oral examination according to §4(2) of the examination regulation.

Conditions
None.

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

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

Media
Slides, access to internet resources.

Literature

- 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: Enterprise Risk Management [2530326]

Coordinators: Ute Werner
Part of the modules: Operational Risk Management I (p. 33)[WI4BWLFBV9], Operational Risk Management II (p. 34)[WI4BWLFBV10]

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

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

Conditions
None.

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

Content

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

Literature

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

Elective literature:
Additional literature is recommended during the course.

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

Course: Decision Theory and Objectives in Applied Politics [25537]

Coordinators: Tangian
Part of the modules: Social Choice Theory (p. 58)[WI4VWL9]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content
A decision model usually consists of a utility function which represents the decision maker's preference to be maximized, and constraints which represent financial, juridical and other restrictions. In policy making, the bottle neck is the definition of the utility function which can be viewed as an aggregated indicator for policy monitoring and evaluation. The lecture course deals with theoretical methods for (i) constructing quadratic and additive utility functions, (ii) eliciting the required data from policy makers, (iii) constructing aggregated indicators with their applications to labour market policies (flexicurity, decent work, aiding regions), and (iv) finding equilibrium prices.

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

Coordinators: Eberhard Hohnecker
Part of the modules: Guided Systems Engineering (p. 94)[WI4INGBGU6]

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

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.

Conditions
See module description.
See module description.

Learning Outcomes

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

Course: Design and Construction Highways [19065]

Coordinators: Ralf Roos
Part of the modules: Design, Construction, Operation and Maintenance Highways (p. 89)[WI4INGBGU1], Highway Engineering (p. 90)[WI4INGBGU2]

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

Learning Control / Examinations
See module description.

Conditions
See corresponding module information.

Learning Outcomes

Content

Course: Gas-Markets [2581022]

Coordinators: Andrej Pustisek
Part of the modules: Basics of Liberalised Energy Markets (p. 49)[WI4BWLIIP4]

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

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

Conditions
None.

Learning Outcomes

Content

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

Course: eServices [2540466]

Coordinators: Christof Weinhardt, Gerhard Satzger
Part of the modules: Service Management (p. 45)[WI4BWLISM6]

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

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

Conditions
None.

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

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

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

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

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

Media

- PowerPoint slides

Literature

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

Course: Economic integration in Europe [2561257]

Coordinators: Jan Kowalski
Part of the modules: Economic Policy (p. 55)[WI4VWL6], Economic Policy II (p. 52)[WW4VWL3]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Literature
Elective literature:
Baldwin, R./ Wyplosz, M.: “The economics of European Integration“ Mcgraw-Hill 2006, 2nd Edition

Course: European and International Law [24666]

Coordinators: Indra Spiecker genannt Döhmann
Part of the modules: Public Business Law (p. 139)[WI4JURA6]

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

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

Conditions
None.

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

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

Media
Content structure

Literature
Further details will be announced in the lecture.
Elective literature:
Further details will be announced in the lecture.

Course: Experimental Economics [2520373]

Coordinators: Siegfried Berninghaus, Kroll
Part of the modules: Market Engineering (p. 42)[WI4BWLISM3], Applied Strategic Decisions (p. 51)[WI4VWL2]

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

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

Conditions
See corresponding module information.

Learning Outcomes
The students should learn

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

Content
Experimental Economics have become a separate field in Economics. Nearly all fields of the economic discipline use economic experiments to verify theoretical results. Besides being used for 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.

Literature
Elective 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: Experimental Lab Class in Welding Technology, in Groups [2173560]

Coordinators: Volker Schulze
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

ECTS Credits	Hours per week	Term	Instruction language
1	3	Winter term	de

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).

Conditions
The participation in the course *Welding Technology I/II* [21565/21570] is assumed.

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.

Literature
Elective literature:
Distributed during the lab attendance.

Course: The Management of R&D Projects with Case Studies [2581963]

Coordinators: Helwig Schmied
Part of the modules: Industrial Production III (p. 48)[WI4BWLIIP6]

ECTS Credits	Hours per week	Term	Instruction language
3.5	2/2	Winter / Summer Term	de

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

Conditions
None.

Learning Outcomes

- Students shall be able to discuss different tasks of R&D-management.
- Students shall be able to apply common approaches to solve these general problems.

Content

- The communication between R&D, production and marketing.
- Problems concerning measuring the productivity of the R&D system.
- Methods for improving the productivity of R&D systems.
- Planning of R&D projects with the help of the Communication-Matrix-Methods for controlling R&D projects' progress.
- The marketing of scientific skills.
- The communication matrix as a tool for the implementation of simultaneous engineering.
- Case studies.

Literature
will be announced in the course

Course: Driving Dynamics Evaluation within the Global Vehicle Simulation [21850]

Coordinators: Schick
Part of the modules: Handling Characteristics of Motor Vehicles (p. 81)[WI4INGMB6]

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

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

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

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

Content

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

Literature
Elective literature:

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: Handling Characteristics of Motor Vehicles I [2113807]

Coordinators: Unrau
Part of the modules: Handling Characteristics of Motor Vehicles (p. 81)[WI4INGMB6]

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

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

Conditions
None.

Learning Outcomes
The students know the basic connections between drivers, vehicles and environment. They can build up a vehicle simulation model, with which forces of inertia, aerodynamic forces and tyre forces as well as the appropriate moments are considered. They have proper knowledge in the area of tyre characteristics, since a special meaning comes to the tire behavior during driving dynamics simulation.

Content

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

Literature
Elective literature:

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: Handling Characteristics of Motor Vehicles II [2114838]

Coordinators: Frank Gauterin
Part of the modules: Handling Characteristics of Motor Vehicles (p. 81)[WI4INGMB6]

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

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

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

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

Content

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

Literature
Elective literature:

1. Richter, B.: Schwerpunkte der Fahrzeugdynamik, Verlag TÜV, 1990
2. Zomotor, A.: Fahrwerktechnik: Fahrverhalten, Vogel Verlag, 1991
3. Gnadler, R.: Umdrucksammlung zur Vorlesung “Fahreigenschaften von Kraftfahrzeugen II “

Course: Vehicle Mechatronics I [2113816]

Coordinators: Ammon
Part of the modules: Handling Characteristics of Motor Vehicles (p. 81)[WI4INGMB6], Vehicle Development (p. 82)[WI4INGMB14]

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

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

Conditions
It is recommeded to have knowledge of control engineering, technical mechanics and automobile technology.

Learning Outcomes
The students have an overview of the system science field of mechatronics and its application in the area of vehicle conception, especially in the context of vehicle system dynamics. They know the tools and methods for a 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)

Literature
Elective 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 I [2113806]

Coordinators: Frank Gauterin
Part of the modules: Handling Characteristics of Motor Vehicles (p. 81)[WI4INGMB6]

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

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

Conditions
None.

Learning Outcomes
The students know what are noise and vibration, how they are generated, and how they are perceived by human beings.
They have knowledge about the requirements given by users and the public. They know which components of the vehicle are participating in which way on noise and vibration phenomenon and how they could be improved.

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

Media
Lecture Script

Literature
Elective literature:

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.
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Course: Vehicle Comfort and Acoustics II [2114825]

Coordinators: Frank Gauterin
Part of the modules: Handling Characteristics of Motor Vehicles (p. 81)[WI4INGMB6]

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

Learning Control / Examinations
The assessment consists of an oral exam (30-40 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
The course can be attended independently from the course *Vehicle Comfort and Acoustics II* [21806].

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

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

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

Noise and vibration properties, comfort optimisation of

- tyres
- brakes
- chasis
- motor
- drive train.

Traffic noise.

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

Media
Lecture script.

Course: Manufacturing Engineering [2149657]

Coordinators: Volker Schulze
Part of the modules: Selected Chapters from Production Engineering II (p. 74)[WI4INGMB2], Selected Chapters from Production Engineering I (p. 73)[WI4INGMB1], Manufacturing Engineering (p. 123)[WI4INGMB23], Selected Chapters from Production Engineering III (p. 75)[WI4INGMB3]

ECTS Credits	Hours per week	Term	Instruction language
9	4/1	Winter term	de

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

Conditions
None.

Learning Outcomes
The student

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

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

The following topics will be covered:

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

Media
Slides and lecture notes for the manufacturing engineering lecture will be made available through Ilias.

Course: Fixed Income Securities [2530260]

Coordinators: Marliese Uhrig-Homburg
Part of the modules: Finance 2 (p. 25)[WI4BWLFBV2], F2&F3 (Finance) (p. 26)[WI4BWLFBV3], Finance 3 (p. 27)[WI4BWLFBV11]

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

Learning Control / Examinations
The assessment consists of a written exam following §4, Abs. 2, 1.

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.

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).

Elective literature:

- Hull, J., Options, Futures, & Other Derivatives, Prentice Hall, Sixth Edition, (2005).

Course: Financial Time Series and Econometrics [2521359]

Coordinators: Svetlozar Rachev
Part of the modules: Mathematical and Empirical Finance (p. 70)[WI4STAT1], Risk Management and Econometrics in Finance (p. 72)[WI4STAT3]

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

Learning Control / Examinations
The assessment of this course consists of a written examination (following §4(2), 1 SPO) and of possible additional assignments during the course (following §4(2), 3 SPO).

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
Financial econometrics is the econometrics of financial markets. It is a quest for models that describe financial time series such as prices, returns, interest rates, financial ratios, defaults, and so on. The economic equivalent of the laws of physics, econometrics represents the quantitative, mathematical laws of economics.

After giving definitions of financial markets' instruments and processes, and a quick overview of basic statistical notions, the present course provides students with valuable tools in regression analysis, modelling univariate time series, ARIMA and ARCH modelling. The stress is always put on the application to financial markets. All illustrations and exercises are based on real market data and situations.

Media
transparencies lecture, exercises

Literature

- Rachev S.T., Mittnik S. Fabozzi F. , Foccardi S., Jasic T. , Financial Econometrics, John Wiley,Finance, 2007
- Rachev S.T., Hsu, J. S. J., Bagasheva B. S., Fabozzi F. J., Bayesian Methods in Finance, John Wiley, Finance, 2007
- Mills: The Econometric Modelling Of Financial Markets. Cambridge University Press.

Course: Financial Intermediation [2530232]

Coordinators: Martin E. Ruckes
Part of the modules: Finance 2 (p. 25)[WI4BWLFBV2], F2&F3 (Finance) (p. 26)[WI4BWLFBV3], Finance 3 (p. 27)[WI4BWLFBV11]

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

Learning Control / Examinations

Conditions
None.

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

Content

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

Literature
Elective literature:

- Hartmann-Wendels/Pfingsten/Weber (2006): Bankbetriebslehre, 4. Auflage, Springer Verlag.
- Freixas/Rochet (1997): Microeconomics of Banking, MIT Press.

Course: Finance and Banking [25350/1]

Coordinators: Karl-Heinz Vollmer
Part of the modules: Mathematical and Empirical Finance (p. 70)[WI4STAT1]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

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: Fluid Power Systems [2114093]

Coordinators: Marcus Geimer
Part of the modules: Automotive Engineering (p. 80)[WI4INGMB5], Mobile Machines (p. 83)[WI4INGMB15]

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

Learning Control / Examinations
Assessment for the module *Mobile Machines*: See module description.
Assessment for the module *Automotive Engineering*: The assessment consists of an oral exam (20 min) taking place in the recess period (according to §4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes
The students will be able to

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

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

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

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

- Compressors
- Motors
- Valves
- Pneumatic circuits.

Course: River Engineering and Ecology II [19213]

Coordinators: Dister
Part of the modules: Understanding and Prediction of Disasters I (p. 115)[WI4INGINTER1], Understanding and Prediction of Disasters II (p. 116)[WI4INGINTER2], Understanding and Prediction of Disasters III (p. 117)[WI4INGINTER3]

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

Learning Control / Examinations

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: Mixed Integer Programming I [25138]

Coordinators: Oliver Stein
Part of the modules: Mathematical Programming (p. 68)[WI4OR6]

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

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.
The examination is held in the semester of the lecture and in the following semester.
Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.
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.
In a combined examination of *Mixed Integer Programming I* [25138] and *Mixed Integer Programming II* [25140], upon attaining more then 60% of the exercise points, the grade of the passed examination is improved by a third of a grading step.
In a combined examination of *Mixed Integer Programming I* [25138] and *Mixed Integer Programming II* [25140], upon attaining more then 60% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student

- knows and understands the fundamentals of 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.

Literature
Elective 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 three years is available online (kop.ior.kit.edu).

Course: Mixed Integer Programming II [25140]

Coordinators: Oliver Stein
Part of the modules: Mathematical Programming (p. 68)[WI4OR6]

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

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.

The examination is held in the semester of the lecture and in the following semester.

Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.

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.

In a combined examination of *Mixed Integer Programming I* [25138] and *Mixed Integer Programming II* [25140], upon attaining more then 60% of the exercise points, the grade of the passed examination is improved by a third of a grading step.

In a combined examination of *Mixed Integer Programming I* [25138] and *Mixed Integer Programming II* [25140], upon attaining more then 60% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student

- knows and understands the fundamentals of 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.

Literature
Elective 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 three years is available online (kop.ior.kit.edu).

Course: Business Models in the Internet: Planning and Implementation [2540456]

Coordinators: Christof Weinhardt, Clemens van Dinther
Part of the modules: Business & Service Engineering (p. 43)[WI4BWLISM4]

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

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

Conditions
None.

Learning Outcomes
The student

- is able to list the most important features of web application lifecycles
- analyses, designs and implements web applications
- evaluates and argues internet business models with special requirements and features
- is able to estimate the practicability of business models

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
- videoconferencing, if circumstances allow

Literature
Will be announced within the course.

Course: Business Strategies of Banks [2530299]

Coordinators: Wolfgang Müller
Part of the modules: Finance 2 (p. 25)[WI4BWLFBV2], F2&F3 (Finance) (p. 26)[WI4BWLFBV3], Finance 3 (p. 27)[WI4BWLFBV11]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes
Students are told the basics of commercial banking.

Content
The management of a bank is in charge of the determination and implementation of business policy - taking into account all relevant endogenous and exogenous factors - that assures the bank's success in the long run. In this context, there exists a large body of banking models and theories which are helpful in describing the success and risk of a bank. This course is meant to be the bridging of banking theory and practical implementation. In the course of the lectures students will learn to take on the bank management's perspective.
The first chapter deals with the development of the banking sector. Making use of appropriate assumptions, a banking policy is developed in the second chapter. The design of bank services (ch. 3) and the adequate marketing plan (ch. 4) are then built on this framework. The operational business of banks must be guided by appropriate risk and earnings management (ch. 5 and 6), which are part of the overall (global) bank management (ch. 7). Chapter eight, at last, deals with the requirements and demands of bank supervision as they have significant impact on a bank's corporate policy.

Literature
Elective literature:

- A script is disseminated chapterwise within the lecture.
- Hartmann-Wendels, Thomas; Pfingsten, Andreas; Weber, Martin; 2000, Bankbetriebslehre, 2. Auflage, Springer

Course: Field Course in Freshwater Ecology [19243]

Coordinators: Stephan Fuchs
Part of the modules: Environmental Management (p. 100)[WI4INGBGU12]

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

Learning Control / Examinations
See module description.

Conditions
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].

Learning Outcomes

- Training during three days
- Environmental site assessment of several river systems
- Limnological investigations (Odenwald and Neckar rivers)
- Water pollution
- Anthropoganic disturbances
- General characterization: Water and its environment -> water structure survey

Content

- physical and chemical parameters
- oxygen balance
- particle size distribution
- water quality studies

Literature
Elective 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: Seminar in Freshwater Ecology [19057/58]

Coordinators: Stephan Fuchs
Part of the modules: Environmental Management (p. 100)[WI4INGBGU12]

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

Learning Control / Examinations
See module description.

Conditions
Prior attendance of the course *Urban Water Ressource Management and Ecological Engineering* [19057/19058].
Combination with *Field Course in Freshwater Ecology* [19243] is recommended.

Learning Outcomes

Content

- Characterization and zonation of rivers and streams
- Nutrients (carbon, nitrogen, phosphorus, oxygen)
- Interaction between sediments and open water
- Water framework direction
- Characterization of Neckar
- Municipal wastewater
- hygienic load
- thermal load

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

Course: Foundry Technology [21575]

Coordinators: Wilhelm
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

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

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

Conditions
The module *Emphasis Material Science* [WI3INGMB9] has to be completed successfully beforehand.

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

Literature
Elective literature:
Will be announced in the lecture.

Course: Global Optimization I [2550134]

Coordinators: Oliver Stein
Part of the modules: Mathematical Programming (p. 68)[WI4OR6]

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

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.
The examination is held in the semester of the lecture and in the following semester.
Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.
The examination can also be combined with the examination of *Global Optimization II* [2550136]. In this case, the duration of the written examination takes 120 minutes.
In a combined examination of *Global Optimization I* [2550134] and *Global Optimization II* [2550136], upon attaining more then 60% of the exercise points, the grade of the passed examination is improved by a third of a grading step.
In a combined examination of *Global Optimization I* [2550134] and *Global Optimization II* [2550136], upon attaining more then 60% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student

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

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

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

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

Literature
Elective literature:

- W. Alt *Numerische Verfahren der konvexen, nichtglatten Optimierung* Teubner 2004
- C.A. Floudas *Deterministic Global Optimization* Kluwer 2000
- R. Horst, H. Tuy *Global Optimization* Springer 1996
- 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 II [2550136]

Coordinators: Oliver Stein
Part of the modules: Mathematical Programming (p. 68)[WI4OR6]

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

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.
The examination is held in the semester of the lecture and in the following semester.
Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration to the written examinationen is subject to fulfilling the prerequisite.
The examination can also be combined with the examination of *Global Optimization I* [2550134]. In this case, the duration of the written examination takes 120 minutes.
In a combined examination of *Global Optimization I* [2550134] and *Global Optimization II* [2550136], upon attaining more then 60% of the exercise points, the grade of the passed examination is improved by a third of a grading step.
In a combined examination of *Global Optimization I* [2550134] and *Global Optimization II* [2550136], upon attaining more then 60% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student

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

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

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

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

Literature
Elective literature:

- W. Alt *Numerische Verfahren der konvexen, nichtglatten Optimierung* Teubner 2004
- C.A. Floudas *Deterministic Global Optimization* Kluwer 2000
- R. Horst, H. Tuy *Global Optimization* Springer 1996
- 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 Production and Logistics - part 1: Global Production [2149610]

Coordinators: Lanza
Part of the modules: Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11], Global Production and Logistics (p. 132)[WI4INGMB31]

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

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

Conditions
None.

Learning Outcomes

Content

Remarks
The course is the replacement for *International Production and Logistics* [21692] and was changed to 4 CP.

Course: Global Production and Logistics - part 2: Global Logistics [2149600]

Coordinators: Kai Furmans
Part of the modules: Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11], Global Production and Logistics (p. 132)[WI4INGMB31]

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

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

Conditions
Prerequisites: *Logistics – Organisation, Design and Control of Logistics Systems* [2118078].

Learning Outcomes
After successfully finishing this course, the student will have sound knowledge about planning and operations of global supply chains and will be able to use simple models for planning. The student will be familiar with the requirements and characteristics of global trade and transport.

Content
Characteristics of global trade

- Incoterms
- Customs clearance, documents and export control

Global transport and shipping

- Maritime transport, esp. container handling
- Air transport

Modeling of supply chains

- SCOR model
- Value stream analysis

Location planning in cross-border-networks

- Application of the Warehouse Location Problem
- Transport Planning

Inventory Management in global supply chains

- Stock keeping policies
- Inventory management considering lead time and shipping costs

Media
Blackboard, data projector.

Literature
Elective literature:

- Arnold/Isermann/Kuhn/Tempelmeier. HandbuchLogistik, Springer Verlag, 2002 (Neuauflage in Arbeit)
- Domschke. Logistik, Rundreisen und Touren,Oldenbourg Verlag, 1982
- Domschke/Drexl. Logistik, Standorte, OldenbourgVerlag, 1996
- Gudehus. Logistik, Springer Verlag, 2007
- Neumann-Morlock. Operations-Research,Hanser-Verlag, 1993
- Tempelmeier. Bestandsmanagement in SupplyChains, Books on Demand 2006
- Schönsleben. IntegralesLogistikmanagement, Springer, 1998

Remarks
The course is the replacement for *International Production and Logistics* [21692] and was changed to 4 CP.

Course: „Good Governance“ at German Corporations [2577919]

Coordinators: Thorsten Reitmeyer, Th. Reitmeyer
Part of the modules: Seminar Module (p. 141)[WW4SEM]

ECTS Credits	Hours per week	Term	Instruction language
6	4	Winter / Summer Term	de

Learning Control / Examinations
Term paper (50%) and written conclusion (50%).

Conditions
None.

Learning Outcomes

Content

Remarks
The seminar expands over 2 semesters.

Course: Graph Theory and Advanced Location Models [2550484]

Coordinators: Stefan Nickel
Part of the modules: Mathematical Programming (p. 68)[WI4OR6]

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

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.

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

Learning Outcomes
The lecture is divided into two parts: In the first part "Graph Theory", basic concepts and algorithms of Graph Theory are presented, which are used in engineering, economic and socio-scientific problems. The students become acquainted with models and methods in order to optimize on graphs and networks. The second part "Advanced Location Models" addresses some selected advanced topics of location theory. The students become familiar with praxis-relevant and current research topics and learn about solution concepts of different location problems.

Content
Graph Theory is an important part of Discrete Mathematics. A special attraction is in its clearness and variety of proof techniques. Object of the first part "Graph Theory" is the mediation of basic graph theoretical concepts and algorithms, which are deployed in many areas. In focus is the modeling of different problems with graph theoretical methods und their solutions with efficient algorithms. Significant focal points are Shortest Paths, Flows, Matchings, Colorings and Matroids.
A variety of application areas of location theory has attracted increasing research interest within the last decades, because location decisions are a critical factor in strategic planning. In the second part "Advanced Location Models", some current research questions of modern industrial location theory are discussed after a short introduction. Thereby, practical models and suitable solution methods for location problems in general networks are presented. The lecture goes into details about Pareto Solutions in Networks, Ordered Median Problems, Covering Problems and Allocation Problems.

Literature

- Jungnickel: Graphs, Networks and Algorithms, 2nd edition, Springer, 2005
- Diestel: Graph Theory, 3rd edition, Springer, 2006
- Bondy, Murt: Graph Theory, Springer, 2008
- Nickel, Puerto: Location Theory, Springer, 2005
- Drezner: Facility Location – Applications and Theory, 2nd edition, Springer, 2005

Remarks
The lecture is planned to be held in the summer term 2013.
The planned lectures and courses for the next three years are announced online.

Course: Fundamentals of Waste Water Treatment [22618]

Coordinators: n.N.
Part of the modules: Water Chemistry (p. 112)[WI4INGCV5], Water Chemistry II (p. 114)[WI4INGCV7]

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

Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes

Content

Literature
Elective 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: Basics of Automotive Engineering I [2113805]

Coordinators: Frank Gauterin, Unrau
Part of the modules: Automotive Engineering (p. 80)[WI4INGMB5]

ECTS Credits	Hours per week	Term	Instruction language
6	4	Winter term	de

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

Conditions
None.

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

Content

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

Literature
Elective literature:

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: Basics of Automotive Engineering II [2114835]

Coordinators: Frank Gauterin, Unrau
Part of the modules: Automotive Engineering (p. 80)[WI4INGMB5]

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

Learning Control / Examinations
The assessment consists of a written exam (90 min) taking place in the recess period (according to §4 (2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
It is recommeded to attend the course *Basics of Automotive Engineering I* [21805].

Learning Outcomes
The students have an overview of the modules, which are necessary for the road holding of a motor vehicle and the power transmission between vehicle bodywork and roadway. They have knowledge of different wheel suspensions, the tyres, the steering elements and the brakes. They know different execution forms, the function and the influence on the driving or brake behavior. They are able to construct the appropriate components correctly.

Content

1. Chassis: Wheel suspensions (rear axles, front axles, kinematics of axles), tyres, springs, damping devices
2. Steering elements: Steering elements of single vehicles and of trailers
3. Brakes: Disc brake, drum brake, retarder, comparison of the designs

Literature
Elective literature:

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: River Engineering and Ecology I [19207]

Coordinators: Dister
Part of the modules: Understanding and Prediction of Disasters I (p. 115)[WI4INGINTER1], Understanding and Prediction of Disasters II (p. 116)[WI4INGINTER2], Understanding and Prediction of Disasters III (p. 117)[WI4INGINTER3]

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

Learning Control / Examinations

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: Principles of Ceramic and Powder Metallurgy Processing [21754]

Coordinators: Oberacker
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

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

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

Conditions
The module *Emphasis Material Science* [WI3INGMB9] has to be completed successfully beforehand.
Basic knowledge of experimental physics and chemistry is recommended.

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

Literature
Elective 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: Principles of Bioengineering [19058]

Coordinators: Josef Winter
Part of the modules: Environmental Management (p. 100)[WI4INGBGU12]

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

Learning Control / Examinations
See module description.

Conditions
Good biological knowledge (secondary school level)
Regular attendance

Learning Outcomes
Combination of biological and process engineering parameters

Content

- Bacteria (e.g. biofilm)
- Microbiological conversions
- Process steps in procedure for municipal wastewater treatment
- Nitrification
- Denitrification
- Biological phosphorus removal

Literature
Elective 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: Internal Combustion Engines and Exhaust Gas Aftertreatment Technology [2134138]

Coordinators: Lox
Part of the modules: Engine Development (p. 85)[WI4INGMB17], Combustion Engines II (p. 122)[WI4INGMB19]

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

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

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

Learning Outcomes

Content

Literature
Will be announced in the lecture.

Course: Fundamentals of Food Chemistry [6602]

Coordinators: Loske
Part of the modules: Specialization in Food Process Engineering (p. 111)[WI4INGCV4]

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

Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes

Content

Course: Combustion Technology 1 (Basics) [22501]

Coordinators: Bockhorn
Part of the modules: Fuels, Environment and Global Development (p. 107)[WI4INGCV2]

ECTS Credits	Hours per week	Term	Instruction language
6	2/1	Summer term	de

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.

Conditions
It is recommended to attend the course *Reaction Engineering I* [22114] beforehand.

Learning Outcomes

Content

Literature
Elective literature:
Beér J.M., Chigier N.: Energy, Combustion and Environment, McGraw Hill Book Company, New York 1981.

Course: Principles of Process Engineering referring to Food I [22213]

Coordinators: Volker Gaukel
Part of the modules: Principles of Food Process Engineering (p. 110)[WI4INGCV3]

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

Learning Control / Examinations
See module description.

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 [22214]

Coordinators: Volker Gaukel
Part of the modules: Principles of Food Process Engineering (p. 110)[WI4INGCV3]

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

Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes

Content

Course: Basic Principles of Patent Law [24815]

Coordinators: K. Melullis
Part of the modules: Intellectual Property Law (p. 137)[WI4JURA4]

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

Learning Control / Examinations
The assessment consists of a written seminar thesis and the presentation thereof as a graded assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations.

Conditions
None.

Learning Outcomes

Content

Media
slides

Literature
Nirk/Ullmann, Patent- Gebrauchsmuster- und Sortenschutzrecht, C.F. Müller, 3. Aufl. 2007, ISBN: 3811433687
Elective literature:
Schulte, Rainer, Patentgesetz, Carl Heymanns Verlag, 8. Aufl. 2008, ISBN:3406555055
Kraßer, Rudolf, Patentrecht, Verlag C.H. Beck, 6. Aufl. 2009, ISBN: 3-406-384552
Jestaedt, Bernhard, Patentrecht - Ein fallbezogenes Lehrbuch, Heymanns, 2. Aufl. 2008, ISBN: 3452261832
Bekard, Patent- und Gebrauchsmustergesetz, Verlag C.H. Beck, 10. Aufl. 2006, ISBN: 3406539548

Remarks
This course was previously announced as *Aktuelle Fragen des Patentrechts.*

Course: Basics of Ground Born Guided Systems [19066]

Coordinators: Michael Weigel
Part of the modules: Logistics and Management of Guided Systems (p. 95)[WI4INGBGU7]

ECTS Credits	Hours per week	Term	Instruction language
6	3/1	Summer term	de

Learning Control / Examinations
See module description.

Conditions
See module description.
Siehe Modulbeschreibung.

Learning Outcomes

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

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

Course: Basics and Methods for Integration of Tires and Vehicles [2114843]

Coordinators: Leister
Part of the modules: Vehicle Development (p. 82)[WI4INGMB14]

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

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

Conditions
Knowledge of automobile technology is recommeded.

Learning Outcomes

Content

Course: Fundamentals for Design of Motor-Vehicle Bodies I [21814]

Coordinators: Bardehle
Part of the modules: Automotive Engineering (p. 80)[WI4INGMB5]

ECTS Credits	Hours per week	Term	Instruction language
1.5	1	Winter term	de

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

Conditions
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

Literature
Elective literature:

1. Automobiltechnische Zeitschrift ATZ, Friedr. Vieweg & Sohn Verlagsges. mbH, Wiesbaden
2. Automobil Revue, Bern (Schweiz)
3. Automobil Produktion, Verlag Moderne Industrie, Landsberg

Course: Fundamentals for Design of Motor-Vehicle Bodies II [21840]

Coordinators: Bardehle
Part of the modules: Automotive Engineering (p. 80)[WI4INGMB5]

ECTS Credits	Hours per week	Term	Instruction language
1.5	1	Summer term	de

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

Conditions
It is recommended to attend the course *Fundamentals for Design of Motor-Vehicle Bodies I* [21814] beforehand.

Learning Outcomes
The students know that, often the design of seemingly simple detail components can result in the solution of complex problems. They have knowledge in testing procedures of body properties. They have an overview of body parts such as bumpers, window lift mechanism and seats. They understand, as well as, parallel to the normal electrical system, about the electronic side of a motor vehicle. They have knowledge of the inert safety of a motor vehicle.

Content

1. Body properties/testing procedures
2. External body-parts
3. Interior trim
4. Compartment air conditioning
5. Electric and electronic features
6. Crash tests
7. Accident analysis, biomechanic

Literature
Elective literature:

1. Automobiltechnische Zeitschrift ATZ, Friedr. Vieweg & Sohn Verlagsges. mbH, Wiesbaden
2. Automobil Revue, Bern (Schweiz)
3. Automobil Produktion, Verlag Moderne Industrie, Landsberg

Course: Fundamentals in the Development of Commercial Vehicles I [21812]

Coordinators: Zürn
Part of the modules: Vehicle Development (p. 82)[WI4INGMB14], Mobile Machines (p. 83)[WI4INGMB15]

ECTS Credits	Hours per week	Term	Instruction language
1.5	1	Winter term	de

Learning Control / Examinations
Assessment for the module *Mobile Machines*: See module description.
Assessment for the module *Automotive Engineering*: The assessment consists of an oral exam (20 min) taking place in the recess period (according to Section 4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes
The students have proper knowledge about the process of commercial vehicle development starting from the concept and the underlying original idea to the real design. They know that the customer requirements, the technical realisability, the functionality and the economy are important drivers. The students are able to develop parts and components. Furthermore they have knowledge about different cap concepts, the interior and the interior design process.

Content

1. Definitions in the area of commercial vehicles
2. Driver of the commercial vehicle development process
3. Development process
4. Development tools
5. Specification criteria
6. Component and parts development
7. Cab

Literature
Elective literature:

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 in the Development of Commercial Vehicles II [21844]

Coordinators: Zürn
Part of the modules: Vehicle Development (p. 82)[WI4INGMB14], Mobile Machines (p. 83)[WI4INGMB15]

ECTS Credits	Hours per week	Term	Instruction language
1.5	1	Summer term	de

Learning Control / Examinations
Assessment for the module *Mobile Machines*: See module description.
Assessment for the module *Automotive Engineering*: The assessment will consist of an oral exam (20 min) taking place in the recess period (according to §4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
It is recommended to attend the course *Fundamentals in the Development of Passenger Vehicles I* [21810] beforehand.

Learning Outcomes
The students are able to create general vehicle concepts tailored for different areas of application. They know the advantages and disadvantages of different drives. Furthermore they are familiar with components, such as transfer box, propeller shaft, powered and non-powered frontaxle etc. Beside other mechanical components, such as chassis, axle suspension and braking system, also electric and electronic systems, such as lighting, control, bus and diagnostic systems, are known.

Content

1. Drive and Drive train of Commercial Vehicles
2. Chassis
3. Axle suspension
4. Braking System
5. Elektrics
6. Elektronic Systems

Literature
Elective 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, Schriften-reihe Automobiltechnik, 1993

Course: Fundamentals in the Development of Passenger Vehicles I [21810]

Coordinators: Frech
Part of the modules: Vehicle Development (p. 82)[WI4INGMB14]

ECTS Credits	Hours per week	Term	Instruction language
1.5	1	Winter term	de

Learning Control / Examinations
The assessment consists of a written exam (90 min) taking place in the recess period (according to §4 (2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes
The students have an overview of the fundamentals of the development of automobiles. They know the development process, the national and the international legal requirements that are to be met. They have knowledge about the thermo-management, aerodynamics and the design of an automobile.

Content

1. Process of automobile development
2. Conceptual dimensioning and design of an automobile
3. Laws and regulations – National and international boundary conditions
4. 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 Passenger Vehicles II [21842]

Coordinators: Frech
Part of the modules: Vehicle Development (p. 82)[WI4INGMB14]

ECTS Credits	Hours per week	Term	Instruction language
1.5	1	Summer term	de

Learning Control / Examinations
The assessment consists of a written exam (90 min) taking place in the recess period (according to §4 (2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
It is recommended to attend the course *Fundamentals in the Development of Passenger Vehicles I* [21810] beforehand.

Learning Outcomes
The students are familiar with the selection of appropriate materials and the choice of adequate production technology. They have knowledge of the acoustical properties of the automobiles, covering both the interior sound and exterior noise. They have an overview of the testing procedures of the automobiles. They know in detail the evaluation of the properties of the complete automobile.

Content

1. Application-oriented material and production technology I
2. Application-oriented material and production technology II
3. Overall vehicle acoustics in the automobile development
4. Drive train acoustics in the automobile development
5. Testing of the complete vehicle
6. Properties of the complete automobile

Media
Lecture script (provided during the first lessons).

Course: Principles of Information Engineering and Management [2540450]

Coordinators: Christof Weinhardt, Clemens van Dinther
Part of the modules: Information Engineering (p. 46)[WI4BWLISM7]

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

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

Conditions
None.

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

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

- extraction/generation,
- storage,
- transformation,
- evaluation,
- marketing
- and usage of information

are analyzed from the business administration perspective and the microeconomic perspective. The state of the art of economic theory is presented across this information lifecycle within the lectures. The content of the lecture is deepened in accompanying lecture courses.

Media

- PowerPoint slides
- eLearning Platform Ilias

Literature

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

Course: Freight Transport [19308]

Coordinators: Bastian Chlond
Part of the modules: Guided Systems Engineering (p. 94)[WI4INGBGU6], Transportation Systems (p. 96)[WI4INGBGU8], Transportation II (p. 99)[WI4INGBGU11]

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

Learning Control / Examinations
See module description.

Conditions
See module description.
See module description.

Learning Outcomes

Content

Course: Commercial and Corporate Law [24011]

Coordinators: Peter Sester
Part of the modules: Commercial Law (p. 136)[WI4JURA2]

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

Learning Control / Examinations
Assessment will consist of written exams following §4, Abs. 2, 3 of the examination regulation.

Conditions
None.

Learning Outcomes
Based on the lectures on civil law, the students are provided with an overview of the specifics of commercial transactions, commercial agency and the law of merchants. Moreover, the forms of organization available in German company law are outlined.

Content
The lecture begins with an introduction into the different terms of merchants of the German Commercial Code. Subsequently, the rules governing trade names, commercial registries and commercial agency are dealt with. This is followed by a presentation of the general rules of commercial transactions and of the specific commercial transactions. In company law, first of all, the basics of partnerships are explained. Thereafter, the focus will be on corporate law which is most important in practice.

Media
Slides.

Literature
Klunzinger, Eugen

- Grundzüge des Handelsrechts, Verlag Vahlen, 12. Aufl. 2003, ISBN 3-8006-2914-3
- Grundzüge des Gesellschaftsrechts, Verlag Vahlen, 13. Aufl. 2004, ISBN 3-8006-3077-X

Elective literature:
Will be announced in the lecture.

Course: Lectures on HVDC and FACTS – Benefits of Power Electronics for Security and Sustainability of Power Supply [23385]

Coordinators: Retzmann
Part of the modules: Electrical Power Engineering (p. 106)[WI4INGETIT4]

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

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

Conditions
None.

Learning Outcomes
The goal is to relay 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 [23392/23394]

Coordinators: Badent
Part of the modules: Electrical Power Engineering (p. 106)[WI4INGETIT4], Generation and transmission of renewable power (p. 109)[WI4INGETIT7]

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

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

Conditions
None.

Recommendations
High-Voltage-Technology I and II

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

Literature
Elective literature:
Küchler, A.; Hochspannungstechnik, Springer Verlag 2005

Remarks
The credits have been raised to 4,5 in summer term 2011.

Course: High-Voltage Technology I [23360/23362]

Coordinators: Badent
Part of the modules: Electrical Power Engineering (p. 106)[WI4INGETIT4], High-Voltage Technology (p. 108)[WI4INGETIT6]

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

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

Conditions
Basic Network and Field Theory

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

Literature
Küchler, Andreas; Hochspannungstechnik, Springer Verlag 2. Auflage 2005, ISBN 3-540-21411-9

Course: High-Voltage Technology II [23361/23363]

Coordinators: Badent
Part of the modules: Electrical Power Engineering (p. 106)[WI4INGETIT4], High-Voltage Technology (p. 108)[WI4INGETIT6]

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

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

Conditions
None.

Learning Outcomes
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

Literature
Elective literature:
Küchler, A. Hochspannungstechnik; Springer Verlag, 2005

Course: Foundations of Hydrological Planning [19201]

Coordinators: Ihringer
Part of the modules: Understanding and Prediction of Disasters I (p. 115)[WI4INGINTER1], Understanding and Prediction of Disasters II (p. 116)[WI4INGINTER2], Understanding and Prediction of Disasters III (p. 117)[WI4INGINTER3]

ECTS Credits	Hours per week	Term	Instruction language
6	3/1	Winter term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

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

Course: Information Systems and Supply Chain Management [2118094]

Coordinators: Kilger
Part of the modules: Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11], Introduction to Logistics (p. 76)[WI4INGMB20], Logistics in Value Chain Networks (p. 129)[WW4INGMB28], Global Production and Logistics (p. 132)[WI4INGMB31]

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

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

Conditions
Technical understanding is required. It is recommended to attend the lecuture *Logistics - Organisation, Design, and Control of Logistic Systems.*

Learning Outcomes
Basic knowledge of information systems for logistics processes will be delivered and the students should be able to identify the requirements of a supply chain and choose an appropriate information system.

Content

1. Overview of logistics systems and processes
2. Basic concepts of information systems and information technology
3. Introduction to IS in logistics: Overview and applications
4. Detailed discussion of selected SAP modules for logistics support

Literature
Elective literature:
Stadtler, Kilger: Supply Chain Management and Advanced Planning, Springer, 4. Auflage 2008

Course: Information Technology and Business Information [2571162]

Coordinators: Bruno Neibecker
Part of the modules: Behavioral Approaches in Marketing and Data Analysis (p. 36)[WI4BWLMAR4], Strategy, Innovation and Data Analysis (p. 35)[WI4BWLMAR3]

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

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).

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.

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

Course: Engineering Seismology [04055]

Coordinators: Wenzel/Sokolov
Part of the modules: Understanding and Prediction of Disasters I (p. 115)[WI4INGINTER1], Understanding and Prediction of Disasters II (p. 116)[WI4INGINTER2], Understanding and Prediction of Disasters III (p. 117)[WI4INGINTER3]

ECTS Credits	Hours per week	Term	Instruction language
5	3/1	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

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

Course: Seminar in Engineering Science [SemING]

Coordinators: Fachvertreter ingenieurwissenschaftlicher Fakultäten
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Literature
Will be announced in the respective seminar.
Elective literature:
Will be announced in the seminar.

Course: Innovationtheory and -policy [2560236]

Coordinators: Ingrid Ott
Part of the modules: Economic Policy (p. 55)[WI4VWL6], Innovation and growth (p. 59)[WW4VWLIWW1], Economic Policy II (p. 52)[WW4VWL3]

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

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.
Students will be given the opportunity of writing and presenting a short paper during the lecture time to achieve a bonus on the exam grade. If the mandatory credit point exam is passed, the awarded bonus points will be added to the regular exam points. A deterioration is not possible by definition, and a grade does not necessarily improve, but is very likely to (not every additional point improves the total number of points, since a grade can not become better than 1). The voluntary elaboration of such a paper can not countervail a fail in the exam.

Conditions
None.

Recommendations
Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. In addition, an interest in quantitative-mathematical modeling is required.

Learning Outcomes
Students shall be given the ability to

- identify the importance of alternative incentive mechanisms for the emergence and dissemination of innovations
- understand the relationships between market structure and the development of innovation
- explain, in which situations market interventions by the state, for example taxes and subsidies, can be legitimized, and evaluate them in the light of economic welfare

Content

- Incentives for the emergence of innovations
- Patents
- Diffusion
- Impact of technological progress
- Innovation Policy

Media

- lecture slides
- exercises

Literature
Excerpt:

- Aghion, P., Howitt, P. (2009), The Economics of Growth, MIT Press, Cambridge MA.
- de la Fuente, A. (2000), Mathematical Methods and Models for Economists. Cambridge University Press, Cambridge, UK.
- Klodt, H. (1995), Grundlagen der Forschungs- und Technologiepolitik. Vahlen, München.
- Linde, R. (2000), Allokation, Wettbewerb, Verteilung - Theorie, UNIBUCH Verlag, Lüneburg.
- Ruttan, V. W. (2001), Technology, Growth, and Development. Oxford University Press, Oxford.
- Scotchmer, S. (2004), Incentives and Innovation, MIT Press.
- Tirole, Jean (1988), The Theory of Industrial Organization, MIT Press, Cambridge MA.

Remarks
The credits have been changed from 4,5 to 5.

Course: Insurance Accounting [2530320]

Coordinators: Felix Ludwig
Part of the modules: Insurance Management I (p. 30)[WI4BWLFBV6], Insurance Management II (p. 31)[WI4BWLFBV7]

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

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).

Conditions
None.

Learning Outcomes

Content

Literature
Elective literature:
K. Küting, C.-P. Weber. Bilanzanalyse, Lehrbuch zur Beurteilung von Einzel- und Konzernabschlüssen. 1997
W. Rockel, E. Helten, H.Loy. Versicherungsbilanzen - Rechnungslegung nach HGB, US-GAAP und IAS/IFRS. 2005
H.Treuberg, B.Angermayer. Jahresabschluss von Versicherungsunternehmen. 1995.

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

Course: Insurance Marketing [2530323]

Coordinators: Ute Werner
Part of the modules: Insurance Management I (p. 30)[WI4BWLFBV6], Insurance Management II (p. 31)[WI4BWLFBV7]

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

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

Conditions
None.

Learning Outcomes
See German version.

Content
See German version.

Literature
Elective 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 on demand. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretary of the chair of insurance science.

Course: Insurance Optimisation [2530316]

Coordinators: Christian Hipp
Part of the modules: Applications of Actuarial Sciences I (p. 28)[WI4BWLFBV4], Applications of Actuarial Sciences II (p. 29)[WI4BWLFBV5]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Literature
Elective 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 Production [2530324]

Coordinators: Ute Werner, Edmund Schwake
Part of the modules: Insurance Management I (p. 30)[WI4BWLFBV6], Insurance Management II (p. 31)[WI4BWLFBV7]

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

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

Conditions
None.

Learning Outcomes
See German version.

Content
See German version.

Literature
Elective 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 on demand. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretary of the chair of insurance science.
In spring term 2011, this course is held by Dr. Edmund Schwake.

Course: Insurance Risk Management [2530335]

Coordinators: Harald Maser
Part of the modules: Insurance Management II (p. 31)[WI4BWLFBV7], Insurance Management I (p. 30)[WI4BWLFBV6]

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

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) .

Conditions
None.

Learning Outcomes
Getting to know basic principles of risk management in insurance companies and credit institutions.

Content

Literature
Elective 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 secretary of the chair of insurance science.

Course: Insurance Statistics [2530303]

Coordinators: Christian Hipp, Michael Schrempp
Part of the modules: Applications of Actuarial Sciences I (p. 28)[WI4BWLFBV4], Insurance Statistics (p. 32)[WI4BWLFBV8], Applications of Actuarial Sciences II (p. 29)[WI4BWLFBV5]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Literature
Elective 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.

Remarks
This course belongs to the modules "*Applications of Actuarial Sciences I*" and "*Applications of Actuarial Sciences II*". It doesn't belong to module "*Insurance Statistics*" anymore.
The number of ECTS credits and of hours per week have been reduced.

Course: Integrated Production Planning [2150660]

Coordinators: Lanza, Gisela
Part of the modules: Selected Chapters from Production Engineering II (p. 74)[WI4INGMB2], Integrated Production Planning (p. 124)[WI4INGMB24], Selected Chapters from Production Engineering III (p. 75)[WI4INGMB3], Selected Chapters from Production Engineering I (p. 73)[WI4INGMB1]

ECTS Credits	Hours per week	Term	Instruction language
9	4/2	Summer term	de

Learning Control / Examinations
Performance is assessed in the form of one written examination (180 min) during the lecture-free period (as per §4(2), 1 SPO [study and examination regulations]). The examination will take place once every semester and can be retaken at every official examination date.

Conditions
None.

Recommendations
It is recommended to attend the course *Manufacturing Technology* [2149657] beforehand.

Learning Outcomes
The student

- has knowledge of the content covered by this lecture and understands the challenges and the fields of action of integrated production planning,
- is able to apply the methods of integrated production planning he/she has learned about to new problems,
- is able to analyse and evaluate the suitability of the methods, procedures and techniques he/she has learned about for a specific problem.

Content
Planning factories within the context of value networks and integrated production systems (Toyota etc.) requires an integrated perspective for the consideration of all functions included in the “factory” system. This includes the planning of manufacturing systems including the product, the value network and factory production, and the examination of SOPs, the running of a factory and maintenance. Content and theory covered by this lecture are completed with many examples from industry and exercises based on real-life situations and conditions.

Main topics covered by the lecture:

1. The basic principles of production planning

2. Links between product planning and production planning

3. Integrating a production site into a production network

4. Steps and methods of factory planning

5. Approach to the integrated planning of manufacturing and assembly plants

6. Layout of production sites

7. Maintenance

8. Material flow

9. Digital factory

10. Process simulation for material flow optimisation

11. Start-up

Media
Lecture notes of the lecture *Integrated Production Planning*

Course: Intelligent Systems in Finance [2511402]

Coordinators: Detlef Seese
Part of the modules: Emphasis in Informatics (p. 62)[WI4INFO2], Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3]

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

Learning Control / Examinations
The assessment is a written examination.
See the German part for special requirements to be admitted for the examination.

Conditions
None.

Learning Outcomes

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

Content
A new generation of computing methods, commonly known as “intelligent systems”, has recently been successfully applied to a variety of business and financial modelling tasks. In many application fields these novel methods outperform traditional statistical techniques. The lecture provides a comprehensive coverage of the area, including foundations and applications. In particular it deals with intelligent software agents, genetic algorithms, neural networks, support vector machines, fuzzy-logic, expert systems and intelligent hybrid systems. The presented applications focus on the finance area and are related to risk management (credit risk, operational risk), financial trading, portfolio management and economic modelling. The lecture is given in cooperation with the company msgGILLARDON. The lecture starts with an introduction of the central problems of application in this area, e.g. decision support for investors, 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.

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.

Elective literature:

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

Remarks

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

The course “Intelligent Systems in Finance” will not be offered any more from summer term 2016 on. The examination will be offered latest until summer term 2015 (repeaters only).

Course: International Risk Transfer [2530353]

Coordinators: Wolfgang Schwehr
Part of the modules: Operational Risk Management I (p. 33)[WI4BWLFBV9], Operational Risk Management II (p. 34)[WI4BWLFBV10]

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

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

Conditions
None.

Learning Outcomes
Becoming acquainted with the various possibilities of international risk transfer.

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

Literature

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

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

Course: International Finance [2530570]

Coordinators: Marliese Uhrig-Homburg, Walter
Part of the modules: F2&F3 (Finance) (p. 26)[WI4BWLFBV3], Finance 2 (p. 25)[WI4BWLFBV2], Finance 3 (p. 27)[WI4BWLFBV11]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes
The objective of this course is to become familiar with the basics of investment decisions on international markets and to manage foreign exchange risks.

Content
The main aspects of this course are the chances and the risks which are associated with international transactions. We carry out our analysis from two distinct perspectives: First the point of view of an international investor second that, of an international corporation. Several alternatives to the management of foreign exchange risks are shown. Due to the importance of foreign exchange risks, the first part of the course deals with currency markets. Furthermore current exchange rate theories are discussed.

Literature
Elective literature:

- D. Eiteman et al. (2004): Multinational Business Finance, 10. Auflage

Course: International Production and Logistics [21692]

Coordinators: Lanza
Part of the modules: Selected Chapters from Production Engineering I (p. 73)[WI4INGMB1], Selected Chapters from Production Engineering II (p. 74)[WI4INGMB2], Selected Chapters from Production Engineering III (p. 75)[WI4INGMB3]

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

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.

Conditions
None.

Learning Outcomes
It is the aim of the course to show opportunities and basic requirements of an enterprise acting abroad. The focus lies on production and operation activities.

Content
Within the course, foreign trade theories, legal and economical backgrounds as well as opportunities and threats of international production will be considered. The structure of international logistics networks and approaches to model, design and analyse such networks will be discussed. Based on examples from practice and science, challenges of international logistics will be shown.

Remarks
The lecture will not be offered any more. Final examinations take place in september 2010. From the winter term 2010/11 on, a successor lecture will be held.

Course: International Economic Policy [2560254]

Coordinators: Jan Kowalski
Part of the modules: Economic Policy II (p. 52)[WW4VWL3]

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

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

Conditions
None.

Recommendations
Previous visit of the lectures *Economics II: Macroeconomics* [2600014] is recommended.

Learning Outcomes

Content

Literature
Elective literature:

- World Bank: “World Development Report”. 2008, 2009
- Wagner, M.: „Einführung in die Weltwirtschaftspolitik“. Oldenbourg 1995
- Gerber, J.: „International Economics“, Pearson, 2007, IV Edition weitere Angaben in der Vorlesung

Remarks
The credits have been changed to 5.

Course: Management Accounting [2530210]

Coordinators: Torsten Lüdecke
Part of the modules: Finance 2 (p. 25)[WI4BWLFBV2], F2&F3 (Finance) (p. 26)[WI4BWLFBV3], Finance 3 (p. 27)[WI4BWLFBV11]

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

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

Conditions
None.

Learning Outcomes
This course aims at providing students with the understanding of the purposes of alternative costing systems as well as the use of relevant information for decision making. The course will also examine techniques for the purpose of cost management and accounting for control.

Content

- Design of Cost Systems
- Cost Classifications, Cost Behavior, and Principles of Cost Allocation
- Activity-based Costing
- Product Costing
- Production Decisions
- Cost-based Pricing
- Cost Management
- Decisions under Risk
- Cost Accounting for Control

Literature
Elective literature:

- 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: Internet Law [24812]

Coordinators: Thomas Dreier
Part of the modules: Intellectual Property Law (p. 137)[WI4JURA4]

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

Learning Control / Examinations

Conditions
None.

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

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

Media
Slides

Literature
Script, Internetrecht (Internet Law)
Elective literature:
Additional literature tba in class.

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

Course: IT for Facility Logistics [2118083]

Coordinators: Thomas
Part of the modules: Introduction to Logistics (p. 76)[WI4INGMB20], Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11], Technical Logistics (p. 128)[WW4INGMB27]

ECTS Credits	Hours per week	Term	Instruction language
6	3/1	Summer term	de

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

Conditions
None.

Learning Outcomes
Students should be familiar with basic concepts of information technology in material handling systems.

Content

- Sensors and actuators in material flow
- Control concepts
- Network hierarchies
- Motors
- Coding technique
- Programmable logic controllers
- Computer communication
- Material flow control systems
- Transport control system

Remarks
The course was formerly known as *Information Technology for Logistic Systems*.

Course: Knowledge Discovery [2511302]

Coordinators: Rudi Studer
Part of the modules: Emphasis in Informatics (p. 62)[WI4INFO2], Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3]

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

Learning Control / Examinations
The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the examination regulation.
Students can be awarded a bonus on their final grade if they successfully complete special assignments.

Conditions
None.

Learning Outcomes
Familiarity with fundamentals of Knowledge Discovery, Data Mining and Machine Learning. Standard algorithms, representations, applications and processes needed for knowledge discovery projects are covered.

Content
The lecture provides an overview of machine learning and data mining techniques for knowledge discovery from large data sets. These techniques are examined in respect of algorithms, applicability to different data representations and application in the real world.Topics of the lectures comprise the whole Machine Learning and Data Mining process like CRISP, data warehousing, OLAP-techniques, learning algorithms, visualization and empircial evaluation. Covered learning techniques range from traditional approaches like decision trees, neural networks and support vector machines to selected approaches resulting from current research. Discussed learning problems are amongst others feauturevector-based learning, text mining and social network analysis.

Media
Slides.

Literature

- T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning: Data Mining, Inference, and Prediction (http://www-stat.stanford.edu/ tibs/ElemStatLearn/)
- T. Mitchell. Machine Learning. 1997
- M. Berhold, D. Hand (eds). Intelligent Data Analysis - An Introduction. 2003
- P. Tan, M. Steinbach, V. Kumar: Introduction to Data Mining, 2005, Addison Wesley

Course: Theory of Business Cycles [25549]

Coordinators: Marten Hillebrand
Part of the modules: Macroeconomic Theory (p. 57)[WI4VWL8], Allocation and Equilibrium (p. 56)[WI4VWL7]

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

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

Conditions
None.

Recommendations
Basic knowledge in micro- and macroeconomics, as conveyed in the courses *Economics I: Microeconomics* [2600012] and *Economics II: Macroeconomics* [2600014], is assumed.
According the focus of the course quantitativ-mathematical modelling should be in participiant's interest.

Learning Outcomes

Content

Literature
Elective 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: Car Insurance [2530308]

Coordinators: M. Schrempp, A. Edalati
Part of the modules: Applications of Actuarial Sciences I (p. 28)[WI4BWLFBV4], Applications of Actuarial Sciences II (p. 29)[WI4BWLFBV5]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Remarks
This course *Car Insurance* is newly included in summer term 2011.

Course: Hospital Management [2550493]

Coordinators: Stefan Nickel, Hansis
Part of the modules: Operations Research in Supply Chain Management and Health Care Management (p. 66)[WI4OR5]

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

Learning Control / Examinations
The assessment consists of attendance, a seminar thesis and a final exam (according to §4(2), 1 of the examination regulation). The examination is held in the term of the lecture and the following lecture.

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 “Hospital management“ 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.
The name of the lecture was changed from “Enterprise Hospital” and updated from 2 to 3 credits.

Course: Credit Risk [2530565]

Coordinators: Marliese Uhrig-Homburg
Part of the modules: Finance 2 (p. 25)[WI4BWLFBV2], F2&F3 (Finance) (p. 26)[WI4BWLFBV3], Finance 3 (p. 27)[WI4BWLFBV11]

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

Learning Control / Examinations
The assessment consists of a written exam following §4, Abs. 2, 1.

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

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).

Elective 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: Customer Orientation in Public Transport [19320]

Coordinators: Eberhard Hohnecker
Part of the modules: Public Transportation Operations (p. 92)[WI4INGBGU4]

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

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.

Conditions
See module description.

Learning Outcomes

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

Course: Warehouse and Distribution Systems [2118097]

Coordinators: Christian Huber
Part of the modules: Introduction to Logistics (p. 76)[WI4INGMB20], Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11], Logistics in Value Chain Networks (p. 129)[WW4INGMB28], Technical Logistics (p. 128)[WW4INGMB27], Material Flow in networked Logistics Systems (p. 127)[WW4INGMB26], Material Flow in Logistic Systems (p. 126)[WW4INGMB25]

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

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

Conditions
None.

Learning Outcomes
This course provides basics to understand material and information processes in warehouse and distribution systems. The student will also learn to evaluate them quantitatively.

Content

- Control and organisation of distribution centers
- Analytical models for analysing and dimensioning of warehouse systems
- Distribution Center Reference Model (DCRM)
- Lean Distribution
- The processes from receiving to shipping
- Planning and controlling
- Distribution networks

Course: Laser Application in Automotive Engineering [21642]

Coordinators: Schneider
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

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

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

Conditions
The module *Emphasis Material Science* [WI3INGMB9] has to be completed successfully beforehand.
Basic knowledge of physics, chemistry and material science is assumed.
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.

Literature
Elective 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: Laser Materials Processing [21640]

Coordinators: Schneider
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

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

Learning Control / Examinations
The assessment consists of an colloquium for every single experiment and an overall final colloquium (according to Section 4(2), 3 of the examination regulation).

Conditions
The attendance to one of the courses *Physical Basics of Laser Technology* and *Laser Application in Automotive Engineering* is required.

Learning Outcomes

Content

Course: Food Science and Functionality [22207]

Coordinators: Watzl
Part of the modules: Principles of Food Process Engineering (p. 110)[WI4INGCV3], Specialization in Food Process Engineering (p. 111)[WI4INGCV4]

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

Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes

Content

Course: Logistics - Organisation, Design, and Control of Logistic Systems [2118078]

Coordinators: Kai Furmans
Part of the modules: Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11], Logistics in Value Chain Networks (p. 129)[WW4INGMB28]

ECTS Credits	Hours per week	Term	Instruction language
6	3/1	Summer term	de

Learning Control / Examinations
The assessment consists of a written exam according to Section 4 (2), 1 of the examination regulation. The grade of the exam may be improved by passing case studies.

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

Learning Outcomes
After successfully finishing this course, the student is able to plan simple material handling and logistic systems and is able to assign the right models to a certain task. He is able to evaluate the performance of the most important elements of material handling and logistic systems.

Content
Introduction

- historical overview
- lines of development

Structure of logistics systems
Distribution logistics

- location planning
- Vehicle Routing Planning
- distribution centers

Inventory management

- demand forecasting
- Inventory management policies
- Bullwhip effect

Production logistics

- layout planning
- material handling
- flow control

Supply Managament

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

Identification Technologies

Media
Blackboard, LCD projector, in excercises also PCs.

Literature
Elective literature:

- Arnold/Isermann/Kuhn/Tempelmeier. Handbuch Logistik, Springer Verlag, 2002 (Neuauflage in Arbeit)
- Domschke. Logistik, Rundreisen und Touren, Oldenbourg Verlag, 1982

- Domschke/Drexl. Logistik, Standorte, Oldenbourg Verlag, 1996
- 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

Remarks
Formerly, the course was known as *Logistics*.

Course: Automotive Logistics [2118085]

Coordinators: Kai Furmans

Part of the modules: Global Production and Logistics (p. 132)[WI4INGMB31], Introduction to Logistics (p. 76)[WI4INGMB20], Material Flow in networked Logistics Systems (p. 127)[WW4INGMB26], Logistics in Value Chain Networks (p. 129)[WW4INGMB28], Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11], Material Flow in Logistic Systems (p. 126)[WW4INGMB25]

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

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

Conditions
None.

Learning Outcomes
It is the aim of the course to show the importance and impact of logistic questions in the automotive industry sector.

Content
A basic model of the automobile production and distribution is used to study the main elements of the automotive supply chain:

- Supply side logistics (Tasks due to disposition and physical accomplishment; methods; solution models)
- Car manufacturing with the specific questions of the interaction of body shell, paint shop and assembly (sequence planning; partial allocation for assembly)
- Car distribution and the connection to sale processes (physical accomplishment; planning and control)

Course: Airport Logistics [2117056]

Coordinators: Richter
Part of the modules: Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11], Introduction to Logistics (p. 76)[WI4INGMB20], Logistics in Value Chain Networks (p. 129)[WW4INGMB28], Material Flow in networked Logistics Systems (p. 127)[WW4INGMB26], Material Flow in Logistic Systems (p. 126)[WW4INGMB25]

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

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

Conditions
None.

Learning Outcomes
Giving an inside view of the conveyor and material handling technical activities on airports is the aim of this course. Furthermore an overview of air traffic and the legal situation is given.

Content
Development of air traffic:

- Legal basics
- Infrastructure (among other things person, luggage and freight conveyance)
- Supply and disposal activities
- Logistic process networks
- Information logistics

Remarks
The course takes place as a block course.

Course: Management of Business Networks [2590452]

Coordinators: Christof Weinhardt, Jan Kraemer
Part of the modules: Service Management (p. 45)[WI4BWLISM6]

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

Learning Control / Examinations
The total grade for this lecture will consist to 50% of the grade achieved in the written mid term examination, to 10% of the assignments during the exercises, and to 40% of a project work, which includes a term paper and a presentation.

Conditions
None.

Learning Outcomes
The student

- indentifes the coordination problems in a business network,
- explains the theorie of strategic and operative management,
- analyses case studies in logistics considering the organization theory and network analysis
- argues and constructs new solutions for the case studies by means of electronic tools

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

Media

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

Literature

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

Course: Management of IT-Projects [2511214]

Coordinators: Roland Schätzle
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

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

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

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.

Literature

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

Further literature is given in each lecture individually.

Course: IT Complexity in Practice [2511404]

Coordinators: Detlef Seese, Kreidler
Part of the modules: Emphasis in Informatics (p. 62)[WI4INFO2], Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3]

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

Learning Control / Examinations
see German version.

Conditions
see German version.

Learning Outcomes
see German version.

Content
see German version

Literature
Elective literature:
Will be announced in the lecture.

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

Coordinators: Yvonne Matz, Peter Sester
Part of the modules: Intellectual Property Law (p. 137)[WI4JURA4]

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

Learning Control / Examinations

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.

Literature

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

Course: Market Engineering: Information in Institutions [2540460]

Coordinators: Christof Weinhardt, Jan Kraemer, Clemens van Dinther, Simon Caton, Marc Adam
Part of the modules: Information Engineering (p. 46)[WI4BWLISM7], Market Engineering (p. 42)[WI4BWLISM3], Communications & Markets (p. 44)[WI4BWLISM5], Electronic Markets (p. 40)[WI4BWLISM2], Applied Strategic Decisions (p. 51)[WI4VWL2]

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

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

Conditions
None.

Learning Outcomes
The students

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

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

Media

- Powerpoint
- eLearning Platform Ilias

Literature

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

Course: Market Microstructure [2530240]

Coordinators: Torsten Lüdecke
Part of the modules: Finance 2 (p. 25)[WI4BWLFBV2], F2&F3 (Finance) (p. 26)[WI4BWLFBV3], Finance 3 (p. 27)[WI4BWLFBV11]

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

Learning Control / Examinations

Conditions
Knowledge of the content of the course *Asset Pricing* [2530555] is assumed.

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
Slides.

Literature
keine
Elective literature:
See reading list.

Course: Master Seminar in Information Engineering and Management [2540510]

Coordinators: Andreas Geyer-Schulz
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
The assessment of this course is according to §4(2), 3 of the examination regulation in form of an examination of the written seminar thesis and a presentation.
The grade is given, if the presentation is held and the seminar thesis is handed in.
The grade of this course is based on the grade of the seminar thesis. The presentation can improve or worsen the grade of the seminar thesis by up to two grade levels (up to 0.7 grades).

Conditions
None.

Learning Outcomes
The student is able to

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

Content
The seminar 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: Master Seminar in Entrepreneurship, Innovation and International Marketing [25196]

Coordinators: Gaul
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Literature
Elective literature:
Wird zur Seminarvorbereitung bekannt gegeben.

Course: Material Flow in Logistic Systems [2117051]

Coordinators: Kai Furmans
Part of the modules: Introduction to Logistics (p. 76)[WI4INGMB20], Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11], Material Flow in Logistic Systems (p. 126)[WW4INGMB25]

ECTS Credits	Hours per week	Term	Instruction language
6	3/1	Winter term	de

Learning Control / Examinations
The assessment consists of a written exam according to Section 4 (2), 1 of the examination regulation. The grade of the exam may be improved by passing case studies.

Conditions
None.

Learning Outcomes
This course provides the basics of material handling systems. The student will learn how to model material handling systems and how to evaluate them according to quantitative aspects.

Content

- Material handling equipment: conveyor system, diverts, merges
- Modelling of material handling systems by graphs and matrixes
- Queueing theory
- Simulation
- Analysis of the current situation
- Planning of the target state by using material and information flow

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

Remarks
The course was formerly known as *Materialflow.*

Course: Materials and Processes in Automotive Lightweight Construction [2149669]

Coordinators: Haepp
Part of the modules: Selected Chapters from Production Engineering I (p. 73)[WI4INGMB1], Selected Chapters from Production Engineering II (p. 74)[WI4INGMB2], Selected Chapters from Production Engineering III (p. 75)[WI4INGMB3], Specialization in Production Engineering (p. 125)[WI4INGMB22]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Mathematical Theory of Democracy [25539]

Coordinators: Tangian
Part of the modules: Social Choice Theory (p. 58)[WI4VWL9]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content
The mathematical theory of democracy deals with the quantitative evaluation of the representative capacity of single decision makers and representative bodies like president, parliament, or council of ministers. The model is used to analyse the Athenian democracy with its selection of representatives by lottery, to estimate the popularity of parties and coalitions in Germany, and to revise Arrow's paradox about the inevitability of a dictator. Moreover, the idea of representativeness is applied to non-societal OR-domains like MCDM, DAX predictions, or traffic control, based on the observation that certain objects can represent properties/behavior of other objects.

Course: Seminar in Mathematics [SemMath]

Coordinators: Fachvertreter der Fakultät für Mathematik
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Literature
Will be announced in the respective seminar.
Elective literature:
Will be announced in the seminar.

Course: Mechanical Models in Railway Engineering [19322]

Coordinators: Eberhard Hohnecker
Part of the modules: Guided Systems Engineering (p. 94)[WI4INGBGU6]

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

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.

Conditions
See module description.
See module description.

Learning Outcomes

Content
calculation of Zimmermann; wheelset-running

Course: Methods in Analyzing Internal Combustion [21134]

Coordinators: Wagner
Part of the modules: Engine Development (p. 85)[WI4INGMB17], Combustion Engines (p. 84)[WI4INGMB16], Combustion Engines II (p. 122)[WI4INGMB19]

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

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

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

Learning Outcomes

Content

Course: Micro-Actuators [21881]

Coordinators: Kohl
Part of the modules: Sensor Technology I (p. 104)[WI4INGETIT3], Sensor Technology II (p. 105)[WI4INGETIT5]

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

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.

Conditions
It is recommended to attend the courses *Material Science II* [21782] and *Electrical Engineering II* [23224] beforehand.

Learning Outcomes

Content

Literature
Elective 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: Microbiology of Food [22209]

Coordinators: Franz
Part of the modules: Specialization in Food Process Engineering (p. 111)[WI4INGCV4]

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

Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes

Content

Course: Mobile Machines [2113073]

Coordinators: Marcus Geimer
Part of the modules: Mobile Machines (p. 83)[WI4INGMB15]

ECTS Credits	Hours per week	Term	Instruction language
6	4	Winter term	de

Learning Control / Examinations
See modul description.

Conditions
Knowledge in Fluid Power are required.

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

Learning Outcomes
The students will learn the basic structure and construction of mobile machines. The basis will be practically introduced by consultants from industry area. Thereby, the typical working process will be described.

Content

- Introduction of the required components and machines
- Basics of the structure of the whole system
- Practical insight in the development techniques

Media
Lecture notes.

Course: Modeling Strategic Decision Making [2577908]

Coordinators: Hagen Lindstädt
Part of the modules: Strategic Corporate Management and Organization (p. 37)[WI4BWLUO1], Strategic Decision Making and Organization Theory (p. 38)[WI4BWLUO3]

ECTS Credits	Hours per week	Term	Instruction language
6	2/1	Summer term	de

Learning Control / Examinations
Written exam 100% following §4, Abs. 2.

Conditions
None.

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.

Literature

- Eisenführ, F.; Weber, M.: *Rationales Entscheiden*. Springer, 4. Aufl. Berlin 2003.[1]
- Laux, H.: Entscheidungstheorie. Springer, 6. Aufl. Berlin 2005.[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: Operating Models in Railway Engineering [19327w]

Coordinators: Eberhard Hohnecker
Part of the modules: Public Transportation Operations (p. 92)[WI4INGBGU4]

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

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.

Conditions
See module description.

Learning Outcomes

Content

Course: Business Process Modelling [2511210]

Coordinators: Andreas Oberweis, Marco Mevius
Part of the modules: Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3], Emphasis in Informatics (p. 62)[WI4INFO2]

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

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

Conditions
None.

Learning Outcomes
Students know 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.

Literature
Literature will be given in the lecture.

Course: Modern Measurement Techniques for Process Optimization [22218]

Coordinators: Regier
Part of the modules: Specialization in Food Process Engineering (p. 111)[WI4INGCV4]

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

Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes

Content

Course: Morphodynamics of Rivers and Streams [19203]

Coordinators: Franz Nestmann, Boris Lehmann
Part of the modules: Understanding and Prediction of Disasters I (p. 115)[WI4INGINTER1], Understanding and Prediction of Disasters II (p. 116)[WI4INGINTER2], Understanding and Prediction of Disasters III (p. 117)[WI4INGINTER3]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

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

Course: Engine Measurement Technologies [2134137]

Coordinators: Bernhardt
Part of the modules: Engine Development (p. 85)[WI4INGMB17], Combustion Engines (p. 84)[WI4INGMB16], Combustion Engines II (p. 122)[WI4INGMB19]

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

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

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

Learning Outcomes

Content

Course: Multidisciplinary Risk Research [2530328]

Coordinators: Ute Werner
Part of the modules: Operational Risk Management II (p. 34)[WI4BWLFBV10], Operational Risk Management I (p. 33)[WI4BWLFBV9]

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

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

Conditions
None.

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

Content
The course consists of two chapters:
In the theoretical part risk concepts of various disciplines will be discussed as well as categorisations of risk (e.g. technical or natural origin) and of risk carriers. Based on empirical research, processes of risk perception, risk assessment, and risk taking – at the individual, institutional, and global level - are described and explained.
The methodological part of the course deals with hazard research, approaches for identification and mapping of risks and their accumulations, as well as with safety culture research. Using empirical studies, survey methods regarding risk perception and risk assessment will be discussed. Specific problems in the context of intercultural research will be considered too.
Students get an overview on the theroretical, empirical and methodological variety of risk research. As a further result, they learn to differentiate and evaluate the perspectives and methods of the different disciplines for risk research.
All students participate actively in the lecture. Per person, at least one presentation and one elaboration are expected.

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 1998.
- http://www.bevoelkerungsschutz.ch

Elective literature:
Additional literature is recommended during the course.

Remarks
This course is offered on demand. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretary of the chair of insurance science.
This course takes place in spring term 2011.

Course: Multivariate Methods [2520317]

Coordinators: Wolf-Dieter Heller
Part of the modules: Statistical Methods in Risk Management (p. 71)[WI4STAT2]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

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: Nature-inspired Optimisation Methods [2511106]

Coordinators: Sanaz Mostaghim, Pradyumn Kumar Shukla
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

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

Learning Control / Examinations
The assessment consists of a written exam (60 min) (according to Section 4(2), 1 of the examination regulation) and an additional written examination called “bonus exam”, 60 min (according Section 4(2), 3 of the examination regulation) or a selection of exersices . The bonus exam may be split into several shorter written tests.
The grade of this course is the achieved grade in the written examination. If this grade is at least 4.0 and at most 1.3, a passed bonus exam will improve it by one grade level (i.e. by 0.3 or 0.4).

Conditions
None.

Learning Outcomes
To learn:

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

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

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

Literature
F. Glover and M. Laguna. „Tabu Search” In: Handbook of Applied Optimization, P. M. Pardalos and M. G. C. Resende (Eds.), Oxford University Press, pp. 194-208, 2002. G. Raidl and J. Gottlieb: Empirical Analysis of Locality, Heritability and Heuristic Bias in Evolutionary Algorithms: A Case Study for the Multidimensional Knapsack Problem. Evolutionary Computation, MIT Press, 13(4), pp. 441-475, 2005.
Weiterführende Literatur:
E. L. Aarts and J. K. Lenstra: „Local Search in Combinatorial Optimization”. Wiley, 1997. D. Corne and M. Dorigo and F. Glover: „New Ideas in Optimization”. McGraw-Hill, 1999. C. Reeves: „Modern Heuristic Techniques for Combinatorial Optimization”. McGraw-Hill, 1995. Z. Michalewicz, D. B. Fogel: „How to solve it: Modern Heuristics”. Springer, 1999. E. Bonabeau, M. Dorigo, G. Theraulaz: „Swarm Intelligence”. Oxford University Press, 1999. A. E. Eiben and J. E. Smith: „Introduction to Evolutionary Computing”. Springer, 2003. K. Weicker: „Evolutionäre Algorithmen”. Teubner, 2002. M. Dorigo, T. Stützle: „Ant Colony Optimization”. MIT Press, 2004. K. Deb: „Multi-objective Optimization using Evolutionary Algorithms”, Wiley, 2003.

Course: Scientific Bases for Examination and Assessement of Water Quality [22603]

Coordinators: F.H. Frimmel
Part of the modules: Water Chemistry (p. 112)[WI4INGCV5], Water Chemistry II (p. 114)[WI4INGCV7]

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

Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes
The lecture gives basics on analytical examination methods which are used to assess water constituents.

Content
1. Hydrological cycle, application, problems, ground-, surface-, wastewater, analytical definitions
2. Sampling, quick tests, conservation, on site examinations, organoleptic
3. General examinations
4. Optical characterization
5. Titrations
6. Main constituents, anions
7. Main constituents, cations
8. Metals
9. Organics
10. Polar organic substances, derivatisation
11. Water specific sum parameters
12. Radioactivity
13. Microbiology

Literature
Elective 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: Nonlinear Optimization I [2550111]

Coordinators: Oliver Stein
Part of the modules: Mathematical Programming (p. 68)[WI4OR6]

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

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.
Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.
The examination can also be combined with the examination of *Nonlinear Optimization II* [2550113]. In this case, the duration of the written examination takes 120 minutes.
In a combined examination of *Nonlinear Optimization I* [2550111] and *Nonlinear Optimization II* [2550113], upon attaining more then 60% of the exercise points, the grade of the passed examination is improved by a third of a grading step.
In a combined examination of *Nonlinear Optimization I* [2550111] and *Nonlinear Optimization II* [2550113], upon attaining more then 60% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student

- knows and understands 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.

Literature
Elective 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.
The lecture is not held in the summer semester 2011.

Course: Nonlinear Optimization II [2550113]

Coordinators: Oliver Stein
Part of the modules: Mathematical Programming (p. 68)[WI4OR6]

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

Learning Control / Examinations
The assessment consists of a written exam (120 minutes) according to §4(2), 1 of the examination regulation.
The exam takes place in the semester of the lecture and in the following semester.
Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registrationfor the written examination is subject to fulfilling the prerequisite.
The exam can also be combined with the examination of *Nonlinear Optimization I* [2550111]. In this case, the duration of the written exam takes 120 minutes.
In a combined exam of *Nonlinear Optimization I* [2550111] and *Nonlinear Optimization II* [2550113], upon attaining more then 60% of the exercise points, the grade of the passed exam is improved by a third of a grading step.
In a combined exam of *Nonlinear Optimization I* [2550111] and *Nonlinear Optimization II* [2550113], upon attaining more then 60% of the computer exercise points, the grade of the passed exam is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student

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

Content
The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, we derive optimality conditions that form the basis for numerical solution methods. Part I of the lecture treats unconstrained optimization problems. Part II of the lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions for constrained problems
- Optimality conditions for constrained convex problems
- Numerical methods for constrained problems (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

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

Literature
Elective literature:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- 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.
The lecture is not held in the summer semester 2011.

Course: Public Media Law [24082]

Coordinators: Christian Kirchberg
Part of the modules: Public Business Law (p. 139)[WI4JURA6]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes
As the traditional media (print, radio, TV) the “new media” (online-services and the Internet) is governed by public law, yet with a different extent of regulation and with apparent effects on private law. The main influences for the media law are constitutional law and European community law. The lectures aims at providing an overview of the common grounds and differences of the current media law regime and of the conceivable perspectives of media convergence. Current developments in politics and economics, which are relevant for public media law, will be used as examples in the lecture. Besides, it is planned to attend a court hearing of the Federal Constitutional Court (Bundesverfassungsgericht) and/or the Federal Court (Bundesgerichtshof).

Content
Initially, the lecture will deal with the constitutional basis of the media law regime. i.e. the responsibilities of the Federal and the State legislatures, freedom of speech, freedom of information, constitutional media rights (Art. 5 para. 1 Constitutional Law) and its limitations by general laws, the ban on censorship and the counterstatement law. In addition, the European community principles on broadcasting and media law will be part of the lecture. Next will be an overview of the individual media laws, namely the broadcasting law (especially Rundfunkstaatsvertrag) the press law of the States and the statute on the so-called “telemedia” services. Finally, the protection of minors in the media will be dealt with (Act on Protection of Minors and Treaty on the Protection of Minors in the Media).

Literature
To understand the legal framework it is necessary for the students to have the relevant statutes, for example “Telemediarecht, Telekommunikations- und Multimediarecht”, beck-Texte im dtv , 7. Auflage 2007.
As an introduction it is recommended to read: Frank Fechner, Medienrecht, Verlag Mohr Siebeck, Verlag Mohr Siebeck, 8. Auflage 2007.

Course: Operational Risk and Extreme Value Theory [2520342]

Coordinators: Svetlozar Rachev
Part of the modules: Statistical Methods in Risk Management (p. 71)[WI4STAT2]

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

Learning Control / Examinations

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.

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: Operations Research in Health Care Management [2550495]

Coordinators: Stefan Nickel
Part of the modules: Operations Research in Supply Chain Management and Health Care Management (p. 66)[WI4OR5]

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

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.

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

Learning Outcomes
The target of this lecture is to show possible applications of well-known methods of Operations Research applied to health services. The students gain the ability to use quantitative models for the operations planning and logistics in a hospital environment, e.g. appointment, transportation, operating room planning or nurse rostering as well as inventory management and layout planning. Furthermore the advantages and benefits of simulation models and OR methods to plan home health care services are discussed.

Content
In the last years reforms of the German health system, e.g. the introduction of the G-DRG-system, have put an increasing cost pressure on hospitals. Therefore their target is to improve quality, transparency, and efficiency of hospital services, e.g. by reducing the length of stay of patients. To achieve this, processes have to be analyzed in order to optimize them if necessary. When looking at the targets of optimization not only efficiency but also quality of care and patient satisfaction (e.g. waiting times) have to be taken into account.
Besides hospitals also home health care services and their planning are discussed in this lecture. Because of the demographic development this is an emerging field in the health care sector. Here, e.g. nurse rosters have to be built which give details about which nurse visits which patient at what time. While doing so different targets have to be regarded, e.g. the continuity of nurse-patient relationship or the minimization of the distances the nurses have to travel.

Literature
Elective literature:

- Fleßa: Grundzüge der Krankenhausbetriebslehre, Oldenbourg, 2007
- Fleßa: Grundzüge der Krankenhaussteuerung, Oldenbourg, 2008
- Hall: Patient flow: reducing delay in healthcare delivery, Springer, 2006

Remarks
The lecture is planned to be held in the winter term 2011/12.
The planned lectures and courses for the next three years are announced online.

Course: Operations Research in Supply Chain Management [2550480]

Coordinators: Stefan Nickel
Part of the modules: Operations Research in Supply Chain Management and Health Care Management (p. 66)[WI4OR5]

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

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.

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

Recommendations
Advanced knowledge of Operations Research (e.g., as conveyed in the lectures *Facility Location and Strategic SCM*, *Tactical and operational SCM*) is recommended.

Learning Outcomes
The lecture conveys basic and advanced modeling techniques playing an important role in today's problem solving occurring in supply networks. The focus is set on mathematical approaches to technical-economical problems, and the derivation of optimal solutions. Students are enabled to classify problems both conceptually and mathematically, and to identify central variables and parameters in a specific problem setting. Additionally, current developments in operations research and supply chain management are reflected and evaluated by students.

Content
Supply Chain Management constitutes a general tool for logistics process planning in supply networks. To an increasing degree quantitative decision support is provided by methods and models from Operations Research. The lecture "OR in Supply Chain Management" conveys concepts and approaches for solving practical problems and presents an insight to current research topics. The lecture's focus is set on modeling and solution methods for applications originating in different domains of a supply chain. The emphasis is put on mathematical methods like mixed integer programming, valid inequalities or column generation, and the derivation of optimal solution strategies.
In form and content, the lecture addresses all levels of Supply Chain Management: After a short introduction, the tactical and operational level will be discussed with regard to inventory models, scheduling as well as cutting and packing. The strategic level will be discussed in terms of layout planning. Another main focus of the lecture is the application of methods from online optimization. This optimization discipline has gained more and more importance in the optimization of supply chains over the several past years due to an increasing amount of dynamic data flows.

Literature

- Simchi-Levi, D.; Chen, X.; Bramel, J.: The Logic of Logistics: Theory, Algorithms, and Applications for Logistics and Supply Chain Management, 2nd edition, Springer, 2005
- Simchi-Levi, D.; Kaminsky, P.; Simchi-Levi, E.: Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies, McGraw-Hill, 2000
- Silver, E. A.; Pyke, D. F.; Peterson, R.: Inventory Management and Production Planning and Scheduling, 3rd edition, Wiley, 1998
- Blazewicz, J.: Handbook on Scheduling - From Theory to Applications, Springer, 2007
- Pinedo, M. L.: Scheduling - Theory, Algorithms, and Systems (3rd edition), Springer, 2008
- Dyckhoff, H.; Finke, U.: Cutting and Packing in Production and Distribution - A Typology and Bibliography, Physica-Verlag, 1992
- Borodin, A.; El-Yaniv, R.: Online Computation and Competitive Analysis, Cambridge University Press, 2005
- Francis, R. L.; McGinnis, L. F.; White, A.: Facility Layout and Location: An Analytical Approach, 2nd edition, Prentice-Hall, 1992

Remarks
The lecture will be held in the summer term 2011.
The planned lectures and courses for the next three years are announced online.

Course: Optimisation of Dynamic Systems [23180]

Coordinators: Sören Hohmann
Part of the modules: Control Engineering I (p. 102)[WI4INGETIT1]

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

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

Conditions
The prior attendance of the course *System Dynamics and Control Engineering* [23155] is assumed.

Learning Outcomes
Have still to be defined.

Content
Subjects are not available yet.

Remarks
The lecture will be offered the first time in winter term 2011/12.

Course: Optimization in a Random Environment [25687]

Coordinators: Karl-Heinz Waldmann
Part of the modules: Stochastic Modelling and Optimization (p. 69)[WI4OR7]

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

Learning Control / Examinations
The assessment consists of an 1h written exam following §4(2), 1 SPO. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3 (§4(2), 3 SPO).

Conditions
None.

Learning Outcomes
Students are enabled to apply their knowledge about techniques and methodology on current problems such as the measurement and evaluation of operational risk as required by the Basel II accord.
Subject matter of the course will be announced in due time.

Content
The course is concerned with the quantitative analysis of selected problems arising in economics, engineering, and natural sciences. Subject matter of the course will be announced in due time.

Media
Blackboard, Slides, Flash Animations, Simulation Software

Literature
Lecture Notes.
Elective literature:
problem-oriented

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: OR-oriented modeling and analysis of real problems (project) [25688]

Coordinators: Karl-Heinz Waldmann
Part of the modules: Stochastic Modelling and Optimization (p. 69)[WI4OR7]

ECTS Credits	Hours per week	Term	Instruction language
4.5	1/0/3	Winter / Summer Term	de

Learning Control / Examinations
Presentation and documentation of the rssults.

Conditions
None.

Learning Outcomes
Students are enabled to apply their knowledge about techniques and methodology on real problems and to develop a practically oriented solution in an OR-lab; e.g. in the public health sector.
Subject matter of the course will be announced in due time.

Content
The course is concerned with the quantitative analysis of selected problems arising in economics, engineering, and natural sciences. Subject matter of the course will be announced in due time.

Media
Blackboard, Slides, OR-Lab

Literature
Problem oriented
Elective literature:
problem-oriented

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Organic Computing [2511104]

Coordinators: Hartmut Schmeck, Sanaz Mostaghim
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

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

Learning Control / Examinations
The assessment of this course consists of a written examination (60 min) (following §4(2), 1 SPO) and of submitting written exercises that recapitulate the content of the course. The exercises include theoretical questions as well as practical programming. For providing a successful solution to all exercises, a bonus will be granted, improving the grade of a passed exam by one grade-step (0.3 or 0.4, respectively, following §4(2), 3 SPO). The course will be offered every second semester (summer term) and exams may be repeated at every ordinary exam date.

Conditions
None.

Learning Outcomes
The student acquires the ability to master methods and concepts of Organic Computing and to demonstrate innovation skills regarding the used methods.
Therefore the course aims at the teaching of fundamentals and methods of Organic Computing within the context of its applicability in practice. On the basis of a fundamental understanding of the taught concepts and methods the students should be able to choose the adequate methods and concepts, if necessary further develop them according to the situation and use them properly when facing related problems in their later job. The students should be capable of finding arguments for the chosen solutions and express them to others.

Content
The mission of Organic Computing is to tame complexity in technical systems by providing appropriate degrees of freedom for self-organized behaviour adapting to changing requirements of the execution environment, in particular with respect to human needs. According to this vision an organic computer system should be aware of its own capabilities, the requirements of the environment, and it should be equipped with a number of “self-x” properties allowing for the anticipated adaptiveness and for a reduction in the complexity of system management. These self-x properties are self-organisation, self-configuration, self-optimization, self-healing, self-protection and self-explanation. In spite of these self-x properties, an organic system should be open to external control actions which might be necessary to prevent undesired behaviour.

Media
powerpoint slides with annotations using a tablet pc access to applets and Internet ressources lecture recording (camtasia).

Literature

- Autonomic Computing: Concepts, Infrastructure and Applications. M. Parashar and S. Hariri (Ed.), CRC Press. December 2006.
- Self-Organization in Biological Systems. S. Camazine, J. Deneubourg, N. R. Franks, J. Sneyd, G. Theraulaz and E. Bonabeau. Princeton University Press, 2003.
- Complex Adaptive Systems: An Introduction. H. G. Schuster, Scator Verlag, 2001.
- Introduction to Evolutionary Computing. A. E. Eiben and J. E. Smith. Natural Computing Series, Springer Verlag, 2003. Swarm Intelligence: From Natural to Artificial Systems.Eric Bonabeau, Marco Dorigo and Guy Theraulaz. Oxford University Press, 1999.
- Control of Complex Systems. K. Astrom, P. Albertos, M. Blanke, A. Isidori and W. Schaufelberger. Springer Verlag, 2001.

Elective literature:

- **Adaptive and Self-organising Systems,** Christian Müller-Schloer, Moez Mnif, Emre Cakar, Hartmut Schmeck, Urban Richter,
  June 2007. Preprint.Submitted to ACM Transactions on Autonomous and Adaptive Systems (TAAS)
- **Organic Computing - Addressing Complexity by Controlled Self-organization,** Jürgen Branke, Moez Mnif, Christian Müller-Schloer, Holger Prothmann, Urban Richter, Fabian Rochner, Hartmut Schmeck, In Tiziana Margaria, Anna Philippou, and Bernhard Steffen, *Proceedings of ISoLA 2006*, pp. 200-206. Paphos, Cyprus, November 2006.
- Evolutionary Optimization in Dynamic Environments. J. Branke. Kluwer Academic Publishers, 2002.
- Self-star Properties in Complex Information Systems: Conceptual and Practical Foundations (Lecture Notes in Computer Science. O. Babaoglu, M. Jelasity, A. Montresor, C. Fetzer, S. Leonardi, A. van Moorsel and M. van Steen. Springer Verlag, 2005.

- Design and Control of Self-organizing Systems. C. Gershenson. PhD thesis, Vrije Universiteit Brussel, Brussels, Belgium, 2007.
- VDE / ITG / GI - Positionspapier: Organic Computing - Computer- und Systemarchitektur im Jahr 2010. Juli 2003. it - Information Technology, Themenheft Organic Computing, Oldenbourg Verlag. Volume: 47, Issue: 4/2005.

further references will be announced in class

Course: Managing Organizations [2577902]

Coordinators: Hagen Lindstädt
Part of the modules: Strategic Corporate Management and Organization (p. 37)[WI4BWLUO1]

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

Learning Control / Examinations
The assessment will consist of a written exam (60 min) taking place at the beginning of the recess period (according to Section 4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes
The course should enable the participants to assess the strengths and weaknesses of existing organisational structures and rules using systematic criteria. Here concepts and models for designing organisation structures, regulating organisational processes and managing organisational changes are presented and discussed using case studies. The course is structured to relate to actions and aims to give students a realistic view of the opportunities and limits of rational design approaches.

Content

- Principles of organisational management
- Managing organisational structures and processes: the selection of design parameters
- Ideal-typical organisational structures: choice and effect of parameter combinations
- Managing organisational changes

Media
Slides.

Literature

- Laux, H.; Liermann, F.: *Grundlagen der Organisation*, Springer. 6. Aufl. Berlin 2005.
- Lindstädt, H.: *Organisation*, in Scholz, C. (Hrsg.): Vahlens Großes Personallexikon, Verlag Franz Vahlen. 1. Aufl. München, 2009.
- Schreyögg, G.: *Organisation. Grundlagen moderner Organisationsgestaltung*, Gabler. 4. Aufl. Wiesbaden 2003.

The relevant excerpts and additional sources are made known during the course.

Course: Organization Theory [2577904]

Coordinators: Hagen Lindstädt
Part of the modules: Strategic Corporate Management and Organization (p. 37)[WI4BWLUO1], Strategic Decision Making and Organization Theory (p. 38)[WI4BWLUO3]

ECTS Credits	Hours per week	Term	Instruction language
6	2/1	Winter term	de

Learning Control / Examinations
The assessment consists of a written exam following §4, Abs. 2, 1 of the examination regulation.

Conditions
None.

Learning Outcomes
The participants are made familiar with mostly classical principles of economic organisational theory and institutional economics. This includes transaction cost theory and agency-theory approaches, models for the function and design of organisational information and decision-making systems, transfer price models to coordinate the exchange of goals and services within companies, models on incentive systems and relative performance tournaments as well as selected OR optimisation approaches to designing organisational structures. The course therefore lays the basis for a deeper understanding of the advanced literature on this key economic area.

Content

- Basic considerations and institution-economic principles of organisational theory
- Transfer prices and internal market-price relationships
- Design and coordination without conflicting objectives
- Economic evaluation of information
- Organisation under asymmetric information and conflicting objectives: agency theory principles

Media
Folien.

Literature

- Laux, H.; Liermann, F.: Grundlagen der Organisation. Springer, 5. Aufl. Berlin 2003.
- Milgrom, P.; Roberts, J.: Economics, Organization and Management. Prentice Hall, Englewoods Cliffs 1992.

The relevant excerpts and additional sources are made known during the course.

Course: Oxidation Processes in Drinking Water Technology [22612]

Coordinators: F.H. Frimmel
Part of the modules: Water Chemistry (p. 112)[WI4INGCV5], Water Chemistry II (p. 114)[WI4INGCV7]

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

Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes

Content
Part I: Theoretical basics of the main methods:
1. Disinfection with chlorine (Cl_2,/HOCl, ClO_2), UV-irradiation, silver (Ag^+), ozone (O_3)
2. Oxidation with Ozone O_3, potassium permanganate $KMnO_4$, hydrogen peroxide H_2O_2, combined oxidation methods UV/H_2O_2, UV/O_3, H_2O_2/O_3, oxygen O2
3. Detection reactions of oxidants (O_3, H_2O_2, Cl_2)
4. Water constituents and their interaction in the treatment steps: THM- and AOX-formation, AOC
5. Special problems: CKW, nitrate, Br^-/BrO_3^-
Part II: Introduction of selected treatment plants: Functional principles (schematic), discussion of the methods applied with advantages and disadvantages

Literature
Elective 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: Patent Law [24574]

Coordinators: N.N.
Part of the modules: Intellectual Property Law (p. 137)[WI4JURA4]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes
It is the aim of this course to 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

Literature

- Schulte, Rainer Patentgesetz Carl Heymanns Verlag, 7. Aufl. 2005 ISBN 3-452-25114-4
- Kraßer, Rudolf, Patentrecht Verlag C.H. Beck, 5. Aufl. 2004 ISBN 3-406-384552

Elective literature:
tba in the transparencies

Course: Pensions [N.N.]

Coordinators: Christian Hipp, Klaus Besserer
Part of the modules: Applications of Actuarial Sciences I (p. 28)[WI4BWLFBV4], Applications of Actuarial Sciences II (p. 29)[WI4BWLFBV5]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Remarks
This course *pensions* replaces part of *Life and Pensions* [2530310].

Course: Personalization and Recommender Systems [2540506]

Coordinators: Andreas Geyer-Schulz
Part of the modules: Business & Service Engineering (p. 43)[WI4BWLISM4], Advanced CRM (p. 39)[WI4BWLISM1]

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

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

The course is considered successfully taken, if at least 50 out of 100 points are acquired in the written exam. In this case, all additional points (up to 25) from excersise work will be added. The grades of this lecture are assigned following the table below:

Grade	Minimum points
1.0	113
1.3	106
1.7	99
2.0	92
2.3	85
2.7	78
3.0	71
3.3	64
3.7	57
4.0	50
4.7	40
5.0	0

Conditions
None.

Learning Outcomes
The student

- knows the options and opportunities of personalization especially in the area of Internet based services
- is proficient in different statistical, data-mining, and game theory methods of computing implicit and explicit recommendations
- evaluates recommender systems and compares these with related services

Content
At first, an overview of general aspects and concepts of personalization and its relevance for service providers and customers is given. Next, different categories of recommender systems are discussed. This includes explicit recommendations like customer reviews as well as implicit services based on behavioral data. Furthermore, the course gives a detailed view of the current research on recommender systems at the Chair of Information Services and Electronic Markets.

Media
Folien, Aufzeichnung der Vorlesung im Internet.

Literature
Rakesh Agrawal, Tomasz Imielinski, and Arun Swami. Mining association rules between sets of items in large databases. In Sushil Jajodia Peter Buneman, editor, Proceedings of the ACM SIGMOD International Conference on Management of Data, volume 22, Washington, D.C., USA, Jun 1993. ACM, ACM Press.
Rakesh Agrawal and Ramakrishnan Srikant. Fast algorithms for mining association rules. In Proceedings of the 20th Very Large Databases Conference, Santiago, Chile, pages 487 – 499, Sep 1994.
Asim Ansari, Skander Essegaier, and Rajeev Kohli. Internet recommendation systems. Journal of Marketing Research, 37:363 – 375, Aug 2000.
Christopher Avery, Paul Resnick, and Richard Zweckhauser. The market for evaluations. American Economic Review, 89(3):564 – 584, 1999.
Ibrahim Cingil, Asuman Dogac, and Ayca Azgin. A Broader Approach to Personalization. Communications of the ACM, 43(8):136 – 141, Aug 2000.
Richard O. Duda, Peter E. Hart, and David G. Stork. Pattern Classification. Wiley-Interscience, New York, 2 edition, 2001.

Andreas Geyer-Schulz, Michael Hahsler, and Maximilian Jahn. A customer purchase incidence model applied to recommender services. In R. Kohavi et al., editor, Proceedings of the WebKDD 2001 – Mining log data across all customer touchpoints, volume 2356 of Lecture Notes in Artificial Intelligence LNAI, pages 25–47, Berlin, 2002. ACM, Springer-Verlag.
Jon M. Kleinberg. Authoritative sources in a hyperlinked environment. JACM, 46(5):604–632, sep 1999.
Joseph Konstan, Bradley Miller, David Maltz, Jonathan Herlocker, Lee Gordon, and John Riedl. Grouplens: Applying Collaborative Filtering to Usernet News. Communications of the ACM, 40(3):77 – 87, Mar 1997.
Paul Resnick, Neophytos Iacovou, Peter Bergstrom, and John Riedl. Grouplens: An open architecture for collaborative filtering of netnews. In Proceedings of the conference on Computer supported cooperative work, pages 175 – 186. ACM Press, 1994.
Elective literature:
Antoinette Alexander. The return of hardware: A necessary evil? Accounting Technology, 15(8):46 – 49, Sep 1999.
Christopher Avery and Richard Zeckhauser. Recommender systems for evaluating computer messages. Communications of the ACM, 40(3):88 – 89, Mar 1997.
Steven Bellman, Gerald Lohse, and Eric Johnson. Predictors of Online Buying Behavior. Communications of the ACM, 42(12):32 – 38, Dec 1999.
Thomas J. Blischok. Every transaction tells a story. Chain Store Age Executive with Shopping Center Age, 71(3):50–56, Mar 1995.
Hans Hermann Bock. Automatische Klassifikation. Vandenhoeck und Ruprecht, Göttingen, 1974.
Andrew S.C. Ehrenberg. Repeat-Buying: Facts, Theory and Applications. Charles Griffin & Company Ltd, London, 2 edition, 1988.
Wolfgang Gaul, Andreas Geyer-Schulz, Michael Hahsler, and Lars Schmidt-Thieme. eMarketing mittels Recommendersystemen. Marketing ZFP, 24:47 – 55, 2002.
Andreas Geyer-Schulz, Michael Hahsler, and Maximilian Jahn. myvu: a next generation recommender system based on observed consumer behavior and interactive evolutionary algorithms. In W. Gaul, O. Opitz, and M. Schader, editors, Data Analysis – Scientific Modeling and Practical Applications, volume 18 of Studies in Classification, Data Analysis and Knowledge Organization, pages 447 – 457, Heidelberg, Germany, 2000. Springer.
Andreas Geyer-Schulz, Michael Hahsler, and 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.
Mark-Edward Grey. Recommendersysteme auf Basis linearer Regression, 2004.
John A. Hartigan. Clustering Algorithms. John Wiley and Sons, New York, 1975.
Kevin Kelly. New Rules for the New Economy: 10 Radical Strategies for a Connected World. Viking, 1998.
Taek-Hun Kim, Young-Suk Ryu, Seok-In Park, and Sung-Bong Yang. An improved recommendation algorithm in collaborative filtering. In K. Bauknecht, A. Min Tjoa, and G. Quirchmayr, editors, E-Commerce and Web Technologies, Third International Conference, Aix-en-Provence, France, volume 2455 of Lecture Notes in Computer Science, pages 254–261, Berlin, Sep 2002. Springer-Verlag.
Ron Kohavi, Brij Masand, Myra Spiliopoulou, and Jaideep Srivastava. Web mining. Data Mining and Knowledge Discovery, 6:5 – 8, 2002.
G. S. Maddala. Introduction to Econometrics. John Wiley, Chichester, 3 edition, 2001.
Andreas Mild and Martin Natter. Collaborative filtering or regression models for Internet recommendation systems? Journal of Targeting, Measurement and Analysis for Marketing, 10(4):304 – 313, Jan 2002.
Andreas Mild and Thomas Reutterer. An improved collaborative filtering approach for predicting cross-category purchases based on binary market basket data. Journal of Retailing & Consumer Services, 10(3):123–133, may 2003.
Paul Resnick and Hal R. Varian. Recommender Systems. Communications of the ACM, 40(3):56 – 58, Mar 1997.
Badrul M. Sarwar, Joseph A. Konstan, Al Borchers, Jon Herlocker, Brad Miller, and John Riedl. Using filtering agents to improve prediction quality in the grouplens research collaborative filtering system. In Proceedings of ACM Conference on Computer-Supported Cooperative Work, Social Filtering, Social Influences, pages 345 – 354, New York, 1998. ACM Press.
J. Ben Schafer, Joseph Konstan, and Jon Riedl. Recommender Systems in E-commerce. In Proceedings of the 1st ACM conference on Electronic commerce, pages 158 – 166, Denver, Colorado, USA, Nov 1999. ACM.
Upendra Shardanand and Patti Maes. Social information filtering: Algorithms for automating “word of mouth”. In Proceedings of ACM SIGCHI, volume 1 of Papers: Using the Information of Others, pages 210 – 217. ACM, 1995.

Course: Life Insurance [N.N.]

Coordinators: Michael Vogt
Part of the modules: Applications of Actuarial Sciences I (p. 28)[WI4BWLFBV4], Applications of Actuarial Sciences II (p. 29)[WI4BWLFBV5]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Remarks
This course *life insurance* replaces part of *Life and Pensions* [2530310].

Course: Photovoltaic Systems Technology [23380]

Coordinators: Schmidt
Part of the modules: Electrical Power Engineering (p. 106)[WI4INGETIT4], Generation and transmission of renewable power (p. 109)[WI4INGETIT7]

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

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.

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.

Literature
Elective literature:
„Regenerative Energiesysteme“, Volker Quaschning, ISBN: 978-3-446-40973-6
„Photovoltaik“, Heinrich Häberlin, ISBN:978-3-8007-3003-2

Course: Physical Basics of Laser Technology [2181612]

Coordinators: Schneider
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

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

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

Conditions
Basic knowledge of physics, chemistry and material science is assumed.
It is not possible, to combine this lecture with the lecture *Laser Application in Automotive Engineering* [21642]

Learning Outcomes
The student

- comprehends the physical basics and understands the function of laser sources and the interactions between laser radiation and materials surfaces.
- Based on this the student is able to choose appropriate laser sources and laser process techniques for various applications in materials processing.

Content
Based on the description of the physical basics about the formation and the properties of laser light the lecture goes through the different types of laser beam sources used in industry these days. The lecture focus on the usage of lasers especially in materials engineering. Other areas like measurement technology or medical applications are also mentioned.

An excursion to the laser laboratory of the Institute for Materials Research (IMF I) at the Forschungszentrum Karlsruhe (FZK) will be offered.

Media
Lecture notes.

Literature
Elective literature:

- 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: Simulation Game in Energy Economics [2581025]

Coordinators: Wolf Fichtner
Part of the modules: Basics of Liberalised Energy Markets (p. 49)[WI4BWLIIP4]

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

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

Conditions
Visiting the course “Introduction to Energy Economics”

Learning Outcomes
Understanding for market mechanisms, pricing and investment decisions in a liberalised electricity market.

Content

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

Literature
Elective literature:
Möst, D. und Genoese, M. (2009): Market power in the German wholesale electricity market. The Journal of Energy Markets (47–74). Volume 2/Number 2, Summer 2009

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

Coordinators: W. Weißkopf
Part of the modules: Project in Public Transportation (p. 93)[WI4INGBGU5], Transportation II (p. 99)[WI4INGBGU11]

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

Learning Control / Examinations
See module description.

Conditions
See module description.

Learning Outcomes

Content

Course: Polymerengineering I [2173590]

Coordinators: Peter Elsner
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes
The field of Polymer Engineering includes synthesis, material science, processing, construction, design, tool engineering, production technology, surface engineering and recycling. The aim is, to equip the students with knowledge and technical skills, and to use the material “polymer” meeting its requirements in an economical and ecological way.

Content
1. Economical aspects of polymers
2. Introduction of mechanical,chemical end electrical properties
3. Processing of polymers (introduction)
4. Material science of polymers
5. Synthesis

Literature
Recommended literature and selected official lecture notes are provided in the lecture

Course: Polymerengineering II [2174596]

Coordinators: Peter Elsner
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes
The field of Polymer Engineering includes synthesis, material science, processing, construction, design, tool engineering, production technology, surface engineering and recycling. The aim is, to equip the students with knowledge and technical skills, and to use the material “polymer” meeting its requirements in an economical and ecological way. Also the manifold production processes are discussed and compared regarding the component design .

Content
1. Processing of polymers

2. Properties of polymer components
Based on practical examples and components

2.1 Selection of material

2.2 Component design

2.3 Tool engineering

2.4 Production technology

2.5 Surface engineering

2.6 Sustainability, recycling

Literature
Recommended literature and selected official lecture notes are provided in the lecture

Course: Portfolio and Asset Liability Management [2520357]

Coordinators: Svetlozar Rachev
Part of the modules: Mathematical and Empirical Finance (p. 70)[WI4STAT1], Statistical Methods in Risk Management (p. 71)[WI4STAT2]

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

Learning Control / Examinations
The assessment of this course consists of a written examination (following §4(2), 1 SPO) and of possible additional assignments during the course (following §4(2), 3 SPO).

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.

Literature
To be announced in lecture.
Elective literature:
To be announced in lecture.

Course: Experimental Laboratories in Sensors and Actuators [23232]

Coordinators: Wolfgang Menesklou
Part of the modules: Sensor Technology I (p. 104)[WI4INGETIT3], Sensor Technology II (p. 105)[WI4INGETIT5]

ECTS Credits	Hours per week	Term	Instruction language
6	4	Summer term	de

Learning Control / Examinations
Assessment consists of a written examinations about basics of the experiment, the evaluation of the practical implementation, and the evaluation of the protocols.
The overall grade consists of the partial grades of the all examinations.

Conditions
See module description.
Successful completion of sensors [23231].

Recommendations
The number of participants is limited, early registration is recommended.

Learning Outcomes
The student should acquire fundamental principles in material science and device technology of sensors and actors to be able to apply materials and sensors from the viewpoint of an application or development engineer.

Content
In groups of three, the students measure autonomously the relevant characteristics of materials, sensors and actuators. Insights may be gained into the fundamental physical mechanism and also the factors determining the design and development of components utilizing these materials. The students should acquire the capability to analyze and present experimental data, and should be able to discuss the technological and economical boundary conditions.
Content: Impedance spectroscopy, Piezoelectric sensor and actuator, Temperature sensors (NTC, PTC), Exhaust gas sensors, (lambda probes),Magnetic sensors (Hall sensor), Intelligent shock absorber (adaptronic system), Scientific presentation.

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

Course: Computing Lab Information Systems [PraBI]

Coordinators: Andreas Oberweis, Detlef Seese, Rudi Studer
Part of the modules: Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3], Emphasis in Informatics (p. 62)[WI4INFO2]

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

Learning Control / Examinations
The assessment of this course are practical work, presentations and a written thesis according to §4(2), 3 of the examination regulation. Practical work, presentations and a written thesis are weighted according to the course.

Conditions
None.

Learning Outcomes
Students are able to

- implement a prototype at the computer based on the given topic.
- write the thesis 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

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: Advanced Lab in Efficient Algorithms [25700p]

Coordinators: Hartmut Schmeck
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

ECTS Credits	Hours per week	Term	Instruction language
4	3	Winter / Summer Term	de

Learning Control / Examinations
The assessment consists of (according Section 4(2), 3 of the examination regulation):

- practical work
- oral presentation of the results
- written report
- discussion and collaboration

Conditions
None.

Learning Outcomes

Content
Topics include the new research issues of the research group “applied Informatics”. The new topics are in the area Organic Computing, Nature-inspired optimization and service oriented architectures.
The methods presented in the lectures are practiced during this laboratory in teamwork including implementation tasks. The results should be presented by an oral presentation and a written report.
The topics of the laboratory are introduced around the end of the former semester on the board A12 of the institute AIFB (building 11.40) and in Internet http://www.aifb.kit.edu/web/SeminarePraktika

Literature
Elective literature:
Will be announced at the beginning of the computer lab.

Remarks
There is a limited number of participants. Therefore students have to register for the lab.

Course: Computing Lab in Intelligent Systems in Finance [25762p]

Coordinators: Detlef Seese
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

ECTS Credits	Hours per week	Term	Instruction language
4	3	Winter / Summer Term	de

Learning Control / Examinations
see German version

Conditions
see German version

Learning Outcomes
see German version

Content
see German version

Literature
Elective literature:
Literature will be announced in the first meeting.

Remarks
see German version

Course: Computing Lab in Complexity Management [25818]

Coordinators: Detlef Seese
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

ECTS Credits	Hours per week	Term	Instruction language
4	3	Winter / Summer Term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Literature
Will be announced in the computing lab.

Course: Practical Course in Engineering Ceramics [21751]

Coordinators: Porz
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

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

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).

Conditions
The module *Emphasis Material Science* [WI3INGMB9] has to be completed successfully beforehand.
Attendance of one course in the area of ceramics is assumed.

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

Coordinators: Erhard Hoffmann
Part of the modules: Water Supply and Sanitation (p. 101)[WI4INGBGU13]

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

Learning Control / Examinations
See module description.

Conditions
Attendance of *Process Engineering in Water Quality Management* [19054]

Learning Outcomes

Content

- Research on “unit processes”
- Gas exchange (oxygenation)
- Phase transition process
- Adsorption/ ion exchange
- separation processes

Course: Lab Class Web Services [25820]

Coordinators: Stefan Tai, Christian Zirpins
Part of the modules: Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3], Informatics (p. 60)[WI4INFO1]

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

Learning Control / Examinations
The assessment of this course is according to §4(2), 3 of the examination regulation in form of an examination of the written seminar thesis, a presentation and a project. The final mark is based on the examination of the written seminar thesis and the project but can be upgraded or downgraded according to the quality of the presentation.

Conditions
The lectures *Service Oriented Computing 1* or *Web Service Engineering* are recommeded.

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 applications on the Internet. Based on concrete application scenarios, the class focuses on the development of software solutions for specific aspects of service-oriented IT-infrastructure. This includes the complete development lifecycle of a large-scale software project and its implementation in small project teams.

Literature
For introduction, the following books are recommended:

- M. P. Papazoglou. Web Services: Principles and Technology. Pearson, 2007.
- G. Alonso, F. Casati, H. Kuno, and V. Machira ju. Web Services - Concepts, Architec-tures and Applications. Springer, 2004.

Specific literature will be announced in the course.

Course: Ecxercises in Knowlegde Management [25740p]

Coordinators: Rudi Studer
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

ECTS Credits	Hours per week	Term	Instruction language
4	3	Winter / Summer Term	de

Learning Control / Examinations
Assessment is based on equal parts on (acc. to §4(2), 3 SPO)

- Essay
- Presentation
- Implementation

Conditions
Attending the lecture “Wissensmanagement” [25860] is required.

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):

- Ontologie-based Knowledge Management
- Semantic Web and Linked Data Applications
- Social Software and Collaboration Tools
- Data and Web Mining
- Personal Knowledge Management
- Case-based Reasoning

Literature
Elective 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: Practical seminar: Health Care Management (with Case Studies) [2550498]

Coordinators: Stefan Nickel
Part of the modules: Operations Research in Supply Chain Management and Health Care Management (p. 66)[WI4OR5]

ECTS Credits	Hours per week	Term	Instruction language
7	2/1/2	Winter / Summer Term	de

Learning Control / Examinations
The assessment consists in a case study, the writing of a corresponding paper, and an oral exam (according to §4(2), 2 of the examination regulation).

Conditions
None.

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

Learning Outcomes
The practical seminar will take place in a hospital in Karlsruhe such that the students are confronted with real problems. The target of this seminar is to develop solutions for these problems using well-known methods of Operations Research. Consequently the students' ability to analyze processes and structures, to collect relevant data as well as to develop and solve models will be promoted.

Content
Processes in a hospital are often grown historically ("We have always done it this way"), so that there has not been the need to analyze processes until reforms of the health system have put increasing pressure on hospitals. Consequently, nowadays hospitals look for possibilities to improve their processes. The students are confronted with case studies and are asked to develop a solution. Therefore they have to collect and analyze relevant data , processes and structures. When developing the solution the students have to bear in mind that besides the economic efficiency also the quality of care and patient satisfaction (e.g. measured in waiting time) may not be neglected in the health care sector.

Literature
Elective literature:

- Fleßa: Grundzüge der Krankenhausbetriebslehre, Oldenbourg, 2007
- Fleßa: Grundzüge der Krankenhaussteuerung, Oldenbourg, 2008
- Hall: Patient flow: reducing delay in healthcare delivery, Springer, 2006

Remarks
The lecture is offered every term.
The planned lectures and courses for the next three years are announced online.

Course: Private and Social Insurance [2530050]

Coordinators: Wolf-Rüdiger Heilmann, Klaus Besserer
Part of the modules: Insurance Management II (p. 31)[WI4BWLFBV7], Insurance Management I (p. 30)[WI4BWLFBV6]

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

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

Conditions
None.

Learning Outcomes
Getting to know basic terms and functioning of private and social insurance.

Content
Basic terms of insurance, i.e. characteristics, judicial and political background and functioning of private and social insurance as well as their economic and societal and political meaning.

Literature
Elective literature:

- 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: Exercises in Civil Law [24506/24017]

Coordinators: Peter Sester, Thomas Dreier
Part of the modules: Commercial Law (p. 136)[WI4JURA2]

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

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.

Conditions
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].

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

Literature
tba in the course.

Course: Product, Process and Ressource Integration in the Automotive Development [2123364]

Coordinators: Sama Mbang
Part of the modules: Virtual Engineering (p. 88)[WI4INGMB22], Virtual Engineering B (p. 131)[WW4INGMB30], Virtual Engineering A (p. 130)[WW4INGMB29]

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

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

Conditions
None.

Learning Outcomes

Content

Course: Production and Logistics Management [2581954]

Coordinators: Magnus Fröhling, Frank Schultmann
Part of the modules: Industrial Production III (p. 48)[WI4BWLIIP6]

ECTS Credits	Hours per week	Term	Instruction language
5.5	2/2	Summer term	de

Learning Control / Examinations
The examination will be in form of a written exam acc. to §4(2), 1 ER. Exams are offered in every semester and can be re-examined at every ordinary examination date.

Conditions
This course is compulsory in module “Industrial Production III” [WI4BWLIIP6].

Learning Outcomes

- Students discuss the basic tasks of an operative production and logistics management.
- Students discuss approaches to solve these tasks and shall be able to apply certain ones.
- Students explain the interdependencies between the tasks and methods to solve.
- Students discuss possible IT tools for production and logistics management.
- Students describe emerging trends in production and logistics management.

Content
This course covers central tasks and challenges of operational production and logistics management. Systems analytically, central planning tasks are discussed. Exemplary solution approaches for these tasks are presented. Further practical approaches are explained. Students get to know the set-up and mode of operation of planning systems such as PPS-, ERP- and Advanced Planning Systems to cope with the accompanying planning tasks. Alongside to MRP II, students will be introduced to integrated supply chain management approaches in Supply Chain Management.

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

Literature
will be announced in the course

Course: Production Planning and Scheduling [2550494]

Coordinators: Jörg Kalcsics
Part of the modules: Operations Research in Supply Chain Management and Health Care Management (p. 66)[WI4OR5]

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

Learning Control / Examinations
The assessment consists of a written exam (120 min) according to Section 4 (2), 1 of the examination regulation. The exam takes place at the beginning of the no lecture phase. Repetition exams are offered after the successive semester.

Conditions
None.

Learning Outcomes
Nach dem Studium dieser Veranstaltung sollten die Studierenden

- die Bedeutung der Produktionsplanung und -steuerung (PPS) für ein Unternehmen einschätzen können,
- die Zielsetzungen und Aufgabenstellungen der PPS im Unternehmen kennen,
- einen Überblick über die grundlegenden PPS-Funktionen haben sowie
- die Methoden zur Analyse der Auftragsabwicklung kennen.

Das Hauptaugenmerk der Veranstaltung liegt auf quantitativen Planungsverfahren zur Losgrößenplanung, sowie der Reihenfolge- und Ablaufplanung.

Content
Aufgrund des enormen Wertschöpfungsprozess der Produktion ist deren Planung und Steuerung von zentraler Bedeutung für jede Industrieunternehmung. Gegenstand der Produktionsplanung und –steuerung (PPS) ist die operative, zeitliche und mengenmäßige Steuerung, Kontrolle und Verwaltung aller Vorgänge, die bei der Produktion von Waren und Gütern notwendig sind. Sie lässt sich die die folgenden Bereiche unterteilen (siehe Gutenberg):

- *Produktionsprogrammplanung*
  Ziel der Produktionsprogrammplanung ist die Festlegung von Art, Menge und zeitlichem Rahmen der in den nächsten Perioden zu produzierenden Erzeugnisse. Je nach Fristigkeit der Planung werden Entscheidungen über grundsätzlich zu fertigende Produktarten und abzudeckende Marktsegmente unter Beachtung der Unternehmensziele und Ressourcenverfügbarkeiten getroffen, oder aber die in einem vorgegebenen Zeitraum tatsächlich herzustellenden Endprodukte und absatzfähigen Zwischenprodukte.
- *Bereitstellungs- und Bedarfsplanung*
  Gegenstand der Bereitstellungs- und Bedarfsplanung ist die Bestimmung von Art, Menge und Bereitstellungstermin der Verbrauchsfaktoren, die für die Erzeugung des zuvor geplanten Produktionsprogramms benötigt werden. Da in der Produktionsprogrammplanung überwiegend Endprodukte betrachtet wurden (Primärbedarfe), muss nun insbesondere eine Planung für die untergeordneten Erzeugnisse, d.h. Zwischen- und Vorprodukte, unter Einbeziehung der Arbeitspläne und Stücklisten folgen (Sekundärbedarfe). Oftmals fällt hierunter auch die Aufgabe der Zusammenfassung von Fertigungsaufträgen zu Losen und die Beschaffungsplanung.
- *Produktionsprozeßplanung*
  Teilgebiete der Produktionsprozeßplanung sind die Durchlauf- und Kapazitätsterminierung, sowie die Reihenfolgeplanung. Mittels der Durchlaufterminierung werden früheste und späteste Termine für die Durchführung einzelner Arbeitsschritte unter Einhaltung der zuvor vereinbarten oder festgelegten Liefertermine ermittelt. Anschließend wird in der Kapazitätsterminierung geklärt, ob die erforderlichen Kapazitäten für das Produktionsprogramm vorhanden sind. Bei Kapazitätsengpässen müssen einzelne Arbeitsschritte in andere Zeiträume verschoben oder Überstunden eingeplant werden. Gegenstand der Reihenfolgeplanung ist schließlich die Bildung von Reihenfolgen für die Bearbeitung von Aufträgen und deren detaillierte zeitliche Verteilung auf einzelne Maschinen.

Literature
Elective literature:

- Domschke, Scholl, Voß: Produktionsplanung, 2. Auflage, Springer, 1997
- Günther, Tempelmeier: Produktion und Logistik, 7. Auflage, Springer, 2007
- Gutenberg: Grundlage der Betriebswirtschaftslehre, Band 1: Die Produktion, 24. Auflage, Springer, 1983
- Nahmias: Production and Operations Analysis, McGraw-Hill, 2008

Remarks
The lecture is held irregularly.
The planned lectures and courses for the next three years are announced online.

Course: Production Systems and Production Technology in Major Assembly Production [2150690]

Coordinators: Stauch
Part of the modules: Selected Chapters from Production Engineering I (p. 73)[WI4INGMB1], Selected Chapters from Production Engineering II (p. 74)[WI4INGMB2], Selected Chapters from Production Engineering III (p. 75)[WI4INGMB3], Global Production and Logistics (p. 132)[WI4INGMB31]

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

Learning Control / Examinations
Performance is assessed in the form of one written examination (60 min) (as per §4(2), 1 or 2 SPO [study and examination regulations]) during the lecture-free period. The examination will take place once every semester and can be retaken at every official examination date.

Conditions
None.

Recommendations
Attendance of the lecture *Manufacturing Engineering* [2149657] is recommended prior to attending this lecture.

Learning Outcomes
The student

- understands the challenges a global automotive company is facing in current times
- knows the possibilities of modern manufacturing engineering and is aware of specific application examples from major assembly production
- is able to apply the methods and approaches covered by the lecture to problems from the context of the lecture.

Content
This lecture has a clear focus on real-life situations and conditions, provides many recent examples from industry and illustrates these examples by means of a study trip to Daimler's Untertürkheim plant. In addition to the technological aspects of major assembly production (engines, axles, transmissions), management-related aspects (HR management of approximately 20,000 employees), logistics-related aspects and other important general conditions (e.g. environmental requirements) will be addressed.

Main topics of the lecture:

- Facts and figures of the Daimler group and of the Untertürkheim plant
- Overview over the MDS and the major assembly process
- Powertrain systems
- Factory planning, start-up and total cost of ownership
- MPS - Mercedes Benz Production System
- Logistics
- Occupational health and safety and environmental protection
- Management and HR
- Quality management
- Study trip to the Untertürkheim plant

Media
Lecture notes (available at the lecture).

Remarks
The maximum number of participants is limited to 70. The dates for the sessions will be made known in time.
The credits were changed to 4 CP.

Course: Project Work in Risk Research [2530393]

Coordinators: Ute Werner, Madalena Salek
Part of the modules: Operational Risk Management II (p. 34)[WI4BWLFBV10], Operational Risk Management I (p. 33)[WI4BWLFBV9]

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

Learning Control / Examinations
The assessment consists of oral presentations and papers on the topics presented (50%) as well as of the participation in group work (50%), according to Section 4 (2), 3 of the examination regulation.

Conditions
Willingness to study literature beforehand in order to prepare for the work project at hand.

Learning Outcomes
Learn how to integrate knowledge from individual and collective group work for developing ideas and creating solutions for current problems in risk research.

Content
Project work with topic from current risk research.
Topics covered so far:

- Risk perception of extreme natural events
- Terrorism: Prevention, Provention, Perception
- Damage potential of man-made hazards
- Risk communikation
- Cross-cultural comparison of risk perception
- Scenario-based hazard assessment
- Improving citizens' emergency preparedness
- Innovative insurance products for adapting to climate change
- Developing a questionnaire regarding risk perception of climate change
- Evaluation of the PROSA-project of DRV-BW

Literature
Indicated during the course for the selected topic.
Elective literature:
Indicated during the course for the selected topic.

Remarks
This course is offered in the spring term 2011.
This course is normally offered each semester. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretary of the chair of insurance science.

Course: Project Workshop-Automative Engineering [2115817]

Coordinators: Frank Gauterin
Part of the modules: Handling Characteristics of Motor Vehicles (p. 81)[WI4INGMB6], Vehicle Development (p. 82)[WI4INGMB14], Automotive Engineering (p. 80)[WI4INGMB5]

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

Learning Control / Examinations
The assessment consists of a project presentation at the end of the lecture period (according to Section 4(2), 3 of the examination regulation) and an oral exam (30-40 min) in the recess period (according to Section 4(2), 2 of the examination regulation). Re-examinations are offered at every ordinary examination date.
The overall grade of the course consists of the weighted grades of both assessments

- Processing and results of the project: 75%
- Oral exam: 25 percent

Conditions
None.

Learning Outcomes
The students are familiar with typical industrial development processes and working style. They are able to apply knowledge gained at the university to a practical task.

Content
During the Project Workshop Automotive Engineering a team of six persons will work on a task given by an German industrial partner using the instruments of project management. The task is relevant for the actual business and the results are intended to be industrialized after the completion of the project workshop. The team will generate approaches in its own responsibility and will develop solutions for practical application. Coaching will be supplied by both, company and institute. At the beginning in a start-up meeting goals and structure of the project will be specified. During the project workshop there will be weekly team meetings. Also a milestone meeting will be held together with persons from the industrial company. In a final presentation the project results will be presented to the company management and to institute representatives.

Media
Course script (will be supplied during the start-up meeting).

Literature
Elective literature:
Steinle, Claus; Bruch, Heike; Lawa, Dieter (Hrsg.), Projektmanagement, Instrument moderner Innovation, FAZ Verlag, Frankfurt a. M., 2001, ISBN 978-3929368277

Course: Projectseminar [SozSem]

Coordinators: Bernart, Kunz, Pfaff, Haupt, Grenz, Eisewicht
Part of the modules: Sociology (p. 140)[WI4SOZ1]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes
The student:

- Is able to develop sociological analyses based on the topic of the seminar
- Is able to organize a small survey or to evaluate a given data set on the research problem

Content
In this class, students will conduct small empirical projects.

Course: Public Management [2561127]

Coordinators: Berthold Wigger, Assistenten
Part of the modules: Strategic Decision Making and Organization Theory (p. 38)[WI4BWLUO3]

ECTS Credits	Hours per week	Term	Instruction language
6	2/1	Winter term	de

Learning Control / Examinations
The assessment consists of an 1h written exam following Art. 4, para. 2, clause 1 of the examination regulation. The grade for this course equals the grade of the written exam.

Conditions
Basic knowledge of Public Finance is required.

Learning Outcomes

Content
The lecture „Public Management“ deals with the economic theory of public sector administration. It is divided into four parts. The first section gives an overview of the legal framework of governmental administration in the Federal Republic of Germany and introduces the classical theory of administration as developed by Weber. Part two studies concepts of public decision-making, which have a significant impact on the operation of public sector administrations and where one focus is on consistency problems of collective decision-making. The third chapter deals with efficiency problems arising in conventionally organized public administrations and companies. X-inefficiency, information and control problems, the isolated consideration of income-spending-relations as well as rent-seeking problems will be considered. In section four the concept of New Public Management, which is a new approach to public sector administration that is mainly based in contract theory, is introduced. Its foundations in institutional economics are developed, with a focus on the specific incentive structures in self-administered administrations. Finally, the achievements of New Public Management approaches are discussed.

Literature
Elective literature:

- Damkowski, W. and C. Precht (1995): Public Management; Kohlhammer
- Richter, R. and E.G. Furubotn (2003): Neue Institutionenökonomik; 3rd edition; Mohr
- Schedler, K. and I. Proeller (2003): New Public Management; 2nd edition; UTB
- Mueller, D.C. (2009): Public Choice III; Cambridge University Press
- Wigger, B.U. (2006): Grundzüge der Finanzwissenschaft; 2nd edition; Springer

Course: High Performance Powder Metallurgy Materials [2126749]

Coordinators: Rainer Oberacker
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

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

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

Conditions
None.

Recommendations
Knowledge of basic material science is assumed. Therefore it is recommended to attend the courses Material Science I [21760] and Material Science II [21782] beforehand.

Learning Outcomes
The students know the basics of powder metallurgy. They are able to asses the conditions for applying either powder metallurgy or competing production methods. They have knowledge on production, properties and application of the most important PM materials.

Content
The lecture gives an overview on production, properties and application structural and functional powder metallurgy material. The following groups of materials are presented: PM High Speed Steels, Cemented Carbides, PM Metal Matrix Composites, PM Secialities, PM Soft Magnetic and Hard Magnetic Materials.

Literature
Elective literature:
W. Schatt ; K.-P. Wieters ; B. Kieback. „.Pulvermetallurgie: Technologien und Werkstoffe“, Springer, 2007
R.M. German. “Powder metallurgy and particulate materials processing. Metal Powder Industries Federation, 2005
F. Thümmler, R. Oberacker. “Introduction to Powder Metallurgy”, Institute of Materials, 1993

Remarks
The course is new in summer term 2011.

Course: Quality Management [2149667]

Coordinators: Lanza, Gisela
Part of the modules: Selected Chapters from Production Engineering I (p. 73)[WI4INGMB1], Selected Chapters from Production Engineering II (p. 74)[WI4INGMB2], Selected Chapters from Production Engineering III (p. 75)[WI4INGMB3], Specialization in Production Engineering (p. 125)[WI4INGMB22], Global Production and Logistics (p. 132)[WI4INGMB31]

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

Learning Control / Examinations
Performance is assessed in the form of one written examination (60 min) (as per §4(2), 1 or 2 SPO [study and examination regulations]) during the lecture-free period. The examination will take place once every semester and can be retaken at every official examination date.

Conditions
None.

Learning Outcomes
The student

- has **knowledge** of the content covered by the lecture,
- **understands** the quality philosophies covered by the lecture,
- is able to **apply** the QM tools and methods he/she has learned about in the lecture **to** new problems from the context of the lecture,
- is able to **analyse** and **evaluate** the suitability of the methods, procedures and techniques he/she has learned about in the lecture for a specific problem.

Content
Based on the quality philosophies Total Quality Management (TQM) and Six Sigma, the lecture deals with the requirements of modern quality management. Within this context, the process concept of a modern enterprise and the process-specific fields of application of quality assurance methods are presented. The lecture covers the current state of the art in preventive and non-preventive quality management methods in addition to manufacturing metrology, statistical methods and service-related quality management. The content is completed with the presentation of certification possibilities and legal quality aspects.

Main topics of the lecture:

1. The term “quality”

2. Total Quality Management (TQM) and Six Sigma

3. Universal methods and tools

4. QM during early product stages - product definition

5. QM during product development and in procurement

6. QM in production - manufacturing metrology

7. QM in production - statistical methods

8. QM in service

9. Quality management systems

10. Legal aspects of QM

Media
Lecture notes (available at the Institute of Production Science)

Remarks
The credits were changed to 4 CP.

Course: Quality Control I [2550674]

Coordinators: Karl-Heinz Waldmann
Part of the modules: Stochastic Modelling and Optimization (p. 69)[WI4OR7]

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

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.

Conditions
None.

Learning Outcomes
The lecture provides students with knowledge of modern techniques in quality management. Students learn to use the techniques, such as control charts, experimental design, efficiently and targeted.

Content
Topics overview: Introduction to TQM, Statistical Process Control (control charts), Acceptance Sampling (sampling plans), Design and Analysis of Experiments

Media
Blackboard, Slides, Flash Animations.

Literature
Lecture Notes
Elective literature:

- Montgomery, D.C. (2005): Introduction to Statistical Quality Control (5e); Wiley.

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Quality Control II [25659]

Coordinators: Karl-Heinz Waldmann
Part of the modules: Stochastic Modelling and Optimization (p. 69)[WI4OR7]

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

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.

Conditions
None.

Learning Outcomes
The lecture provides students with knowledge of modern techniques in reliability engineering.

Content
Topics overview: Reliability Theory (structure function, reliability of complex systems, modeling and estimating lifetime distributions, systems with repair), Maintenance

Media
Blackboard, Slides, Flash Animations.

Literature
Lecture Notes
Elective literature:

- ROSS, S.M.: Introduction to Probability Models (5 ed). Academic Press, 1993.
- KOHLAS, J.: Zuverlässigkeit und Verfügbarkeit. B.G. Teubner, Stuttgart, 1987.
- BIROLINI, A: Qualität und Zuverlässigkeit technischer Systeme, Springer, Berlin, 1991.

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Quality Management of Food Processing [22205/6]

Coordinators: Schuchmann
Part of the modules: Principles of Food Process Engineering (p. 110)[WI4INGCV3], Specialization in Food Process Engineering (p. 111)[WI4INGCV4]

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

Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes

Content

Course: Quantitative Methods for Supply Chain Risk Management [2118090]

Coordinators: Cardeneo
Part of the modules: Safety Science I (p. 118)[WI4INGINTER4], Safety Science III (p. 120)[WI4INGINTER6], Safety Science II (p. 119)[WI4INGINTER5], Introduction to Logistics (p. 76)[WI4INGMB20], Logistics in Value Chain Networks (p. 129)[WW4INGMB28], Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11]

ECTS Credits	Hours per week	Term	Instruction language
6	3/1	Winter term	de

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

Conditions
Knowledge in Logistics and Operations Research are recommended (linear and mixed integer optimization, simple graph theory, and basic knowledge of statistics).

Learning Outcomes
The student

- identifies, analyzes and assigns risks of logistic systems
- plans location and transport decisions under uncertainty
- knows risk-relevant elements and knows adequate countermeasures for planning processes (regarding procurement, demand, infrastructure, continuity management)

Content
The planning and the operation of logistics systems are strongly connected with uncertainty: It is the unknown demand, varying transportation times, unexpected delays, irregularly production yield or volatile rates of exchange: Quantities, times, qualities and prices are uncertain values. Therefore it is necessary to deal with particular these uncertain values to avoid negative effects . In this lecture we mostly work with mathematical models and methods to control the various kinds of risks.

Literature
Will be announced in the lecture.

Remarks
From now on the course will be offered in winter terms.

Course: Reaction Mechanisms in Different Ecosystems [19241]

Coordinators: Josef Winter
Part of the modules: Environmental Management (p. 100)[WI4INGBGU12]

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

Learning Control / Examinations
See module description.

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

Learning Outcomes
Interaction of transformations with process engineering.

Content

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

Course: Computer Integrated Planning of New Products [2122387]

Coordinators: Roland Kläger
Part of the modules: Virtual Engineering (p. 88)[WI4INGMB22], Virtual Engineering A (p. 130)[WW4INGMB29], Virtual Engineering B (p. 131)[WW4INGMB30]

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

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

Conditions
None.

Learning Outcomes

Content

Course: Law in Public Transport [19325]

Coordinators: Ralf Schweinsberg
Part of the modules: Public Transportation Operations (p. 92)[WI4INGBGU4]

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

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.

Conditions
See module description.

Learning Outcomes

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

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

Course: Control of Linear Multivariable Systems [23177]

Coordinators: Mathias Kluwe
Part of the modules: Control Engineering II (p. 103)[WI4INGETIT2]

ECTS Credits	Hours per week	Term	Instruction language
6	3/1	Winter term	de

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

Conditions
The prior attendance of the course *System Dynamics and Control Engineering* [23155] is assumed.

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 information or disturbances and uncertainties. The students get familiar with the design of dynamic feedback controllers and learn how to achive robustness.

Content

- *Modelling of linear systems*
  input-output-models of time and transform domain, State space models
- *Analyses of linear systems*
  stability, steering capability and observability, poles and pole-zeros
- *Control synthesis in input-output-models*
  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 eigenvalue, selective design processes: modal control, decoupling control, Vollständige Modale Synthese, Riccati control, dead beat control
- *Synthesis of state space observers*
  entire observer, reduced observer
- *Synthesis of output feedback controllers*
- S*ynthesis of controllers for disturbed systems*
  disturbance control, disturbance modelling
- *Synthesis of dynamic state space controllers*
  PI-state space 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, construction of the reduced model via Litz

Media
Supplemental sheets
Demonstration with Matlab/Simulink

Literature
Föllinger, Otto: Regelungstechnik, Hüthig-Verlag, 8. Auflage
Elective 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: Regulation Theory and Practice [2560234]

Coordinators: Kay Mitusch
Part of the modules: Network Economics (p. 53)[WI4VWL4], Basics of Liberalised Energy Markets (p. 49)[WI4BWLIIP4]

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

Learning Control / Examinations
Result of success is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC). Examination is offered every semester and can be retried at any regular examination date.

Conditions
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.
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.

Literature
Literature and lecture notes are handed out during the course.

Remarks
Since WS 2010/2011, the lecture has 4,5 instead of 4 credit points.

Course: Capability maturity models for software and systems engineering [2511216]

Coordinators: Ralf Kneuper
Part of the modules: Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3], Emphasis in Informatics (p. 62)[WI4INFO2]

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

Learning Control / Examinations
The assessment of this course is a written or (if necessary) oral examination according to §4(2) of the examination regulation.

Conditions
None.

Learning Outcomes
Students 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.

Literature
Literature is given in each lecture individually.

Course: Reinsurance [2530312]

Coordinators: Christian Hipp, Schwehr
Part of the modules: Applications of Actuarial Sciences I (p. 28)[WI4BWLFBV4], Applications of Actuarial Sciences II (p. 29)[WI4BWLFBV5]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Literature
Elective 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.

Remarks
The credits have been reduced to 3.

Course: Product Design [22215]

Coordinators: Schuchmann
Part of the modules: Specialization in Food Process Engineering (p. 111)[WI4INGCV4]

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

Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes

Content

Course: Risk Communication [2530395]

Coordinators: Ute Werner
Part of the modules: Operational Risk Management I (p. 33)[WI4BWLFBV9], Operational Risk Management II (p. 34)[WI4BWLFBV10]

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

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

Conditions
None.

Learning Outcomes
See German version.

Content
See German version.

Literature
Elective 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 on demand, normally during winter term. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretary of the chair of insurance science.

Course: Risk Management of Microfinance and Private Households [26354]

Coordinators: Ute Werner
Part of the modules: Operational Risk Management II (p. 34)[WI4BWLFBV10], Operational Risk Management I (p. 33)[WI4BWLFBV9]

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

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

Conditions
None.

Learning Outcomes
Becoming acquainted with starting points for analysing the special risk situation of private households and micro enterprises; learning to synchronize various risk coping instruments, identifying risks of microfinance products and learning to design innovative microfinance products.

Content
The course consists of two interlocking parts:
In the first part the socio-economic framework as well as the goals and strategies of private-sector risk management are discussed, with an emphasis on insurance decisions. In the second part the issue of small 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.

Media
Scriptum.

Literature

- H.-U. Vollenweider. *Risikobewältigung in Familie und Haushalt - eine sicherheitsökonomische Studie.* 1986.
- P. Zweifel, R. Eisen. Versicherungsökonomie. 2003
- J. Ledgerwood, I. Johnson, J.M. Severino. *Microfinance Handbook: An Institutional and Financial Perspective.* 2001.
- B.M. de Aghion, J. Morduch. The Economics of Microfinance. 2005.

Remarks
This course is offered on demand. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretary of the chair of insurance science.

Course: Scale up in Biology and Engineering [22417]

Coordinators: Hausmann
Part of the modules: Specialization in Food Process Engineering (p. 111)[WI4INGCV4]

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

Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes

Content

Course: Failure Analysis [21562]

Coordinators: Poser-Keppler
Part of the modules: Safety Science II (p. 119)[WI4INGINTER5], Safety Science I (p. 118)[WI4INGINTER4], Safety Science III (p. 120)[WI4INGINTER6], Specific Topics in Material Science (p. 86)[WI4INGMB18]

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

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

Conditions
Basic knowledge in materials science (e.g. lectures *Materials Science I and II*) are required.

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

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

Remarks
For further information, see http://www.iwk1.kit.edu/28.php

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

Coordinators: Eberhard Hohnecker
Part of the modules: Public Transportation Operations (p. 92)[WI4INGBGU4]

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

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.

Conditions
See module description.

Learning Outcomes

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

Course: Welding Technology I/II [21565/21570]

Coordinators: Spies
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

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

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).

Conditions
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.

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

Literature
Elective literature:

- Ruge: Handbuch der Schweißtechnik, Springer-Verlag, 1985
- Dilthey: Schweißtechnische Fertigungsverfahren I, Augustinus, Aachen, 1991
- Fachbände des Deutschen Verlags für Schweißtechnik

Course: Semantic Web Technologies I [2511304]

Coordinators: Rudi Studer, Sebastian Rudolph, Andreas Harth
Part of the modules: Emphasis in Informatics (p. 62)[WI4INFO2], Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3]

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

Learning Control / Examinations
The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the examination regulation or of an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation.
The exam takes place every semester and can be repeated at every regular examination date.

Conditions
Lectures on Informatics of the Bachelor on Information Management (Semester 1-4) or equivalent.

Learning Outcomes

- Basic knowledge about the main ideas and the realisation of Semantic Web Technologies

Content
”Semantic Web” denotes an extension of the World Wide Web by meta data and applications in order to make the meaning (semantics) of data on the web usable by intelligent systems, e.g. in e-commerce and internet portals. Central to this is the representation and processing of knowledge in form of ontologies. This lecture provides the foundations for knowledge representation and processing for the corresponding technologies and presents example applications. It covers the following topics:

- Extensible Markup Language (XML)
- Resource Description Framework (RDF) and RDF Schema
- Web Ontology Language (OWL)
- Rule Languages
- Applications

Media
Slides.

Literature

- Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, York Sure: Semantic Web - Grundlagen, Springer, 2008 (ISBN 978-3-540-33993-9)
- S. Staab, R. Studer (Editors). Handbook on Ontologies. International Handbooks in Information Systems. Springer 2003.

Elective literature:

1. Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, Foundations of Semantic Web Technologies. Textbooks in Computing, Chapman and Hall/CRC Press, 2009.
2. G. Antoniou, Grigoris Antoniou, Frank Van Harmelen, A Semantic Web Primer, MIT Press, 2004
3. Uwe Schöning. Logik für Informatiker. Spektrum Akademischer Verlag, 5. Auflage 2000
4. Steffen Hölldobler. Logik und Logikprogrammierung. Synchron Verlag, 3. Auflage 2003
5. Dieter Fensel. Spinning the Semantic Web. 2003 (ISBN 0262062321).
6. Handschuh, Staab. Annotation for the Semantic Web. 2003 (ISBN 158603345X).
7. J. Sowa. Knowledge Representation. Brooks/Cole 1999
8. Tim Berners-Lee. Weaving the Web. Harper 1999 geb. 2000 Taschenbuch.
9. Ian Jacobs, Norman Walsh. Architecture of the World Wide Web, Volume One. W3C Recommendation 15 December 2004. http://www.w3.org/TR/webarch/

Course: Semantic Web Technologies II [2511306]

Coordinators: Elena Simperl, Andreas Harth, Sebastian Rudolph, Daniel Oberle
Part of the modules: Emphasis in Informatics (p. 62)[WI4INFO2], Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3]

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

Learning Control / Examinations
Written Examination (60 min) according to §4, Abs. 2, 1 of the examination regulations or oral examination of 20 minutes according to §4, Abs. 2, 2 of the examination regulations.
The exam takes place every semester and can be repeated at every regular examination date.

Conditions
Lectures on Informatics of the Bachelor on Information Management (Semester 1-4) or equivalent. *Semantic Web Technologies I* [2511304] is recommended.

Learning Outcomes

- Acquisition of basic competencies in Linked Data and data integration on the web
- Acquisition of advanced knowledge in knowledge representation with ontologies
- Acquisition of detailed knowledge of acquisition and evaluation of ontologies
- Analysis of typical usage scenarios and industry applications

Content
Central components of the Semantic Web are explained in detail. Linked Data foundations, crawling, querying and applications; knowledge representation, ontology modelling; ontology development and evaluation; Further, benefits and challenges of semantic technologies are discussed.

Media
Slides.

Literature

- Pascal Hitzler, Sebastian Rudolph, Markus Krötzsch: Foundations of Semantic Web Technologies. Chapman & Hall/CRC 2009.
- Steffen Staab, Rudi Studer (Editors). Handbook on Ontologies. International Handbooks in Information Systems. Springer 2003.
- John Domingue, Dieter Fensel, James A. Hendler (Editors). Handbook of Semantic Web Technologies. Springer 2011.

Elective literature:

1. Grigoris Antoniou, Frank Van Harmelen. A Semantic Web Primer. MIT Press, 2004
2. Uwe Schöning. Logik für Informatiker. Spektrum Akademischer Verlag, 2000
3. Steffen Hölldobler. Logik und Logikprogrammierung. Synchron Verlag, 2003
4. Dieter Fensel. Spinning the Semantic Web. MIT Press, 2003
5. John Sowa. Knowledge Representation. Brooks/Cole, 1999
6. Tim Berners-Lee. Weaving the Web. HarperOne, 1999
7. 7. Dean Allemang. Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL. Morgan Kaufmann, 2008
8. Asuncion Gomez-Perez, Oscar Corcho, Mariano Fernando Lopez: Ontological Engineering: with examples from the areas of Knowledge Management, e-Commerce and the Semantic Web. Springer, 2004
9. Nicola Guarino and Chris Welty. Identity, Unity, and Individuation: Towards a Formal Toolkit for Ontological Analysis. Proceedings of ECAI-2000: The European Conference on Artificial Intelligence. IOS Press, 2000
10. Nicola Guarino and Chris Welty. Evaluating Ontological Decisions with OntoClean. Communications of the ACM. 45(2):61-65, 2000
11. Tom Heath and Chris Bizer. Linked Data: Evolving the Web into a Global Data Space. Synthesis Lectures on the Semantic Web: Theory and Technology, 2011

Course: Seminar in Enterprise Information Systems [SemAIFB1]

Coordinators: Rudi Studer, Andreas Oberweis, Thomas Wolf, Ralf Kneuper
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
The assessment of this course is according to §4(2), 3 SPO in form of an examination of the written seminar thesis and a presentation.
The final mark is based on the examination of the written seminar thesis but can be upgraded or downgraded according to the quality of the presentation.
The seminar is for bachelor as well as master students. The differentiation will be made by selection of different topics and different standards of evaluation.

Conditions
See corresponding module information.

Learning Outcomes
Students are able to

- do literature search based on a given topic: identify relevant literature, find, assess and evaluate this literature.
- write the seminar thesis (and later the Bachelor-/Masterthesis) with a minimal learning curve by using format requirements such as those recommended by well-known publishers.
- give presentations in a scientific context in front of an auditorium. These techniques are presented and learned during the seminar.
- present results of the research in written form generally found in scientific publications.

Content
The seminar intensifies and extends specific 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

Literature
Literature will be given individually in the specific seminar.

Course: Seminar Efficient Algorithms [SemAIFB2]

Coordinators: Hartmut Schmeck
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
The assessment consists of a talk (presentation of 45-60 minutes) about the research topic of the seminar together with discussion, a written summary about the major issues of the topic (approx. 15 pages) and attending the discussions of the seminar (according Section 4(2), 3 of the examination regulation).
The grade of this course is achieved by the weighted sum of the grades (talk 50%, written summary 30% and discussion 20%).
This seminar is for bachelor as well as master students. The difference between them is calculated according to different evaluation mechanisms for the written summary work and the talk.

Conditions
See corresponding module information.

Learning Outcomes
The students should learn to work on research papers by searching for new topics in computer science and by presenting the major issues of the papers.
The master students should deepen their ability to develop independent insight into new scientific topics and to communicate them through oral presentation and written summary to others.
The students will learn to deal with critical discussions on scientific presentations and written summaries through active participation in the seminar.

Content
Topics include the new research issues of the research group “applied Informatics”. The new topics are in the area Organic Computing, Nature-inspired optimization and service oriented architectures.
The topics of the seminars are introduced around the end of the former semester on the board A12 of the institute AIFB (building 11.40) and in Internet http://www.aifb.kit.edu/web/SeminarePraktika

Literature
Will be announced at the beginning of the semester.

Remarks
There is a limited number of participants. The students have to register for the seminar.

Course: Seminar Energy Economics [SemEW]

Coordinators: Wolf Fichtner, Patrick Jochem, Anke Eßer-Frey, Massimo Genoese
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Seminar Public Finance [2560130]

Coordinators: Berthold Wigger, Assistenten
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations

Conditions
See module description.
Adequate for students in an advanced stage of their studies.

Learning Outcomes

Content
Preparation, presentation, and discussion of recent research papers on varying Public Finance issues. The current seminar subject, including the exact topics to work on, will be announced under http://fiwi.iww.kit.edu and on the notice board prior to the start of semester.

Literature
Will be announced at the beginning of the seminar.

Course: Seminar Conveying Technology and Logistics [SemIFL]

Coordinators: Kai Furmans
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
Participation during the information presentation. The performance review is based on the written paper and the two presentations. Active participation during the presentations is required.

Conditions
None.

Learning Outcomes
The student gets an opportunity to learn how to work academically. By delving into a scientific topic the student learns to do research and to argue specially in logistics and material handling. Through the presentation of his work the student will learn technical basics of presentation and basics of academic argumentation. Also rhetorical competence will be acquired.

Content
The topics of the seminar will be published under http://www.ifl.uni-karlsruhe.de/seminare.php one semester before. To participate it is necessary to sign in the semester before.

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

Coordinators: Matthias Zimmermann
Part of the modules: Safety, Computing and Law in Highway Engineering (p. 91)[WI4INGBGU3]

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

Learning Control / Examinations
See module description.

Conditions
See corresponding module information.

Learning Outcomes

Content

Literature
Elective literature:
Lecture materials “Sicherheitsmanagement im Straßenwesen”

Course: Seminar in Finance [2530293]

Coordinators: Marliese Uhrig-Homburg, Martin E. Ruckes
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations

Conditions
None.

Recommendations
Knowledge of the content of the module *F1 (Finance)* [WI4BWLFBV1] is assumed.

Learning Outcomes
The student gets in touch with scientific work. Through profound working on a specific scientific topic the student is meant to learn the foundations of scientific research and reasoning in particular in finance.
Through the presentations in this seminar the student becomes familiar with the fundamental techniques for presentations and foundations of scientific reasoning. In addition, the student earns rhetorical skills.

Content
Within this seminar different topics of current concern are treated. These topics have their foundations in the contents of certain lectures.
The topics of the seminar are published on the website of the involved finance chairs at the end of the foregoing semester.

Literature
Will be announced at the end of the foregoing semester.

Course: Seminar in International Economy [SemIWW2]

Coordinators: Jan Kowalski
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: [SemIWW3]

Coordinators: Ingrid Ott
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
The assessment is carried out through a term paper within the range of 12 to 15 pages, a presentation of the results of the work in a seminar meeting, and active participation in the discussions of the seminar meeting (§ 4 (2), 3 SPO).

The final grade is composed of the weighted graded examinations. (Essay 50%, 40% oral presentation, active participation 10%).

The seminar is intended for students both of bachelor and master degree program. They are differentiated by different assessment criteria for term paper and presentation grading.

Conditions
At least one of the lectures “Theory of Endogenous Growth” or “Innovation Theory and Policy” should be attended in advance, if possible.

Learning Outcomes

Content
The current topic of the seminar including the subjects treated will be announced before the semester begins at http://wipo.iww.kit.edu.
Previous Topics:

- Economic Aspects of General Purpose Technologies (SS 2010)
- Questions of Modern Economic Growth Theories (WS 2010/2011)
- Beans or fully automated machines? Determinants of Developement and Growth in a globalized World (SS 2011)

Literature
Todaro, Michael P. und Stephen C. Smith (2009). Economic Development, Tenth Edition, Pearson Education Ltd., Essex.

Course: Seminar in Industrial Production [SemIIP2]

Coordinators: Frank Schultmann, Magnus Fröhling, Michael Hiete
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
Assessment acc. to §4 (2), No.3 ER by assessing the written seminar thesis (approx. 20 pages), the oral presentation and active participation in public discussions. The final grade will be formed by weighing the individual assessment grades.

Conditions
Students should have completed the modules „Industrial Production I“ [WW3BWLIIP], „Industrial Production II“ [WI4BWLIIP2] or “Industrial Production III” [WW3BWLIIP6].

Learning Outcomes
Students shall gain insights into selected research of the Institute of Industrial Production (IIP).

- Students search for, identify, review and evaluate relevant literature.
- Students prepare their seminar thesis (and later on bachelor/master thesis) with a minimum expense in becoming acquainted with their topic and general layout.
- Students produce an oral presentation in a scientific context by using the outlined techniques of scientific presentation.
- Students learn to present their written results in an adequate form for scientific publishing.

Students in M.Sc. studies will have to put special emphasis on a critical discussion and evaluation of their topic, since they will have to look into actual scientific results in the field of industrial production.

Content
This seminar covers actual topics of industrial production, logistics, environmental science, project management and similar fields. We recommend a successful attendance of previous IIP modules (not compulsory!).
Actual topics covered in this seminar will be published before the start of semester.

Course: Seminar Information Engineering and Management [SemIW]

Coordinators: Christof Weinhardt
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
The student is evaluated based on the written work, a presentation of the results in front of an audience and his contribution to the discussion

Conditions
See corresponding module information.

Recommendations
Business Engineering/Economics Engineering: At least one module offered by the institute should have been chosen before attending this seminar.

Learning Outcomes
The student should be able to do a literature review based on a predefined topic in the context of information engineering and management. The approach comprises the identification of relevant literature according to the topic and an analysis as well as an evaluation of the methods presented in the literature. The student learns to present his results in a paper and in front of an audience on a academic level. This process gives him the knowledge and practice for further research work like a master thesis or a doctoral thesis

Content
In the seminar the student should learn to apply the research methods to a predefined topic area. The topics are based on research questions in Information Engineering and Management across different industry sectors. This problem analysis requires a interdisciplinary examination.

Media

- Powerpoint
- eLearning Platform Ilias
- Software Tools, if necessary

Literature
The student will receive the necessary literature for his research topic.

Remarks

- Students from Bachelor and Master Course can visit the seminar. The research topic as well as the evaluation of the work and the presentation will have a different focus between Bachelor and Master Course.
- All the seminars offered at the chair of Prof. Dr. Weinhardt can be chosen. The current topics of the seminars are available at the following homepage: http://www.im.uni-karlsruhe.de/lehre.

Course: Seminar Complexity Management [SemAIFB3]

Coordinators: Detlef Seese
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
see German version

Conditions
None.

Learning Outcomes
see German version

Content
see German version

Literature
Will be announced in the seminar.

Remarks
The number of participants is limited. Please take notice about the inscription procedure at the institutes website. Specific titles and the topics of offered seminars will be announced before the start of a semester on the website of AIFB.

Course: Seminar Public Sector Risk Management [2530355]

Coordinators: Hochrainer
Part of the modules: Operational Risk Management I (p. 33)[WI4BWLFBV9], Operational Risk Management II (p. 34)[WI4BWLFBV10]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Seminar Service Science, Management & Engineering [2590470]

Coordinators: Christof Weinhardt, Gerhard Satzger, Rudi Studer, Stefan Tai
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
The assessment of this course is according to §4(2), 3 SPO in form of an examination of the written seminar thesis (15-20 pages), a presentation and active participation in class.
The final mark is based on the examination of the written seminar thesis but can be upgraded or downgraded according to the quality of the presentation.

Conditions
See corresponding module information.

Recommendations
Lecture *eServices* [2540466] is recommended.

Learning Outcomes
Autonomously deal with a special topic in the Service Science, Management and Engineering field adhering to scientific standards.

Content
Each Semester, the seminar will cover topics from a different selected subfield of Service Science, Management & Engineering. Topics include service innovation, service economics, service computing, transformation and coordination of service value networks as well as collaboration for knowledge intensive services.
See the KSRI website for more information about this seminar: http://www.ksri.kit.edu

Literature
The student will receive the necessary literature for his research topic.

Course: Seminar Stochastic Models [SemWIOR1]

Coordinators: Karl-Heinz Waldmann
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
The assessment of this course is in form of an examination of the written seminar thesis and a presentation. The final mark is the result of both the paper and its presentation.

Conditions
None.

Learning Outcomes
In case studies students comprehend stochastic relationships and gain deep knowledge of modelling, evaluation, and optimization of stochastic systems. In group presentations, students learn basic academic presentation and argument skills.

Content
The actual topic as well as the contemporary issues are available online.

Media
Power Point and related presentation techniques.

Literature
Will be presented with the actual topic.

Course: Seminar Knowledge Management [SemAIFB4]

Coordinators: Rudi Studer
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
The success monitoring is done through a presentation about a research topic from the current topic of the seminar (45-60 minutes) followed by a discussion, a written summary of the main points (approx. 15 pages) and of active participation in discussions (in accordance with §4(2),3 SPO).
The total mark is composed of the graded and weighted success controls (50% lecture, 30% written paper, and 20% participation and discussion.
The seminar can be attended by both bachelor and master students. A differentiation is made by different topic assignment and evaluation standards for seminar paper and presentation.

Conditions
See module description.

Learning Outcomes
The students will learn to perform literature searches on current topics in computer science and holistic knowledge management as well as preparing and presenting the contents of scientific publications.

During the work on the seminar topics the master students will deepen their skills to autonomously comprehend current scientific knowledge and to convey it to others through oral presentations and written summaries.

Through active participation in the seminar, students acquire skills in critical appraisal of research topics and in oral and written presentation of independently developed research content.

Content
Each year, the seminar will cover topics from a different selected subfield of knowledge management, e.g.:

- Ontology-based knowledge management,
- Information Retrieval and Text Mining,
- Data Mining,
- Personal Knowledge Management,
- Case Based Reasoning (CBR),
- Collaboration and Scoial Computing,
- Business-process Oriented Knowledge Management.

Media
Slides.

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.)

Remarks
The number of students is limited. Students have to observe the designated registration process.

Course: Seminar in Insurance Management [SemFBV1]

Coordinators: Ute Werner
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
Two oral presentations, written reports of 10 pages each on the same topics, as well as active participation in discussion and working groups (according to §4(2), 3 SPO).
The grading consists of the weighted performance of the works performed.

Conditions
See corresponding module information.
The seminar is held within the courses of *Insurance Management* [WW3BWLFBV4] and [WW4BWLFBV6/7], respectively.
A course taken as a seminar cannot be chosen as a part of a course module (and vice versa).

Recommendations
The seminar fits well with the bachelor modules *Risk and Insurance Management* [WW3BWLFBV3] and *Insurance Markets and Management* [WW3BWLFBV4] as well as with the master modules *Insurance Management I* [WI4BWLFBV6] and *Insurance Management* II [WI4BWLFBV7]. These modules, though, are not required to be taken.

Learning Outcomes
See German version.

Content
The seminar is offered within the following courses:

- Principles of Insurance Management
- Insurance Marketing
- Insurance Production
- Service Management

For their contents refer to the information given at the referring pages.

Literature
Will be announced at the beginning of the lecture period.

Remarks
Some of the respective courses are offered on demand. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretary of the chair of insurance science.

Course: Seminar in Operational Risk Management [SemFBV2]

Coordinators: Ute Werner
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
Two oral presentations, written reports of 10 pages each on the same topics, as well as active participation in discussion and working groups (according to §4(2), 3 SPO).
The grading consists of the weighted performance of the works performed.

Conditions
See corresponding module information.
The seminar is held within the courses of *Operational Risk Management I/II* [WW4BWLFBV8/9] but with special forms of working.
A course taken as a seminar cannot be chosen as a part of a course module (and vice versa).

Recommendations
The seminar fits well with the bachelor module *Risk and Insurance Management* [WW3BWLFBV3] as well as with the master modules *Operational Risk Management I* [WI4BWLFBV8] and *Operational Risk Management* II [WI4BWLFBV9]. These modules, though, are not required to be taken.

Learning Outcomes
See German version.

Content
The seminar is offered within the following courses:

- Enterprise Risk Management
- Multidisciplinary Risk Research
- Risk Communication
- Risk Management of Microfinance and Private Households
- Project Work in Risk Research

For their contents refer to the information given at the referring pages.

Literature
Will be announced at the beginning of the course period.

Remarks
Some of the respective courses are offered on demand. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretary of the chair of insurance science.

Course: Seminar in strategic and behavioral marketing [2572197]

Coordinators: Bruno Neibecker
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
The student is evaluated based on the written work, a presentation of the results in front of an audience and his contribution to the discussion

Conditions
None.

Learning Outcomes
At the seminar (with a “Referat” as its goal) the student should be able to do a literature review based on a predefined topic in the context of marketing research. The approach comprises the identification of relevant literature according to the topic and an analysis as well as an evaluation of the methods presented in the literature. The student learns to present his results in a paper and in front of an audience on a academic level.

Content
In the seminar the student should learn to apply the research methods to a predefined topic area. The topics are based on research questions in marketing. This problem analysis requires a interdisciplinary examination. As a special option, the implementation of methodological solutions for market research can be accomplished and discussed with respect to its application.

Literature
Will be allocated according the individual topics.

Remarks
• Students from Bachelor and Master Course can visit the seminar. The research topic as well as the evaluation of the work and the presentation will have a different focus between Bachelor and Master Course.

Course: Seminar in Ergonomics [SemIIP]

Coordinators: Artur Wollert, Christine Harbring
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations

Conditions
See corresponding module information.

Learning Outcomes

Content

Literature
Will be announced at the end of the recess period.

Course: Seminar in Discrete Optimization [2550491]

Coordinators: Stefan Nickel
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
The assessment consists of a written seminar thesis of 20-25 pages and a presentation of 40-60 minutes (according to §4(2), 3 of the examination regulation).
The final mark for the seminar is the weighted average of the marks for the assessed assignments (seminar thesis 50 %, presentation 50%).
The seminar can be attended both by Bachelor and Master students. A differentiation will be achieved by different valuation standards for the seminar thesis and presentation.

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

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 topics of the seminar will be announced at the beginning of the term in a preliminaty meeting. Dates will be announced on the internet.

Literature
Literature and relevant sources will be announced at the beginning of the seminar.

Remarks
The seminar is offered in each term.

Course: Seminar in Experimental Economics [SemWIOR3]

Coordinators: Siegfried Berninghaus
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
Term paper and presentation

Conditions
See corresponding module information.
A course in the field of Game Theory should be attended beforehand.

Learning Outcomes
The seminar wants to deepen the methods of scientific work. Students shall learn to discuss critical the latest research results in Experimental Economics.
Students learn the technical basics of presentation and to argument scientifically. Also rethoric skills shall be amplified.

Content
The seminar's topic will be announced before the beginning of each semester on the internet (http://www.wior.uni-karlsruhe.de/LS_Berninghaus/Studium/).

Media
Slides.

Literature
Will be announced at the end of the recess period.

Course: Seminar in Continous Optimization [2550131]

Coordinators: Oliver Stein
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
The assessment is composed of a 15-20 page paper as well as a 40-60 minute oral presentation according to §4(2), 3 of the examination regulation.
The total grade is composed of the equally weighted grades of the written and oral assessments.
The seminar is appropriate for bachelor as well as for master students. Their differentiation results from different assessment criteria for the seminar paper and the seminar presentation.

Conditions
See corresponding module information.
Attendance is compulsory.
Preferably at least one module offered by the institute should have been chosen before attending this seminar.

Learning Outcomes
The seminar aims at describing, evaluating, and discussing recent as well as classical topics in continuous optimization. The focus is on the treatment of optimization models and algorithms, also with respect to their practical application.
The student is introduced to the style of scientific work. By focussed treatment of a scientific topic the student learns the basics of scientific investigation and reasoning.
For further development of a scientific work style, master students are particularly expected to critically question the seminar topics.
With regard to the oral presentations the students become acquainted with presentation techniques and basics of 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.

Literature
References and relevant sources are announced at the beginning of the seminar.

Course: Seminar on Network Economics [2560263]

Coordinators: Kay Mitusch
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
The assessment consists of a seminar paper of 15-20 pages, a presentation of results and active participation in the diskussion during the seminar (according to §4(2), 3 ERSC)
The grading is carried out primarily in reference to the seminar paper, however, divergent performance in the presentation will be accounted for by a corresponding adjustment. In particular, there is the chance to improve grades through good participation during the seminar.

Conditions
See module description.
Basic knowledge of network economics is required. The course *Competition in Networks* [26240] should be completed.

Learning Outcomes
The student

- can acquire a scientific article to an economic topic,
- deepens his/her knowlede in network economics,
- gets inspiration for a potential master thesis.

Content
The current theme of the seminar including the suggestion of topics for the seminar papers will be announced in KIM and on the notice board at the institute (http://netze.iww.kit.edu).
(The title of the seminar may change from term to term depending on the topic)

Course: Seminar in Risk Theory and Actuarial Science [SemFBV3]

Coordinators: Christian Hipp
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations

Conditions
See corresponding module information.
Knowledge of statistics and actuary science is an advantage.
The seminar is a good addition to the Bachelor module *Calculation and Control* [WW3BWLFBV2] and to the Master modules *Applications of Actuarial Sciences I/II* [WW4BWLFBV4/5]. However these modules are not a prerequisite for the participation in the seminar.

Learning Outcomes

Content

Literature
Will be announced at the end of the recess period.

Course: Seminar in Game and Decision Theory [SemWIOR4]

Coordinators: Siegfried Berninghaus
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
Term paper and presentation

Conditions
Completion of all 1st an 2nd year modules of the Bachelor Program.
See corresponding module information.

Learning Outcomes
The seminar wants to deepen the methods of scientific work. Students shall learn to discuss critical the latest research results in game theory.
Procurement of SQs: Students learn the technical basics of presentation and to argument scientifically. Also rethoric skills shall be amplified.

Content
The seminar's topic will be announced before the beginning of each semester on the internet (http://www.wior.uni-karlsruhe.de/LS_Berninghaus/Studium/).

Media
Slides.

Literature
Will be announced at the end of the recess period.

Course: [2561209]

Coordinators:
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Seminar: Management accounting for industrial engineers [2577916]

Coordinators: Marc Wouters
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Seminar: Legal Studies [RECHT]

Coordinators: Inst. ZAR
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Seminar: Sensorik [23233/23234]

Coordinators: Wolfgang Menesklou
Part of the modules: Sensor Technology I (p. 104)[WI4INGETIT3], Sensor Technology II (p. 105)[WI4INGETIT5]

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

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).

Conditions
Successful completion of the course Electrical Engineering II [23224] and sensors [23231].

Recommendations
It is recommended to visit the Course Materials Science II [21553] in advance.

Learning Outcomes
The student will learn how to deal with a scientific topic, to analyze literature, to summarize the published results and to present them in a talk.

Content
This course is aimed to graduate students in electrical and business engineering. The student has to analyze scientific literature related to sensors. The results of this literature study have to be summarized in a paper and presented in a talk.

Literature
Will be announced in the lecture.

Course: Seminar: Software Patents [24357]

Coordinators: Ralf Reussner, Michael Kuperberg, Klaus Melullis
Part of the modules: Intellectual Property Law (p. 137)[WI4JURA4]

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

Learning Control / Examinations
The assessment of this course consists of a written seminar thesis and a presentation thereof according to sec. 4 subsec. 2 no. 3 study and examination regulations.

Conditions
None.

Learning Outcomes

Content

Media
Will be supplied specific to the topic.

Literature
Will be announced specific to the topic.

Course: Seminar: Management and Organization [2577915]

Coordinators: Hagen Lindstädt
Part of the modules: Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
Term paper (50%) and presentation (50%).

Conditions
See corresponding module information.

Learning Outcomes
The aim of the seminar is to describe corporate and organisational management approaches, to assess them critically and clarify them using practical examples. The focus is on assessing the models with a view to their applicability and theoretical limits.

Content
The subjects are redefined each semester on the basis of current issues.

Media
Slides.

Literature
The relevant sources are made known during the course.

Course: Seminar paper “Production Engineering” [21690sem]

Coordinators: Volker Schulze, Lanza, Munzinger
Part of the modules: Selected Chapters from Production Engineering I (p. 73)[WI4INGMB1], Selected Chapters from Production Engineering II (p. 74)[WI4INGMB2], Selected Chapters from Production Engineering III (p. 75)[WI4INGMB3], Seminar Module (p. 141)[WW4SEM]

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

Learning Control / Examinations
The following work and performance is required for the successful completion of the seminar:

- active participation in the seminar,
- completion of a seminar paper on the topic of the seminar (minimum input: 80 h) and
- a presentation given after completion of the seminar paper.

The seminar paper can be submitted:

- for the module: *seminar module* [SemING] OR
- to improve the module grade of modules: *Manufacturing Engineering* [WI4INGMB23], *Integrated Production Planning* [WI4INGMB24] or *Vertiefung der Produktionstechnik* [WI4INGMB22].

Each seminar paper can be submitted only once. One paper cannot be submitted for both the seminar module and the improvement of the grade.

The score of the seminar paper can be used to improve the grade of one of the above-mentioned modules. The module grade can be improved by three tenths maximum. Only seminar papers written at wbk Institute of Production Science qualify for an improvement of the module grade.

One seminar paper can be used for the improvement of one module grade (named above) maximum. For the improvement of a grade, no more than one seminar paper can be submitted.

Conditions
None.

Learning Outcomes
Complex analysis and addressing of production engineering related problem areas

Content
Students independently deal with production engineering related problems from the fields of manufacturing engineering, machine tools and handling technology and organisation, planning and logistics with tutorial assistance. The results are aggregated in the form of a seminar paper and are then illustrated in the form of a presentation.

Media
Lecture notes of the Institute of Production Science.

Course: Practical Seminar Knowledge Discovery [25810]

Coordinators: Rudi Studer
Part of the modules: Emphasis in Informatics (p. 62)[WI4INFO2], Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3]

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

Learning Control / Examinations

Conditions
None.

Recommendations
Knowledge of algorithms in the area of knowledge discovery is assumed. Therefore it is recommended to attend the course [2511302] Knowledge Discovery beforehand.

Learning Outcomes
Implementation of an own knowledge discovery project. Includes familiarization with, prototypical implementation, experiments and presentation of a topic from the fields of knowledge discovery and data mining adhering to scientific standards.

Content
The practical course will cover topics in the field of knowledge discovery. Each term, a different topic is covered, e.g.: text mining or learning with semantic data. Details will be announced every semester.

Media
Slides.

Course: Sensors [23231]

Coordinators: Wolfgang Menesklou
Part of the modules: Sensor Technology I (p. 104)[WI4INGETIT3]

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

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.

Conditions
See module description.

Learning Outcomes
The student should acquire fundamental principles in material science and device technology of sensors to be able to apply materials and sensors from the viewpoint of an application or development engineer.

Content
Mechanical Sensors (strain gauges, piezoelectric sensors),Thermal Sensors, Optical Sensors, Magnetic sensors, Acoustic Sensors, Gas Sensors (Lambda Probes, Taguchi, Electronic Nose), Bio and Chemical Sensors.

Media
Online material is available.

Literature
Elective literature:
Schaumburg, H.: Sensoren. Stuttgart, Teubner 1992
Tränkler, H.-R., Obermeier, E. (Hrsg.): Sensortechnik. Springer, Berlin Heidelberg 1998

Course: Sensor Systems (Integrated Sensor Actuator Systems) [23240]

Coordinators: Wersing
Part of the modules: Sensor Technology I (p. 104)[WI4INGETIT3], Sensor Technology II (p. 105)[WI4INGETIT5]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

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.

Conditions
It is recommended to attend the courses *Material Science II* [21782] and *Electrical Engineering II* [23224] beforehand.

Learning Outcomes

Content

Literature
Elective 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: Service Innovation [2540468]

Coordinators: Gerhard Satzger, Andreas Neus
Part of the modules: Service Management (p. 45)[WI4BWLISM6], Business & Service Engineering (p. 43)[WI4BWLISM4]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	en

Learning Control / Examinations
The assessment consists of an 1h written exam following §4(2), 3 SPO and of assignments during the course as an "Erfolgskontrolle anderer Art" following §4(2), 3 SPO.

Conditions
None.

Learning Outcomes
Understand the difference between innovation and invention, and that disruptive effects can be fast and wide-reaching.
Know examples for innovation via processes, organization, business models; see how service and product innovation differ.
Understand the link between risk and innovation; be aware of obstacles to innovation and know how to address them.

Content
While innovation in manufacturing or agriculture can leverage a considerable body of research, experience and best practice, innovation in services has not reached the same level of maturity. In practice, while many organizations have a well-understood process for innovating in the product business, innovating in services is often still a fuzzy and complex undertaking. In this lecture we will discuss the state of research, compare product and service innovation, understand how innovation diffusion works, examine case studies of service innovation, open vs. closed innovation, how to leverage user communities to drive innovation and understand obstacles, and enablersand how to manage, incentivize and foster service innovation.

Literature

- Barras, Richard (1986) Towards a theory of innovation in services. Research Policy 15, 161-173
- Hauschildt, Jürgen und Salomo, Sören (2007) Innovationsmanagement. 4. Auflage, München: Vahlen.
- von Hippel, Erich (2007) Horizontal innovation networks - by and for users. Industrial and Corporate Change, 16:2
- Sundbo, Jon (1997) Management of Innovation in Services. The Service Industries Journal, Vo. 17, No. 3, pp. 432-455

Elective literature:

- Benkler, Yochai (2006) The Wealth of Networks: How Social Production Transforms Markets and Freedom. Yale University Press. (Online: http://www.benkler.org)
- Christensen, Clayton M. (2003) The Innovator's Dilemma, Harper Collins.
- Kanerva, M.; Hollanders, H. & Arundel, A. (2006) TrendChart Report: Can we Measure and Compare Innovation in Services?
- von Hippel, Erich (2005) Democratizing Innovation. The MIT Press, Cambridge, MA. (Online: http://web.mit.edu/evhippel/www/books/D
- 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: Service Management [26327]

Coordinators: Ute Werner
Part of the modules: Insurance Management I (p. 30)[WI4BWLFBV6], Insurance Management II (p. 31)[WI4BWLFBV7]

ECTS Credits	Hours per week	Term	Instruction language
4.5	3/0	Winter / Summer Term	de

Learning Control / Examinations
The assessment consists of oral presentations (incl. papers) within the lecture (according to Section 4 (2), 3 of the examination regulation) and a final oral exam (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the assessment of the oral presentations incl. papers (50 percent) and the assessment of the oral exam (50 percent).

Conditions
None.

Learning Outcomes
See German version.

Content
See German version.

Literature
Elective literature:
Ch. Belz, T. Bieger. Dienstleistungskompetenz und innovative Geschäftsmodelle, St. Gallen 2002.
M. Bruhn. Qualitätsmanagement für Dienstleistungen. 6. Aufl. Berlin 2008.
H. Corsten, R. Gssinger. Dienstleistungsmanagement, 5. Aufl. München/Wien 2007.
A. Lehmann. Dienstleistungsmanagement: Strategien und Ansatzpunkte zur Schaffung von Service... 1995.
H. Meffert, M. Bruhn. Dienstleistungsmarketing: Grundlagen - Konzepte – Methoden. Wiesbaden 2006

Remarks
This course is offered on demand. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Service Oriented Computing 1 [2511500]

Coordinators: Stefan Tai
Part of the modules: Emphasis in Informatics (p. 62)[WI4INFO2], Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

Learning Control / Examinations
The assessment of this course is a written examination (60min.) in the first week after lecture period (nach §4(2), 1 SPO).

Conditions
Lecture *AI2* [2511032] is recommended.

Learning Outcomes
The course introduces concepts, methods, and techniques of “service-oriented computing”, including languages for (Web) service description, methods and tools for the development of services, and platforms (middleware, runtimes) for the Web-based deployment, delivery, and execution of services. The course provides a solid technical foundation that enables the student to address the increasingly relevant challenges of developing “service-oriented architectures (SOA)” in the industry.

Content
Web services represent the next-generation of Web technology, and are an evolution of conventional distributed middleware. They enable new and improved ways for enterprise computing, including application interoperability and integration, and business process management. Modern software systems are being designed as service-oriented architectures (SOA), 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)

Media
Slides, access to internet resources.

Literature
Will be announced in the lecture.

Course: Service Oriented Computing 2 [2511308]

Coordinators: Rudi Studer, Sudhir Agarwal, Barry Norton
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations
The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the examination regulation or of an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation.

Conditions
It is recommended to attend the course *Service-oriented Computing 1* [2511500] beforehand.

Learning Outcomes
Students will extend their knowledge and proficiency in the area of modern service-oriented technologies. Thereby, they acquire the capability to understand, apply and assess concepts and methods that are of innovative and scientific nature.

Content
Building upon basic Web service technologies the lecture introduces select topics of advanced service computing and service engineering. In particular, focus will be placed on new Web-based architectures and applications leveraging Web 2.0, Cloud Computing, Semantic Web and other emerging technologies.

Literature
Literature will be announced in the lecture.

Course: Safety Management in Highway Engineering [19315]

Coordinators: Matthias Zimmermann
Part of the modules: Safety, Computing and Law in Highway Engineering (p. 91)[WI4INGBGU3]

ECTS Credits	Hours per week	Term	Instruction language
2	1	Winter term	de

Learning Control / Examinations
See module description.

Conditions
See corresponding module information.

Learning Outcomes

Content

Remarks
For further information, see http://www.ise.uni-karlsruhe.de/16.php

Course: Safety Engineering [2117061]

Coordinators: Kany
Part of the modules: Introduction to Logistics (p. 76)[WI4INGMB20], Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11], Technical Logistics (p. 128)[WW4INGMB27]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter term	de

Learning Control / Examinations
The assessment consists of an oral exam according to §4 (2), 2 of the examination regulation. It may be a written exam (according to §4 (2), 1 of the examination regulation) in the case of large number of participants.

Conditions
None.

Learning Outcomes

Content
The course provides basic knowledge of safety engineering. In particular the basics of health at the working place, job safety in Germany, national and European safety rules and the basics of safe machine design are covered. The implementation of these aspects will be illustrated by examples of material handling and storage technology. This course focuses on: basics of safety at work, safety regulations, basic safety principles of machine design, protection devices, system security with risk analysis, electronics in safety engineering, safety engineering for storage and material handling technique, electrical dangers and ergonomics. So, mainly, the technical measures of risk reduction in specific technical circumstances are covered.

Course: Safety in Construction [19404]

Coordinators: Hirschberger, Sittinger
Part of the modules: Safety Science II (p. 119)[WI4INGINTER5], Safety Science I (p. 118)[WI4INGINTER4], Safety Science III (p. 120)[WI4INGINTER6]

ECTS Credits	Hours per week	Term	Instruction language
1.5	1	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Remarks
Block course. For further information, see http://www.tmb.uni-karlsruhe.de/676.php

Course: Urban Water Resource Management and Ecological Engineering [19057/58]

Coordinators: Stephan Fuchs, Josef Winter
Part of the modules: Water Supply and Sanitation (p. 101)[WI4INGBGU13]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	de

Learning Control / Examinations
See module description.

Conditions
It is recommended to attend the course *Principles of Bioengineering* [19058] beforehand.

Learning Outcomes
Part of urban water management

- Water quality description -> oxygen demand
- Fundamentals of water supply
- Calculating a netwirk of water supply
- Drainage
- Facilities of wastewater and sludge treatment

Part of engineering ecology

- Ecosystems and inhabitants
- Development of ecosystems
- Land- water ecosystems
- Growth kinetics
- Biofilms
- Aquatic ecology
- Oxygen profiles
- Hygiene
- Soil and soil genesis
- Soil water retention
- Soil protection act

Content

Literature
Elective 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: Simulation of coupled systems [2114095]

Coordinators: Marcus Geimer
Part of the modules: Vehicle Development (p. 82)[WI4INGMB14], Mobile Machines (p. 83)[WI4INGMB15]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
Assessment for the module *Mobile Machines*: See module description.
Assessment for the module *Automotive Engineering*: The assessment consists of an oral exam (20 min) taking place in the recess period (according to Section 4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
It is recommended to have:

- Knowledge of ProE (ideally in actual version)
- Basic knowledge of Matlab/Simulink
- Basic knowledge of dynamics of machines
- Basic knowledge of hydraulics

Learning Outcomes
The limitation of the simulation programs and the related problems will be introduced by using the example of the working movement of a wheel loader. As a solution the coupled simulation of multiple programs by using the mentioned example will be shown.

Content

- Knowledge of the basics of multi-body and hydraulic simulation programs
- Possibilities of coupled simulations
- Development of a simulation model by using the example of a wheel loader
- Documentation of the results in a short report

Literature
Elective literature:

- miscellaneous guides according the software-tools pdf-shaped
- information to the wheel-type loader

Course: Simulation I [2550662]

Coordinators: Karl-Heinz Waldmann
Part of the modules: Stochastic Modelling and Optimization (p. 69)[WI4OR7]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/1/2	Winter term	de

Learning Control / Examinations
The assessment consists of an 1h written exam according to Section 4(2), 1 of the examination regulation. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3 (according to Section 4(2), 3 of the examination regulation).

Conditions
Foundations in the following fields are required:

- Operations Research, as lectured in *Introduction to Operations Research I* [2550040] and *Introduction to Operations Research II* [2530043].
- Statistics, as lectured in *Statistics I* [25008/25009] and *Statistics II* [25020/25021].

Learning Outcomes
The lecture provides insights into the typical process in planning and conducting simulation studies.

Content
As the world is getting more complex it is often not possible to analytically provide key figures of interest without overly simplifying the problem. Thus efficient simulation techniques become more and more important. In the lecture important basic concepts are presented in terms of selected case studies.
Topics overview: Discrete event simulation, generation of random numbers, generating discrete and continous random variables, statistical analysis of simulated data.

Media
Blackboard, Slides, Flash Animations, Simulation Software

Literature

- Lecture Notes
- K.-H. Waldmann / U. M. Stocker: Stochastische Modelle - Eine anwendungsorientierte Einführung; Springer (2004).

Elective literature:

- A. M. Law / W. D. Kelton: Simulation Modeling and Analysis (3rd ed); McGraw Hill (2000)

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Simulation II [2550665]

Coordinators: Karl-Heinz Waldmann
Part of the modules: Stochastic Modelling and Optimization (p. 69)[WI4OR7]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/1/2	Summer term	de

Learning Control / Examinations
The assessment consists of an 1h written exam following §4(2), 1 SPO. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3 (§4(2), 3 SPO).

Conditions
Foundations in the following fields are required:

- Operations Research, as lectured in *Introduction to Operations Research I* [2550040] and *Introduction to Operations Research II* [2530043].
- Statistics, as lectured in *Statistics I* [25008/25009] and *Statistics II* [25020/25021].
- *Simulation I*[2550662]

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

Literature

- Lecture Notes

Elective literature:

- A. M. Law / W. D. Kelton: Simulation Modeling and Analysis (3rd ed); McGraw Hill (2000)
- K.-H. Waldmann / U. M. Stocker: Stochastische Modelle - Eine anwendungsorientierte Einführung; Springer (2004).

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Simulation Methods in Product Development Process [2185264]

Coordinators: Jivka Ovtcharova, Albert Albers, Thomas Böhlke
Part of the modules: Virtual Engineering (p. 88)[WI4INGMB22]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/1	Winter term	de

Learning Control / Examinations
The assessment consists of an oral exam (30 min) according to Section 4(2), 2 of the examination regulation. The examination takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
Knowledge from the course *Virtual Engineering I* is recommended.

Learning Outcomes

Content

Course: Simulation of Spray and Mixture Formation in Internal Combustion Engines [21114]

Coordinators: Baumgarten
Part of the modules: Engine Development (p. 85)[WI4INGMB17], Combustion Engines (p. 84)[WI4INGMB16], Combustion Engines II (p. 122)[WI4INGMB19]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter term	de

Learning Control / Examinations
The assessment consists of an oral exam (30 min) according to §4 (2), 2 of the examination regulation. The grade of the exam is included in the overall grade of the module with a weighting factor of 3.

Conditions
The course *Combustion Engines A* [21101] has to be completed beforehand.

Learning Outcomes

Content

Course: Simulation Methods for Transport Modelling [19305]

Coordinators: Peter Vortisch, S. Schnittger
Part of the modules: Transportation II (p. 99)[WI4INGBGU11]

ECTS Credits	Hours per week	Term	Instruction language
1,5	1	Winter term	de

Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes

Content

Course: Application of Simulation Tools [19309]

Coordinators: Peter Vortisch, M. Kagerbauer
Part of the modules: Transportation II (p. 99)[WI4INGBGU11]

ECTS Credits	Hours per week	Term	Instruction language
1,5	0/1	Summer term	de

Learning Control / Examinations
The assessment is a not graded certificate of attendence (according to §4(2), 3 of the examination regulation).

Conditions
None.

Learning Outcomes

Content

Course: Software Engineering [2511206]

Coordinators: Andreas Oberweis, Detlef Seese
Part of the modules: Emphasis in Informatics (p. 62)[WI4INFO2], Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

Learning Control / Examinations
The assessment consists of an 1h written exam in the first week after lecture period.

Conditions
Modul “Introduction to Informatics” [WW1INFO] is precondition

Learning Outcomes
Students

- are familiar with the concepts and principles of software engineering
- know important and common software development process models
- know methods for requirements analysis and know how to model and evaluate use case models
- know models for systems structuring and 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.

Literature
Elective 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 Laboratory: OR Models II [2550497]

Coordinators: Stefan Nickel
Part of the modules: Operations Research in Supply Chain Management and Health Care Management (p. 66)[WI4OR5], Mathematical Programming (p. 68)[WI4OR6]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/1	Summer term	de

Learning Control / Examinations
The assessment is a 120 minutes examination, including a written and a practical part (according to §4(2), 1 of the examination regulation).
The examination is held in the term of the software laboratory and the following term.

Conditions
Successful completion of the course *Software Laboratory: OR-Models I* [2550490].
Basic knowledge as conveyed in the module *Introduction to Operations Research* [WI1OR] is assumed.

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 and nonlinear 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.
The software laboratory also introduces some of the most frequently used modelling and programming languages that are used in practice to solve optimization problems.

Remarks
The planned lectures and courses for the next three years are announced online.

Course: Software Laboratory: SAP APO [n.n.]

Coordinators: Stefan Nickel
Part of the modules: Operations Research in Supply Chain Management and Health Care Management (p. 66)[WI4OR5]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/1	Summer term	de

Learning Control / Examinations
The assessment is a 120 minutes examination, including a written and a practical part (according to §4(2), 1 of the examination regulation).
The examination is held in the term of the lecture and the following term.

Conditions
Basic knowledge as conveyed in the module *Introduction to Operations Research* [WI1OR] is assumed.

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 held irregularly.
The planned lectures and courses for the next three years are announced online.

Course: Software Laboratory: Simulation [n.n.]

Coordinators: Stefan Nickel
Part of the modules: Operations Research in Supply Chain Management and Health Care Management (p. 66)[WI4OR5]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/1	Summer term	

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.

Conditions
Basic knowledge as conveyed in the module *Introduction to Operations Research* [WI1OR] is assumed.

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 held irregularly.
The planned lectures and courses for the next three years are announced online.

Course: Software Technology: Quality Management [2511208]

Coordinators: Andreas Oberweis
Part of the modules: Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3], Emphasis in Informatics (p. 62)[WI4INFO2]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation in the first week after lecture period.

Conditions
Programming knowledge in Java and basic knowledge of computer science are expected.

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.

Literature

- Helmut Balzert: Lehrbuch der Software-Technik. Spektrum-Verlag 1998
- Peter Liggesmeyer: Software-Qualität, Testen, Analysieren und Verifizieren von Software. Spektrum Akademischer Verlag 2002

Elective literature:
Further literature is given in lectures.

Course: Sorption Processes in Water Treatment [22611]

Coordinators: Höll
Part of the modules: Water Chemistry (p. 112)[WI4INGCV5]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Summer term	de

Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes

Content

Literature
Elective 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: Social Network Analysis in CRM [2540518]

Coordinators: Bettina Hoser
Part of the modules: Advanced CRM (p. 39)[WI4BWLISM1]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter / Summer Term	de

Learning Control / Examinations
Assessment consists of a written exam of 1 hour length following §4 (2), 1 of the examination regulation and by submitting written papers as part of the exercise following §4 (2), 3 of the examination regulation.

The course is considered successfully taken, if at least 50 out of 100 points are acquired in the written exam. In this case, all additional points (up to 12) from 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

Conditions
None.

Learning Outcomes
The objectives of this course are to give students an introduction to and overview of social network analysis as a methodological approach for analysis in different areas of business administration, especially customer relationship management. Theory as well as application of social network analysis will be discussed. Students will learn how to perform and interpret analysis results.

Content
The trend to view economic and social structures as networks allows to 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

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: Special Topics in Information Engineering & Management [2540478]

Coordinators: Christof Weinhardt
Part of the modules: Communications & Markets (p. 44)[WI4BWLISM5], Information Engineering (p. 46)[WI4BWLISM7], Business & Service Engineering (p. 43)[WI4BWLISM4]

ECTS Credits	Hours per week	Term	Instruction language
4.5	3	Winter / Summer Term	de

Learning Control / Examinations
The assessment of this course is according to §4(2), 3 SPO in form of a written documentation, a presentation of the outcome of the conducted pracitical components and an active participation in class.
Please take into account that, beside the written documentation, also a practical component (such as a survey or an implementation of an application) is part of the course. Please examine the course description for the particular tasks.
The final mark is based on the graded and weighted attainments (such as the written documentation, presentation, practical work and an active participation in class)

Conditions
None.

Learning Outcomes
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

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: www.iism.kit.edu/im/lehre
The Special Topics Information Engineering and Management is equivalent to the practical seminar, as it was only offered for the major in “Information Management and Engineering” so far. With this course students majoring in “Business Engineering“ and “Economics Engineering” also have the chance of getting practical experience and enhance their scientific capabilities.
The Special Topics Information Engineering and Managementcan be chosen instead of a regular lecture (see module description). Please take into account, that this course can only be accounted once per module.

Course: Special Topics of Enterprise Information Systems [SBI]

Coordinators: Andreas Oberweis
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter / Summer Term	

Learning Control / Examinations
The assessment of this course is a written or (if necessary) oral examination according to §4(2) of the examination regulation.

Conditions
None.

Learning Outcomes
Students are able to handle methods and instruments in a 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.

Literature
Will be announced at the beginning of the course.

Course: Special Topics of Efficient Algorithms [25700sp]

Coordinators: Hartmut Schmeck
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter / Summer Term	

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). The exam will be offered in every semester and can be repeated on regular examination dates.
If the mark obtained in the written exam is in between 1.3 and 4.0, a successful completion of the assignments or the bonus exam will improve the mark by one level (i.e. by 0.3 or 0.4).

Conditions
None.

Learning Outcomes
The student will learn how to use methods and concepts of efficient algorithms and how to demonstrate adequate innovative capabilities with respect to the used methods.
This course emphasizes the teaching of advanced concepts in relation to their applicability in the real world. Based on a fundamental understanding of the covered concepts and methods, students should know how to select appropriate concepts and methods for problem settings in their professional life, and, if necessary, to extend and apply them in an adequate form. The students should be enabled to find adequate arguments for justifying their chosen problem solutions.

Content
This course emphasizes the new topics in the area of algorithms, data structures, and computer infrastructures. The exact topics can vary according to the audiences and the time it is held.

Literature
Elective literature:
Will be announced in the lecture.

Remarks
This course can be particularly used for recognising the external courses with the topics in the area of algorithms, data-structures and computer infrastructures but are not associated in other courses in this subject area.

Course: Special Topics of Complexity Management [KompMansp]

Coordinators: Detlef Seese
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter / Summer Term	de

Learning Control / Examinations
see German version

Conditions
see German version

Learning Outcomes
see German version

Content
see German version

Literature
Elective literature:
Will be announced in the lecture.

Remarks
see German version

Course: Special Topics of Software- and Systemsengineering [SSEsp]

Coordinators: Andreas Oberweis, Detlef Seese
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter / Summer Term	

Learning Control / Examinations
The assessment consists of an 1h written exam in the first week after lecture period.

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

Literature
Elective literature:
Will be announced at the beginning of the course.

Remarks
This course can be used in particular for the acceptance of external courses whose content is in the broader area of software and systems engineering, but cannot assigned to another course of this topic.

Course: Special Topics of Knowledge Management [25860sem]

Coordinators: Rudi Studer
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter / Summer Term	

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.

Conditions
The lecture *Angewandte Informatik I - Modellierung* [2511030] is a prerequisite.

Learning Outcomes
The students acquire the skills, methods and tools in one specialized topic of “knowledge management” to demonstrate their mastery and innovativeness.
The lecture aims at providing principles and methods in the context of the practical application of KM. On the basis of a fundamental understanding of concepts, methods, and tools, students will be able to work on advanced problems. The students will be able to find and argue for solutions of KM problems.

Content
The lecture 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 and Process-oriented Knowledge Management
- Formal Concept Analysis
- Semantic Search and Text Mining
- Combination of Social Software and Semantic Web

Literature
Elective literature:
Depends on the actual content.

Course: Special Topics in Optimization I [25128]

Coordinators: Oliver Stein
Part of the modules: Mathematical Programming (p. 68)[WI4OR6]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/1	Winter / Summer Term	de

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.

The examination is held in the semester of the lecture and in the following semester.

Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.

The examination can also be combined with the examination of *Special Topics in Optimization II* [25126]. In this case, the duration of the written examination takes 120 minutes.

In a combined examination of *Special Topics in Optimization I* [25128] and *Special Topics in Optimization II* [25126], upon attaining more then 60% of the exercise points, the grade of the passed examination is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student knows and understands fundamentals of a special topic in continuous optimization.

Content

Remarks
The lecture is offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu).

Course: Special Topics in Optimization II [25126]

Coordinators: Oliver Stein
Part of the modules: Mathematical Programming (p. 68)[WI4OR6]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/1	Winter / Summer Term	de

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.

The examination is held in the semester of the lecture and in the following semester.

Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.

The examination can also be combined with the examination of *Special Topics in Optimization I* [25128]. In this case, the duration of the written examination takes 120 minutes.

In a combined examination of *Special Topics in Optimization I* [25128] and *Special Topics in Optimization II* [25126], upon attaining more then 60% of the exercise points, the grade of the passed examination is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student knows and understands fundamentals of a special topic in continuous optimization.

Content

Remarks
The lecture is offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu).

Course: Special Sociology [spezSoz]

Coordinators: Gerd Nollmann, Pfadenhauer, Pfaff, Haupt, Grenz, Eisewicht, Kunz
Part of the modules: Sociology (p. 140)[WI4SOZ1]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter / Summer Term	de

Learning Control / Examinations
The assessment conists of a gradedterm paper (according to Section 4 (2), 3 of the examination regulation.

Conditions
The form of the lecture has to be attended and must be completed with 2 Credit Points. The form of the lecture must not be swapped by a seminar according sociological theory, according techniques of social research or any other lecture.

Learning Outcomes
The student

- gains basic knowledge of a Special Sociology.
- gains knowledge of a specific problem in the Social Sciences.
- accordingly is capable of questioning further phenomena of the Social Sciences.
- is able to specify, pursue and explain own scientific questions.

Content
The student has the choice of the broad range of course offerings at the institute. In the course specific scientific problems and their debate will be introduced and dicussed.

Media
Will be announced in the lecture.

Literature
Will be announced in the lecture.
Elective literature:
Will be announced in the lecture.

Course: Game Theory I [2520525]

Coordinators: Siegfried Berninghaus
Part of the modules: Social Choice Theory (p. 58)[WI4VWL9], Applied Strategic Decisions (p. 51)[WI4VWL2]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/2	Summer term	de

Learning Control / Examinations
The assessment consists of a written exam (80 minutes) according to Section 4(2),1 of the examination regulation.
The exam takes place in the recess period and can be resited at every ordinary examination date.

Conditions
None.

Recommendations
Basic knowledge of mathematics and statistics is assumed.
See corresponding module information.

Learning Outcomes
This course conveys established knowledge in theory of strategic decision making. The students shall be able to analyze strategic problems systematically and to give advice for behavior in concrete economic situations.

Content
Main topic is non-cooperative game theory. Models, solution concepts and applications are discussed for simultaneous as well as sequential games. Different equilibrium concepts are introduced and a short introduction to cooperative game theory is given.

Media
Folien, Übungsblätter.

Literature
Gibbons, A primer in Game Theory, Harvester-Wheatsheaf, 1992
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
Elective literature:

- Binmore, Fun and Games, DC Heath, Lexington, MA, 1991

Course: Game Theory II [2521369]

Coordinators: Siegfried Berninghaus
Part of the modules: Applied Strategic Decisions (p. 51)[WI4VWL2]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/2	Winter term	de

Learning Control / Examinations
The assessment consists of a written exam according to Section 4(2), 1 of the examination regulation. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Recommendations
See corresponding module information.
Basic knowledge of mathematics and statistics is assumed.

Learning Outcomes
This course teaches advanced knowledge in strategic decision theory. Latest developments in game theory are discussed. The student learns to judge complex strategic problems and to offer adequate solutions.

Content
This lecture aims at 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.

Literature

- Berninghaus/Ehrhart/Güth, Strategische Spiele, 2. Auflage, Springer Verlag, 2006
- van Damme, Stability and Perfection of Nash Equilibria, 2. Auflage, Springer Verlag, 1991

Elective literature:

- Aumann/Hart (edts.), Handbook of Game Theory I-III, Elsevier Publishers, North Holland, 1992/1994/2002

Course: Facility Location and Strategic Supply Chain Management [2550486]

Coordinators: Stefan Nickel
Part of the modules: Operations Research in Supply Chain Management and Health Care Management (p. 66)[WI4OR5]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/1	Summer term	de

Learning Control / Examinations
The assessment consists of a written exam (120 min) according to Section 4 (2), 1 of the examination regulation.
The exam takes place in every semester.
Prerequisite for admission to examination is the succesful completion of the online assessments.

Conditions
Basic knowledge as conveyed in the module *Introduction to Operations Research* [WW1OR] is assumed.

Learning Outcomes
The lecture covers basic quantitative methods in location planning in the context of strategic Supply Chain Planning. Besides the discussion of several criteria for the evaluation of the locations of facilities, the students are acquainted with classical location planning models (planar models, network models and discrete models) and advanced location planning models designed for Supply Chain Management (single-period and multi-period models).The exercises accompanying the lecture offer the possibility to apply the considered models to practical problems.

Content
Since the classical work “Theory of the Location of Industries” of Weber from 1909, the determination of an optimal location of a new facility with respect to existing customers is strongly connected to strategical logistics planning. Strategic decisions concerning the location of facilities as production plants, distribution centers or warehouses are of high importance for the rentability of supply chains. Thoroughly carried out, location planning allows an efficient flow of materials and leads to lower costs and increased customer service.
Subject of the course is an introduction to the most important terms and definitions in location planning as well as the presentation of basic quantitative location planning models. Furthermore, specialized location planning models for Supply Chain Management will be addressed as they are part in many commercial SCM tools for strategic planning tasks.

Literature
Elective literature:

- 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 planned lectures and courses for the next three years are announced online.

Course: Statistical Methods in Financial Risk Management [2521353]

Coordinators: Svetlozar Rachev
Part of the modules: Statistical Methods in Risk Management (p. 71)[WI4STAT2], Risk Management and Econometrics in Finance (p. 72)[WI4STAT3]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	en

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).

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
Part 1: Financial Risk Management: Risk Indicators at Instrumental Level; (Single Fixed Flow, Fixed Rate Bond, FRA, Interest Rate Futures, Interest Rate Swaps, FX Spot, FX Forward, Plain Vanilla Options), Credit Risk, Risk Indicators at the Portfolio Level (Pricing Environment, Interest Rate Factors, FX Factors), Value-at-Risk (VAR) and Asset-Liability Management, Risk Metrics - Market Risk in a Single Position, Measures of Market Risk: (Linear and Non-linear Positions), Market Risk Limits, Calibrating Valuation and Risk Models Performance Evaluation, Probability Distributions and Statistical Assumptions Forecasting Volatilities and Correlations (Basic Design, Ex-post Estimation, Ex-ante Estimation - Forecasting, Defining the Optimal Decay Factor), Assessing Performance (Univariate and Multivariate Tail Probabilities), Mathematics of Structures Monte Carlo (Generating Statistics, Properties of the Correlation Matrix), Mapping Algorithms (Fixed Income, Foreign Exchange, Commodities, Options). Models for Credit Risk. Introduction to Operational Risk
Part 2: Optimal portfolio management: portfolio construction, long/short investing, transaction costs and turnover, performance analysis, asset allocation, benchmark timing. Integrating the equity portfolio management process, active versus passive portfolio management, tracking error (backward-looking versus forward looking tracking error, the impact of portfolio size, benchmark volatility and portfolio betas on tracking error), equity style management (types of equity styles, style classification system), passive strategies(constructing an index portfolio, index tracking and cointegration), active investing (top-down and bottom-up approaches to active investing, fundamental law of active management, strategies based on technical analysis, technical analysis and statistical pattern recognition, market-neutral strategies and statistical arbitrage), Application of Multifactor Risk Models(Risk Decomposition, Portfolio construction and Risk Control, Assessing the exposure of a portfolio, Risk control against a stock-market index, Tilting a portfolio).

Media
transparencies, exercises.

Literature

- Fat-Tailed and Skewed Asset Return Distributions: Implications for Risk Management, Portfolio selection, and Option Pricing, Rachev, S., Menn C. and Fabozzi F. , John Wiley, Finance, 2005
- Financial Optimization, by Stavros A. Zenios, 1993, Cambridge University Press.
- The Mathematics of Financial Modeling and Investment Management, by Sergio Focardi and Frank Fabozzi, 2004, Wiley

Remarks
URL: http://www.statistik.uni-karlsruhe.de/

Course: Tax Law I [24168]

Coordinators: Detlef Dietrich
Part of the modules: Private Business Law (p. 138)[WI4JURA5]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Winter term	de

Learning Control / Examinations
The assessment consists of a written exam (approx. 45 minutes) according to section 4 subsection 2 no. 1 study and examination regulations.

Conditions
None.

Learning Outcomes
The target of the lecture is an introduction to national business tax law. The legal norms, spread on several individual tax laws, which are decisive for the taxation of the companies and their owners, will be treated. The focus is on basic fiscal knowledge realizable in practice as a component of modern business economics.

Content
Except for a basic knowledge of the existing German company types and the annual financial statements (balance sheet, statement of earnings), no fiscal previous knowledge is required. The lecture intends to give a current global overview about the most important elements of law. The focus is on trade or business companies in the most common forms such like sole traders, partnerships and corporations.

Media
transparancies

Literature

- Grashoff Steuerrecht, Verlag C. H. Beck, last edition
- Tipke/Lang Steuerrecht, Verlag C. H. Beck, last edition

Course: Tax Law II [24646]

Coordinators: Detlef Dietrich
Part of the modules: Private Business Law (p. 138)[WI4JURA5]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Summer term	de

Learning Control / Examinations
The assessment consists of a written exam following §4, Abs. 2, 1 of the SPO.

Conditions
None.

Learning Outcomes
It is the target of the lecture to provide extended knowledge in business administration related theory of taxation in the field of economics and law, based on the general lecture “introduction to corporate tax law”. The students obtain the basis for an economic examination of the fiscal prescriptions and are able to assess the impact on business decisions. The emphasis is on such tax law regulations which allow possibilities for action and decision to the taxpayer.

Content
The lecture requires basic knowledge of commercial law and company law as well as of earnings tax law. Basic and current questions of German corporate taxation are systematically prepared in topic blocs; foils, leaflets and supplementary references are distributed in the individual sessions. There is room for discussion. A recent text collection of the tax laws will be necessary.

Media
transparancies

Literature

- Grashoff, Steuerrecht, Verlag C.H. Beck, latest edition.
- Spangemacher, Gewerbesteuer, Band 5, Grüne Reihe, Erich Fleischer Verlag
- Falterbaum/Bolk/Reiß/Eberhart, Buchführung und Bilanz, Band 10, Grüne Reihe, Erich Fleischer Verlag
- Tipke, K./Lang, J., Steuerrecht, Köln, in der neuesten Auflage.
- Jäger/Lang Körperschaftsteuer, Band 6, Grüne Reihe, Erich Fleischer Verlag
- Lippross Umsatzsteuer, Band 11, Grüne Reihe, Erich Fleischer Verlag
- Plückebaum/Wendt/ Niemeier/Schlierenkämper Einkommensteuer, Band 3, Grüne Reihe, Erich Fleischer Verlag

Course: Instrumentation and Control Technologies for Production Systems [2150683]

Coordinators: Gönnheimer
Part of the modules: Specialization in Production Engineering (p. 125)[WI4INGMB22]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Summer term	de

Learning Control / Examinations
The assessment consists of an oral exam (20 min) taking place during the recess period (according to Section 4(2), 1 or 2) of the examination regulation).
The examination takes place every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes

Content

Course: Stochastic and Econometric Models in Credit Risk Management [2520337]

Coordinators: Svetlozar Rachev
Part of the modules: Statistical Methods in Risk Management (p. 71)[WI4STAT2]

ECTS Credits	Hours per week	Term	Instruction language
5	2/2	Summer term	en

Learning Control / Examinations

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.

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: Stochastic Calculus and Finance [2521331]

Coordinators: Svetlozar Rachev
Part of the modules: Mathematical and Empirical Finance (p. 70)[WI4STAT1]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	en

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).

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
The course will provide rigorous yet focused training in stochastic calculus and finance. The program will cover modern approaches in stochastic calculus and mathematical finance. Topics to be covered:

1. Stochastic Calculus. Stochastic Processes, Brownian Motion and Martingales, Stopping Times, Local martingales, Doob-Meyer Decomposition, Quadratic Variation, Stochastic Integration, Ito Formula, Girsanov Theorem, Jump-diffusion Processes. Stable and tempered stable processes. Levy processes.
2. Mathematical Finance: Pricing Models. The Black-Scholes Model, State prices and Equivalent Martingale Measure, Complete Markets and Redundant Security Prices, Arbitrage Pricing with Dividends, Term-Structure Models (One Factor Models, Cox-Ingersoll-Ross Model, Affine Models), Term-Structure Derivatives and Hedging, Mortgage-Backed Securities, Derivative Assets (Forward Prices, Future Contracts, American Options, Look-back Options), Option pricing with tempered stable and Levy-Processes and volatility clustering, Optimal Portfolio and Consumption Choice (Stochastic Control and Merton continuous time optimization problem), Equilibrium models, Consumption-Based CAPM, Numerical Methods.

Media
transparencies, exercises.

Literature
To be announced in lecture.
Elective literature:

- Dynamic Asset Pricing Theory, Third Edition. by Darrell Duffie, Princeton University Press, 1996
- Stochastic Calculus for Finance II: Continuous-Time Models, by Steven E. Shreve , Springer, 2003
- An Introduction to Stochastic Integration (Probability and its Applications) by Kai L. Chung , Ruth J. Williams , Birkhaueser,
- Methods of Mathematical Finance by Ioannis Karatzas , Steven E. Shreve , Springer 1998
- Kim Y.S. ,Rachev S.T. ,Bianchi M-L, Fabozzi F. Financial market models with Levy processes and time-varying volatility, Journal of Banking and Finance, 32/7,1363-1378, 2008.
- Hull, J., Options, Futures, & Other Derivatives, Prentice Hall, Sixth Edition, (2005).

Course: Markov Decision Models I [2550679]

Coordinators: Karl-Heinz Waldmann
Part of the modules: Stochastic Modelling and Optimization (p. 69)[WI4OR7]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1/2	Winter term	de

Learning Control / Examinations
The assessment consists of an 1h written exam following Section 4(2), 1 of the examination regulation. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3 (according to Section 4(2), 3 of the examination regulation).

Conditions
None.

Learning Outcomes
The lecture provides students with knowledge of modern techniques of stochastic modelling. Students are able to properly describe and analyze basic stochastic systems.

Content
Markov Chains, Poisson Processes, Markov Chains in Continuous Time, Queuing Systems

Media
Blackboard, Slides, Flash Animations, Simulation Software

Literature
Waldmann, K.H. , Stocker, U.M. (2004): Stochastische Modelle - eine anwendungsorientierte Einführung; Springer
Elective literature:
Norris, J.R. (1997): Markov Chains; Cambridge University Press
Bremaud, P. (1999): Markov Chains, Gibbs Fields, Monte Carlo Simulation, and Queues; Springer

Course: Markov Decision Models II [2550682]

Coordinators: Karl-Heinz Waldmann
Part of the modules: Stochastic Modelling and Optimization (p. 69)[WI4OR7]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/1/2	Summer term	de

Learning Control / Examinations
The assessment consists of an 1h written exam following §4(2), 1 SPO. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3.

Conditions
None.

Learning Outcomes
The lecture provides students with knowledge on Markov decision processes for analysis to control and optimize stochastic dynamic systems. They are able to apply the theory aquired and to adjust the models to actual problems. They develop the optimality criterion and can solve the resulting optimal value function efficiently to gain optimal policies and the optimal value.

Content
Markov decision models: Foundations, optimality criteria, solution of the optimality equation, optimality of simply structured decision rules, applications.

Media
Blackboard, Slides, Flash Animations, Simulation Software

Literature
Lecture Notes
Elective literature:
Waldmann, K.H. , Stocker, U.M. (2004): Stochastische Modelle - eine anwendungsorientierte Einführung; Springer
Puterman, M.L. (1994): Markov Decision Processes: Discrete Stochastic Dynamic Programming; John Wiley

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Material Flux Analyses - River Basin Management [19245]

Coordinators: Stephan Fuchs
Part of the modules: Environmental Management (p. 100)[WI4INGBGU12]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
See module description.

Conditions
Prior attendance of the course *Urban Water Ressource Management and Ecological Engineering* [19057/19058] is recommended.

Learning Outcomes

Content

- Introduction
- Tools for material flow/ mass balance
- Measurement and analyzation of material flow in water management
- Material flow in urban areas
- Material flow in agricultural areas
- Nutrient and heavy metal budget in Germany
- Water quality
- Material flow in industry
- Water cycle
- Nitrogen cycle
- Phosphorus cycle
- Pesticide cycle

Literature
Elective literature:
Lehn, H., Steiner, M., Mohr, H.: Wasser – die elementare Ressource; Leitlinien einer nachhaltigen Nutzung, Springer Verlag, Berlin, (1999)

Course: Material Flow Analysis and Life Cycle Assessment [2581995]

Coordinators: Liselotte Schebek
Part of the modules: Industrial Production II (p. 47)[WI4BWLIIP2]

ECTS Credits	Hours per week	Term	Instruction language
3.5	2/0	Winter term	de

Learning Control / Examinations
The examination will be in form of a written exam acc. to §4(2), 3 ER at the end of the semester.

Conditions
None.

Learning Outcomes

- Students shall be aware of the important role of material flow systems for the economy and ecology.
- Students shall be proficient in understanding the basics and methodology of analytical tools for material flow analysis and Life Cycle Assessment.
- Students shall be able to apply Life Cycle Assessment in case studies.

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.

Media
Media will be provided on learning platform.

Literature
will be annouced in the course

Course: Strategical Aspects of Energy Economy [2581958]

Coordinators: Armin Ardone
Part of the modules: Energy Industry and Technology (p. 50)[WI4BWLIIP5]

ECTS Credits	Hours per week	Term	Instruction language
3.5	2/0	Winter term	

Learning Control / Examinations
The assessment consists of a written exam according to Section 4 (2),1 of the examination regulation.

Conditions
None.

Learning Outcomes

Content

Course: Strategic and Innovative Decision Making in Marketing [2571166]

Coordinators: Bruno Neibecker
Part of the modules: Strategy, Innovation and Data Analysis (p. 35)[WI4BWLMAR3]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/1	Summer term	de

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).

Conditions
See corresponding module information.

Learning Outcomes
(see description of the course)

Content
The course places emphasis on the role of marketing in strategic planning. The planning and implementation stages are discussed using a case study in business portfolio analysis, talking about experience effects, approaches in defining strategic business units. A critical view on market orientation as a source of sustainable competitive advantage is given. Further topics are innovation and diffusion models, behavioral approaches to innovative decision processes and a discussion on Porter's single diamond theory and globalization.

Literature
(Literature is in English and German, see German description)

Course: Strategic Management of Information Technology [2511602]

Coordinators: Thomas Wolf
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations
The assessment of this course is a written or (if necessary) oral examination according to §4(2) of the examination regulation.

Conditions
None.

Learning Outcomes
Students know the outer frame of IT in an enterprise and know which functions IT has within an enterprise. They 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

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: Structural and Functional Ceramics [2126775]

Coordinators: M. J. Hoffmann
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Summer term	de

Learning Control / Examinations
The assessment consists of an oral exam (20-30 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation). The re-examination is offered upon agreement.

Conditions
Basic knowledge of experimental physics and chemistry is recommended.
It is recommended to attend the course *Introduction in Ceramics [21755].*

Learning Outcomes
Based on concrete examples the importance of microstructural constitution on mechanical, thermal, chemical and electrical properties is shown.

Content
The lecture gives an overview on structure and properties of technical relevant structural and functional ceramic materials and parts. The following groups of materials are presented: Silicon Nitride, Silicon Carbide, Alumina, Zirconia, Ferrolectric ceramics.

Literature
Elective literature:
H. Salmang, H. Scholze, „Keramik“, Springer-Verlag;
Kingery, Bowen, Uhlmann, „Introduction To Ceramics“, Wiley-Verlag

Course: Superhard Thin Film Materials [2177618]

Coordinators: Ulrich
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter term	de

Learning Control / Examinations
The assessment consists of an oral exam (30 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation). The re-examination is offered upon agreement.

Conditions
None.

Recommendations
Basic knowledge of physics, chemistry and material science is assumed.
The module *Emphasis Material Science* [WI3INGMB9] should be completed successfully beforehand.

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.

Literature
Elective literature:

- G. Kienel: Vakuumbeschichtung 1 bis 5, VDI-Verlag 1995
- R. A. Haefer: Oberflächen- und Dünnschichttechnologie; Teil I und II, Springer-Verlag 1991

Course: Supply Chain Management [21062]

Coordinators: Alicke
Part of the modules: Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11], Logistics in Value Chain Networks (p. 129)[WW4INGMB28]

ECTS Credits	Hours per week	Term	Instruction language
6	3/1	Winter term	de

Learning Control / Examinations
The assessment consists of an oral exam according to §4 (2), 2 of the examination regulation.

Conditions
None.

Learning Outcomes
The course provides the theoretical and practical basics to use approaches of Supply Chain Management within the operational practice.
Exercises show the practical side of the lessons.

Content

- Bullwhip-Effect, Demand Planning & Forecasting
- Conventional planning processes (MRP + MRPII)
- Stock keeping strategy
- Data acquisition and analysis
- Design for logistics (Postponement, Mass Customization, etc.)
- Logistic partnerships (VMI, etc.)
- Distribution structures (central vs. distributed, Hub&Spoke)
- SCM-metrics (performance measurement) e-business
- Special sectors as well as guest lectures

Course: Supply Chain Management with Advanced Planning Systems [2581961]

Coordinators: Mathias Göbelt, Christopher Sürie
Part of the modules: Industrial Production III (p. 48)[WI4BWLIIP6]

ECTS Credits	Hours per week	Term	Instruction language
2	2	Summer term	en

Learning Control / Examinations
see module description

Conditions
see module description

Learning Outcomes
This lecture deals with supply chain management from a practitioner's perspective with a special emphasis on the software solution SAP SCM and the planning domain. First, the term supply chain management is defined and its scope is determined. Methods to analyze supply chains as well as indicators to measure supply chains are derived. Second, the structure of an APS (advanced planning system) is discussed in a generic way. Later in the lecture, the software solution SAP SCM is mapped to this generic structure. The individual planning tasks and software modules (demand planning, supply network planning, production planning / detailed scheduling, transportation planning / vehicle scheduling, global available-to-promise) are presented by discussing the relevant business processes, providing academic background, describing planning processes for a fictive company and showing the user interface and user-related processes in the software solution.
The lecture is supported by a self-explanatory tutorial, in which students can explore the software solution for the fictive company offline on their own.

Content
1. **Introduction to Supply Chain Management**
1.1. Supply Chain Management Fundamentals
1.2. Supply Chain Management Analytics
2. Structure of Advanced Planning Systems
3. SAP SCM
3.1. Introduction / SCM Solution Map
3.2. Demand Planning
3.3. Supply Network Planning
3.4. Production Planning and Detailed Scheduling
3.5. Deployment
3.6. Transportation Planning and Vehicle Scheduling
3.7. [Optional] Global Available to Promise
4. SAP SCM in Practice
4.1. Success Stories
4.2. SAP Implementation Methodology

Course: Systematic Product Development in Sensor Technology [23209]

Coordinators: Ivers-Tiffée, Riegel
Part of the modules: Sensor Technology I (p. 104)[WI4INGETIT3], Sensor Technology II (p. 105)[WI4INGETIT5]

ECTS Credits	Hours per week	Term	Instruction language
3	1/1	Winter term	de

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.

Conditions
It is recommended to attend the courses *Material Science II* [21782] and *Electrical Engineering II* [23224] beforehand.

Learning Outcomes

Content

Literature
Elective literature:
Schaumburg, H.: Sensoren. Stuttgart, Teubner 1992
Schaumburg, H.: Sensoranwendungen. Stuttgart, Teubner 1995

Course: Systematic Selection of Materials [2174576]

Coordinators: Wanner
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations
The assessment consists of an oral exam (20-30 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation). The re-examination is offered upon agreement.

Conditions
The course *Material Science I* [21760] has to be completed beforehand.
Basic knowledge of natural science and knowledge of the content *Material Science II* [21782] is recommended.

Learning Outcomes
The students are able to select the best material for a given application. They are proficient in selecting materials on base of performance indices and materials selection charts. They can identify conflicting objectives and find sound compromises. They are aware of the potential and the limits of hybrid material concepts (composites, bimaterials, foams) and can determine whether following such a concept yields a useful benefit.

Content
Important aspects and criteria of materials selection are examined and guidelines for a systematic approach to materials selection are deeloped. The following topics are covered: the status of materials selection in mechanical design and product development; the most important classes of materials and their property profiles;

Literature
Elective literature:

- Materials Selection in Mechanical Design: Das Original mit Übersetzungshilfen, Easy-Reading-Ausgabe, Ashby, M. F.; Wanner, A. (Hrsg.); Fleck, C. (Hrsg.), Spektrum Akademischer Verlag, ISBN: 978-3-8274-1762-6, 2006

Course: System Dynamics and Control Engineering [2300155]

Coordinators: Sören Hohmann
Part of the modules: Control Engineering I (p. 102)[WI4INGETIT1]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/1	Summer term	de

Learning Control / Examinations
The assessment consists of a written exam (120 min) taking place at the beginn of the recess period (according to §4 (2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
Knowledge of integral transformations is assumed.
Therefore it is recommeded to attend the course *Complex Analysis and Integral Transformations* beforehand or to acquire a good knowledge through private study (see literature), but a proof of performance is not necessary.

Learning Outcomes
As the system dynamics and control engineering fundamental lecture, the course familiars with the basic elements, structures and the behavior of dynamic systems. It gives them insight into the problems of control and intuition about methods available to solve such problems. Both frequency response and state space methods for anlisys and design of dynamic systems are considered.

Content

- *Introduction*
  open-loop and closed-loop control systems; basic concepts and definitions, structure of automation systems, control system design, examples of control systems
- *Elements of Control Circuits - Classification and Description*
  properties of dynamic systems, linear approximation about an operation point, information flow between transfer elements, block diagram models and transformations, behavior of elementary control circuit elements, polar plots (Nyquist diagrams), Bode diagrams
- *Frequency Response Analysis of Continuous Linear Control Circuits*
  control system characteristics, stability, stability criterions, steady-state behavior of control circuits, sensitivity to parameter variations
- *Frequency Response Design*
  system performance specification, classification of controller design methods, typical linear controllers, frequency response design using the Bode diagram, controller design according to Ziegler - Nichols, absolute value optimum design, feed forward control, secondary control, cascaded control, root locus analysis and design
- *State Space Representation of Continuous Systems*
  state space equations, controllability and observability, solution of state equations, Linear State Variable Feedback Systems,pole placement design, linear optimal control (Riccati-controller)
- *State Observers*
  full order observer, control through observers, separation principl

Literature

- Föllinger, Otto: Regelungstechnik, Hüthig-Verlag, 8.Auflage, 1994
- Lunze, Jan: Regelungstechnik 1, Springer-Verlag, 1996

Elective literature:
Will be announced in the lecture.

Remarks
The cycle for the lecture *System Dynamics and Control Engineering [23155]* has been changed from winterterm into summerterm. The reduced form of the lecture 3+1 (6 LP) will be offered in summerterm first time. Therefore the content could be changed.

Course: Tactical and Operational Supply Chain Management [2550488]

Coordinators: Stefan Nickel
Part of the modules: Operations Research in Supply Chain Management and Health Care Management (p. 66)[WI4OR5]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/1	Winter term	de

Learning Control / Examinations
The assessment consists of a written exam (120 minutes) according to Section 4(2), 1 of the examination regulation.
The exam takes place in every the semester.
Prerequisite for admission to examination is the succesful completion of the online assessments.

Conditions
Basic knowledge as conveyed in the module *Introduction to Operations Research* [WI1OR] is assumed.

Learning Outcomes
The main goal of the lecture is the presentation of fundamental techniques from procurement and distribution logistics. A further aspect is set on methods from inventory management and lot sizing. Students acquire the ability to efficiently utilize quantitative models from transportation planning (long-distance and distribution planning), inventory management and lot sizing in production. The introduced methods will be discussed in more detail and illustrated with case-studies in the accompanying exercises

Content
The planning of material transport is an essential element of Supply Chain Management. By linking transport connections across different facilities, the material source (production plant) is connected with the material sink (customer).
The general supply task can be formulated as follows (cf. Gudehus): For given material flows or shipments, choose the optimal (in terms of minimal costs) distribution and transportation chain from the set of possible logistics chains, which asserts the compliance of delivery times and further constraints. The main goal of the inventory management is the optimal determination of order quantities in terms of minimization of fixed and variable costs subject to resource constraints, supply availability and service level requirements. Similarly, the problem of lot sizing in production considers the determination of the optimal amount of products to be produced in a time slot.
The course includes an introduction to basic terms and definitions of Supply Chain Management and a presentation of fundamental quantitative planning models for distribution, vehicle routing, inventory management and lot sizing. Furthermore, case studies from practice will be discussed in detail.

Literature
Elective literature:

- Domschke: Logistik: Transporte, 5. Auflage, Oldenbourg, 2005
- 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 planned lectures and courses for the next three years are announced online.

Course: Technical Logistics I, basics [2117081]

Coordinators: Martin Mittwollen
Part of the modules: Introduction to Logistics (p. 76)[WI4INGMB20], Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11], Technical Logistics (p. 128)[WW4INGMB27]

ECTS Credits	Hours per week	Term	Instruction language
4	2/1	Winter term	de

Learning Control / Examinations
The assessment consists due to the number of attendees, of an oral or a written exam according to Section 4 (2), 1 of the examination regulation.

Conditions
None.

Learning Outcomes
After successfully finishing this course, the student is able to work with fundamental questions of conveyor technology. He knows crucial parts and cause and effects of machines and processes of technical logistics.

Content
Introduction

- historical overview
- application examples
- structure

processes and machines of technical logistics

- model of causes and effects inside technical logistics
- systemization of conveyors

transported materials

- bulk material
- Piece goods
- Transporting support means.

Drive devices

- Energy transmission
- Transfer elements
- Model of lifting and driving devices
- Characteristics of loads and drives
- Drive control
- Selction and design of electric drives

Closed loop control

Media
Blackboard, LCD projector, work sheets

Literature
Elective literature:

- M. Scheffler: Grundlagen der Fördertechnik – Elemente und Triebwerke (und ähnliche)
- Dubbel: Taschenbuch für den Maschinenbau, Kapitel: Fördertechnik
- R. Fischer: Elektrische Maschinen

Remarks
The course is changed in content against the former *Technische Logistik I* [2117501].

Course: Technical Logistics I, basics and systems [2117082]

Coordinators: Martin Mittwollen
Part of the modules: Introduction to Logistics (p. 76)[WI4INGMB20], Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11], Technical Logistics (p. 128)[WW4INGMB27]

ECTS Credits	Hours per week	Term	Instruction language
6 (ggf. kontextabhängig)	3/1	Winter term	de

Learning Control / Examinations
The assessment consists due to the number of attendees, of an oral or a written exam according to Section 4 (2), 1 of the examination regulation.

Conditions
None.

Learning Outcomes
After successfully finishing this course, the student is able to work with fundamental questions of conveyor technology. He knows crucial parts and cause and effects of machines and processes of technical logistics. Key elements become embedded in material flow systems.

Content
Introduction

- historical overview
- application examples
- structure

processes and machines of technical logistics

- model of causes and effects inside technical logistics
- systemization of conveyors

transported materials

- bulk material
- Piece goods
- Transporting support means.

Drive devices

- Energy transmission
- Transfer elements
- Model of lifting and driving devices
- Characteristics of loads and drives
- Drive control
- Selction and design of electric drives
- Closed loop control

Material flow systems

- Key elements of material flow systems
- Identification
- Performance
- Storage racks

Media
Blackboard, LCD projector, work sheets

Literature
Elective literature:

- M. Scheffler: Grundlagen der Fördertechnik – Elemente und Triebwerke (und ähnliche)
- Dubbel: Taschenbuch für den Maschinenbau, Kapitel: Fördertechnik

- R. Fischer: Elektrische Maschinen
- H. Martin: Transport- und Lagerlogistik
- R. Koether: Technische Logistik
- Arnold, Furmans: Materialfluss in Logistiksystemen (from 6th edition)

Remarks
The course is changed in content against the former *Technische Logistik I* [2117501].

Course: Technical Logistics II, selected application examples [2118081]

Coordinators: Martin Mittwollen
Part of the modules: Technical Logistics and Logistic Systems (p. 78)[WI4INGMB11], Technical Logistics (p. 128)[WW4INGMB27]

ECTS Credits	Hours per week	Term	Instruction language
4	2/1	Summer term	de

Learning Control / Examinations
The assessment consists due to the number of attendees, of an oral or a written exam according to Section 4 (2), 1 of the examination regulation.

Conditions
Technische Logistik II is based on Technische Logistik I; thus it is strongly recommended to have heard Technische Logistik I [2117081] or [2117082] in advance.

Learning Outcomes
After successfully finishing this course, the student is able to design crucial machines of conveyor technology. He can deal with effects of dynamics caused by operation. He can consider fundamental safety requirements.

Content
Introduction

- Repetition of TL I

Lifting of loads by the example of a bridge crane

- Design and function
- Model: one mass oscillator
- Rope stress, lifting power coefficient

Elevator

- Design, function
- Friction drive, traction capability
- Safety gear

Ground conveyor (example: s&r machine)

- Design, function
- Modeling
- Horizontal dynamics, reduction of oscillation

Tilting, Turning, Slewing of ground conveyors

- Stability against overturning
- Tilting torque, tilting axes
- Force limiting devices

Fork lift truck

- Design, function
- Modeling
- Horizontal dynamics, reducing of oscillation

Media
Blackboard, LCD projector, work sheets

Literature
Elective literature:

- M. Scheffler: Grundlagen der Fördertechnik – Elemente und Triebwerke (und ähnliche)
- Dubbel: Taschenbuch für den Maschinenbau, Kapitel: Fördertechnik
- R. Fischer: Elektrische Maschinen
- H. Martin: Transport- und Lagerlogistik
- R. Koether: Technische Logistik
- Arnold, Furmans: Materialfluss in Logistiksystemen (from 6th edition)

Remarks
The course is based on *Technische Logistik I* [2117081] and [2117082].

Course: Technical Logistics II, selected application examples plus project [2118086]

Coordinators: Martin Mittwollen
Part of the modules: Technical Logistics (p. 128)[WW4INGMB27]

ECTS Credits	Hours per week	Term	Instruction language
6 (ggf. kontextabhängig)	3/1	Summer term	de

Learning Control / Examinations
The assessment consists due to the number of attendees, of an oral or a written exam according to Section 4 (2), 1 of the examination regulation.

Conditions
Technische Logistik II is based on Technische Logistik I; thus it is strongly recommended to have heard Technische Logistik I [2117081] or [2117082] in advance

Learning Outcomes
After successfully finishing this course, the student is able to design crucial machines of conveyor technology. He can deal with effects of dynamics caused by operation. He can consider fundamental safety requirements. Working on an course related project, the student enlarges his specific knowledge.

Content
Introduction

- Repetition of TL I

Lifting of loads by the example of a bridge crane

- Design and function
- Model: one mass oscillator
- Rope stress, lifting power coefficient

Elevator

- Design, function
- Friction drive, traction capability
- Safety gear

Ground conveyor (example: s&r machine)

- Design, function
- Modeling
- Horizontal dynamics, reduction of oscillation

Tilting, Turning, Slewing of ground conveyors

- Stability against overturning
- Tilting torque, tilting axes
- Force limiting devices

Fork lift truck

- Design, function
- Modeling
- Horizontal dynamics, reducing of oscillation

Project work

- Working on a typical question with relation to and enlarging of the course

Media
Blackboard, LCD projector, work sheets

Literature
Elective literature:

- M. Scheffler: Grundlagen der Fördertechnik – Elemente und Triebwerke (und ähnliche)

- Dubbel: Taschenbuch für den Maschinenbau, Kapitel: Fördertechnik
- R. Fischer: Elektrische Maschinen
- H. Martin: Transport- und Lagerlogistik
- R. Koether: Technische Logistik
- Arnold, Furmans: Materialfluss in Logistiksystemen (from 6th edition)

Remarks
The course is based on *Technische Logistik I* [2117081] and [2117082].

Course: Technological Change in Energy Industry [2581000]

Coordinators: Martin Wietschel
Part of the modules: Energy Industry and Technology (p. 50)[WI4BWLIIP5]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Winter term	de

Learning Control / Examinations
The assessment consists of a written exam.

Conditions
None.

Learning Outcomes

Content

Course: Telecommunication and Internet Economics [2561232]

Coordinators: Kay Mitusch
Part of the modules: Network Economics (p. 53)[WI4VWL4], Electronic Markets (p. 40)[WI4BWLISM2]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	de

Learning Control / Examinations
Result of success is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC). Examination is offered every semester and can be retried at any regular examination date.

Conditions
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.

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.

Literature
Literature and lecture notes will be announced in the lecture.

Course: Telecommunications Law [24632]

Coordinators: Indra Spiecker genannt Döhmann
Part of the modules: Public Business Law (p. 139)[WI4JURA6]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Summer term	de

Learning Control / Examinations
The assessment consists of an written exam (following §4(2), 1 SPO).

Conditions
None.

Learning Outcomes
Telecommunications is the technical basis of the Information Engineering and Management. In which way for example UMTS is regulated, is of relevant importance for the supply of services in the world of the mobile contents services. The central defaults of the telecommunications regulation are in the telecommunications law (TKG). This was completely amended due to community-legal defaults 2004. The lecture procures for apprehending the basics of legal framework of the information society the essential knowledge in telecommunication law.

Content
The lecture offers an overview of the new TKG. The whole range of the regulation is treated: Of the material-legal instruments of the competition-creative economic regulation (market -, entrance -, payment regulation as well as special supervision of abuse) and the non-economic regulation (customer protection; Broadcasting; Assignment of frequencies, numbers and rights of way; secrecy of telecommunications; Data security and public security) up to the institutional arrangement of the regulation. To assist in the understanding the technical and economic bases are clarified as well as community and constitutional default sat at the beginning of the lecture.

Media
Content structure

Literature
Since the law material is to be partly compiled in the discourse with the studying, a current version of the TKG is to be bring along to the lecture.
Further literature will be announced in the lecture.
Elective literature:
tba

Course: Theoretical Sociology [thSoz]

Coordinators: Gerd Nollmann, Pfadenhauer, Pfaff, Haupt, Grenz, Eisewicht
Part of the modules: Sociology (p. 140)[WI4SOZ1]

ECTS Credits	Hours per week	Term	Instruction language
2	2	Winter / Summer Term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes
The student

- gains specific knowledge of a particular research problem.

Content
Students are free to choose any course on specific questions on contemporary research offered by the Institute of Sociology. In class, the specific research question, recent data and current debates on the problem will be presented and discussed.

Course: Transport Economics [2560230]

Coordinators: Gernot Liedtke, Eckhard Szimba
Part of the modules: Network Economics (p. 53)[WI4VWL4], Environmental Economics (p. 54)[WI4VWL5]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	de

Learning Control / Examinations
The assessment is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC). Examination is offered every semester and can be retried at any regular examination date.

Conditions
None.

Learning Outcomes
The course provides students an overview of transport economics. The field deals with the role of transport infrastructure, regulation and pricing in transportation from an economic perspective. The course shall prepare for a career entry in the public sector, a regulation authority or a transport related consultancy. The course also adresses future employees of major construction companies and project corporations for transport infrastructure.
The course gives insights in the complex trade offs to be dealt with in regulatory and infrastructre measures and explains the relevant political considerations. It will be demonstrated, how to estimate the quantitative effects of transport policies using transport models.

Content
The course shall provide an overview of classical welfare economic aspects in referance to planning, asessment, and pricing of transport infrastructure. It will be demonstrated, using new microeconomic models, which impacts regulation and pricing in transport have on the economic actions of individuals and logisticans and which benefits and costs apply. The following topics will be discussed:

- Targets, areas and tools of transport policy,
- Project evaluation from the perspective of the public sector,
- Private sector costing and project evaluation,
- Transport system analysis,
- Macroscopic transport modelling,
- Microeconomic transport demand models, particularly logistics models,
- Case studies.

Media
didactic models in MS-Excel

Literature
Will be announced in the lecture.
(for literature to prepare the lecture - see additional literature)
Elective 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/sou

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”

Remarks
Since WS 2010/2011, the lecture has 4,5 instead of 4 credit points.

Course: Excercises in Chemical Technology of Water [22602]

Coordinators: F.H. Frimmel
Part of the modules: Water Chemistry (p. 112)[WI4INGCV5], Water Chemistry I (p. 113)[WI4INGCV6]

ECTS Credits	Hours per week	Term	Instruction language
2	1	Winter term	de

Learning Control / Examinations
See module description.

Conditions
The attendance of the course *Chemical Technology of Water* [22601] is a prerequisite to participate in the exercise.

Learning Outcomes
The contents of 22601 are deepened and calculations are given.

Content
Tutorials and exercise sheets concerning
1. Chemical-physical basics
2. Lime – carbon dioxide equilibrium
3. Adsorption
4. Ion exchange
5. Oxidation

Literature
Elective 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: Metal Forming [2150681]

Coordinators: Herlan
Part of the modules: Specialization in Production Engineering (p. 125)[WI4INGMB22]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Summer term	de

Learning Control / Examinations
The assessment consists of an oral exam (20 min) taking place during the recess period (according to Section 4(2), 1 or 2) of the examination regulation).
The examination takes place every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes

Content

Course: Environmental and Ressource Policy [2560548]

Coordinators: Rainer Walz
Part of the modules: Environmental Economics (p. 54)[WI4VWL5]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Summer term	de

Learning Control / Examinations

Conditions
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* [2520371] and *Economic Policy* [2560280].

Learning Outcomes

Content

Literature
Elective literature:
Michaelis, P.: Ökonomische Instrumente in der Umweltpolitik. Eine anwendungsorientierte Einführung, Heidelberg
OECD: Environmental Performance Review Germany, Paris

Remarks
The credits have been reduced to 4.

Course: Environment Communication [19212]

Coordinators: Kämpf
Part of the modules: Understanding and Prediction of Disasters I (p. 115)[WI4INGINTER1], Understanding and Prediction of Disasters II (p. 116)[WI4INGINTER2], Understanding and Prediction of Disasters III (p. 117)[WI4INGINTER3]

ECTS Credits	Hours per week	Term	Instruction language
3	2/1	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Remarks
For further information, see http://www.iwk.uni-karlsruhe.de/kurse_vertiefungsstudium.php

Course: Environmental Economics and Sustainability [2521547]

Coordinators: Rainer Walz
Part of the modules: Environmental Economics (p. 54)[WI4VWL5]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

Learning Control / Examinations

Conditions
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* [2600012] and *Economics II: Macroeconomics* [2600014].

Learning Outcomes

Content

Literature
Elective literature:
Hodge, I.: Environmental Economics, Houndsmills
Umweltbundesamt: Nachhaltige Entwicklung in Deutschland, Erich Schmidt Verlag,Berlin

Course: Environmental Law [24140]

Coordinators: Indra Spiecker genannt Döhmann
Part of the modules: Environmental Economics (p. 54)[WI4VWL5], Public Business Law (p. 139)[WI4JURA6]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

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.

Conditions
None.

Recommendations
Knowledge of Law, esp. Public Law I or II are recommended.

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 certifiates. 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

Literature
Will be announced in the course.
Elective literature:
Will be announced in the course.

Course: Environmental Impact of Roads [19302]

Coordinators: Ralf Roos
Part of the modules: Highway Engineering (p. 90)[WI4INGBGU2]

ECTS Credits	Hours per week	Term	Instruction language
1.5	1	Summer term	de

Learning Control / Examinations
See module description.

Conditions
See corresponding module information.

Learning Outcomes

Content

Course: Management and Strategy [2577900]

Coordinators: Hagen Lindstädt
Part of the modules: Strategic Corporate Management and Organization (p. 37)[WI4BWLUO1]

ECTS Credits	Hours per week	Term	Instruction language
4	2/0	Summer term	de

Learning Control / Examinations
The assessment consists of a written exam (60 min) taking place at the beginn of the recess period (according to §4 (2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes
The participants learn about central concepts of strategic management along the ideal-typical strategy process: internal and external strategic analysis, concept and sources of competitive advantages, their importance when establishing competitive and corporate strategies as well as strategy assessment and implementation. This aims in particular to provide a summary of the basic concepts and models of strategic management, i.e. to provide in particular an action-oriented integration.

Content

- Corporate management principles
- Strategic management principles
- Strategic analysis
- Competitive strategy: modelling and selection on a divisional level
- Strategies for oligopolies and networks: anticipation of dependencies
- Corporate strategy: modelling and evaluation on a corporate level
- Strategy implementation

Media
Slides.

Literature

- Grant, R.M.: *Contemporary Strategy Analysis.* Blackwell, 5. Aufl. Massachusetts 2005.
- Lindstädt, H.; Hauser, R.: *Strategische Wirkungsbereiche von Unternehmen.* Gabler, Wiesbaden 2004.

The relevant excerpts and additional sources are made known during the course.

Course: Copyright [24121]

Coordinators: Thomas Dreier
Part of the modules: Intellectual Property Law (p. 137)[WI4JURA4]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Winter term	de

Learning Control / Examinations
The assessment consists of a written exam according to section 4 subsection 2 no. 1 study and examination regulations.

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
slides

Literature
Schulze, Gernot Meine Rechte als Urheber Verlag C.H.Beck, current edition
Elective literature:
Additional literature tba in class.

Remarks
It is possible that this course will be taught in the summer instead of the winter semester.

Course: Valuation [2530212]

Coordinators: Martin E. Ruckes
Part of the modules: Finance 1 (p. 24)[WI4BWLFBV1], Finance 2 (p. 25)[WI4BWLFBV2], F2&F3 (Finance) (p. 26)[WI4BWLFBV3], Finance 3 (p. 27)[WI4BWLFBV11]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/1	Winter term	en

Learning Control / Examinations

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.

Literature
Elective literature:
Titman/Martin (2007): Valuation – The Art and Science of Corporate Investment Decisions, Addison Wesley.

Course: Combustion Related Environmental Protection [22507]

Coordinators: Bockhorn
Part of the modules: Fuels, Environment and Global Development (p. 107)[WI4INGCV2]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Summer term	de

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.

Conditions
It is recommended to attend the course *Reaction Engineering I* [22114] beforehand.

Learning Outcomes

Content

Literature
Elective literature:
Beér J.M., Chigier N.: Energy, Combustion and Environment, McGraw Hill Book Company, New York 1981.

Course: Combustion Engines A [2133101]

Coordinators: Spicher
Part of the modules: Engine Development (p. 85)[WI4INGMB17], Combustion Engines (p. 84)[WI4INGMB16], Combustion Engines I (p. 121)[WI4INGMB18]

ECTS Credits	Hours per week	Term	Instruction language
9	4/2	Winter term	de

Learning Control / Examinations
The assessment consists of a written exam (120 min) according to §4 (2), 1 of the examination regulation. The grade of the exam is included in the overall grade of the module with a weighting factor of 6.

Conditions
It is recommended to have basic knowledge of thermodynamics.

Learning Outcomes

Content

Course: Combustion Engines B [2134135]

Coordinators: Spicher
Part of the modules: Engine Development (p. 85)[WI4INGMB17], Combustion Engines (p. 84)[WI4INGMB16], Combustion Engines II (p. 122)[WI4INGMB19]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations
The assessment consists of a written exam (120 min) according to Section 4 (2), 1 of the examination regulation. The grade of the exam is included in the overall grade of the module with a weighting factor of 5.

Conditions
The course *Combustion Engines A* [21101] has to be completed beforehand.
Knowledge of thermodynamics is recommended.

Learning Outcomes

Content

Course: Process Engineering in Waste Management [19059]

Coordinators: Josef Winter
Part of the modules: Water Supply and Sanitation (p. 101)[WI4INGBGU13]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
See module description.

Conditions
Only in combination with field trips.

Learning Outcomes

Content

- Waste types
- Waste separation
- Transportation and collection
- Waste disposal (landfill)
- Landfill facilities and operations
- Biowaste composting
- Bio fermentation
- Ash recovery

Course: Process Engineering in Water Quality Management [19054]

Coordinators: Erhard Hoffmann
Part of the modules: Water Supply and Sanitation (p. 101)[WI4INGBGU13]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
See module description.

Conditions
Prior attendance of the course *Urban Water Resource Management and Ecological Engineering* [19057/19058].
Attendance of *Process Engineering in Water Quality Management* [19054]

Learning Outcomes

Content

- Concept of “unit process”
- Gas exchange
- Acid-baze-reactions
- Oxidation- reduction- reactions
- Phase transition processes
- Adsoption/ ion exchange
- Separation process
- Membrane process

Literature
Elective 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: Behavioral Approaches in Marketing [2572167]

Coordinators: Bruno Neibecker
Part of the modules: Behavioral Approaches in Marketing and Data Analysis (p. 36)[WI4BWLMAR4]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/1	Winter term	de

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).

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).
Neuromarketing.

Literature
(Literature is in English and German, see German description)

Course: Laws concerning Traffic and Roads [VLBGU]

Coordinators: Albrecht Kuder
Part of the modules: Safety, Computing and Law in Highway Engineering (p. 91)[WI4INGBGU3]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
See module description.

Conditions
See corresponding module information.

Learning Outcomes

Content

Course: Station and Rail Transport Facilities [19307w]

Coordinators: Eberhard Hohnecker
Part of the modules: Logistics and Management of Guided Systems (p. 95)[WI4INGBGU7], Guided Systems Engineering (p. 94)[WI4INGBGU6]

ECTS Credits	Hours per week	Term	Instruction language
3	2/2	Winter term	de

Learning Control / Examinations
See module description.

Conditions
See module description.
See module description.

Learning Outcomes

Content
stations and terminals for passengers and freight

Course: Transport Planning Methods [19301w]

Coordinators: Peter Vortisch
Part of the modules: Transportation Systems (p. 96)[WI4INGBGU8], Transportation Ia (p. 97)[WI4INGBGU9], Transportation Ib (p. 98)[WI4INGBGU10]

ECTS Credits	Hours per week	Term	Instruction language
3	1/1	Winter term	de

Learning Control / Examinations
See module description.

Conditions
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.

Learning Outcomes

Content

Course: Project in Public Transportation I [19323]

Coordinators: Eberhard Hohnecker
Part of the modules: Project in Public Transportation (p. 93)[WI4INGBGU5]

ECTS Credits	Hours per week	Term	Instruction language
4	4	Summer term	de

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.

Conditions
See module description.
The lecture is oligator in the module *Project in Public Transportation* [WI4INGBGU5].

Learning Outcomes

Content
practise: urban traffic project: Planing and line-layouting

Course: Project in Public Transportation II [19324]

Coordinators: Eberhard Hohnecker
Part of the modules: Project in Public Transportation (p. 93)[WI4INGBGU5]

ECTS Credits	Hours per week	Term	Instruction language
2	2	Winter term	de

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.

Conditions
See module description.
The lecture is oligator in the module *Project in Public Transportation* [WI4INGBGU5].

Learning Outcomes

Content
practise: urban traffic project: economic evaluation

Course: Transport System Planning [19062]

Coordinators: Peter Vortisch
Part of the modules: Transportation Systems (p. 96)[WI4INGBGU8], Transportation Ib (p. 98)[WI4INGBGU10], Transportation II (p. 99)[WI4INGBGU11]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	de

Learning Control / Examinations
See module description.

Conditions
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.

Learning Outcomes

Content

Course: Traffic Engineering and Traffic Telematics [19303w]

Coordinators: Bastian Chlond
Part of the modules: Transportation Ia (p. 97)[WI4INGBGU9], Transportation Ib (p. 98)[WI4INGBGU10]

ECTS Credits	Hours per week	Term	Instruction language
3	1/1	Winter term	de

Learning Control / Examinations
See module description.

Conditions
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.

Learning Outcomes

Content

Course: Basics in Transport Planning and Traffic Engineering [19027]

Coordinators: Peter Vortisch, Bastian Chlond
Part of the modules: Transportation Systems (p. 96)[WI4INGBGU8], Transportation Ia (p. 97)[WI4INGBGU9]

ECTS Credits	Hours per week	Term	Instruction language
3	1/1	Summer term	de

Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes
Provision of first insights into methodologies and techniques in the fields of transport planning and traffic engineering.

Content
The course is forming the fundamentals in the field as well the necessary technical knowledge. It is separated into two parts.

In the transport planning part the following basics are considered:

- content of the transport field
- definitions and terminology
- spatial representation
- transport relations in survey areas
- representation of spatial relationships in matrices
- information sources / data for transport demand modelling
- aggregated planning models (assignment)

In the second part the first basics of traffic engineering are considered:

- trajectories of vehicles on sections
- the fundamental diagram
- capacities and traffic loads on roads
- capacity considerations of unsignalized intersections
- fundamentals of traffic signaling and control

Course: Failure of Structural Materials: Fatigue and Creep [21715]

Coordinators: Gruber
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter term	de

Learning Control / Examinations
The assessment consists of an oral exa (30 min) according to Section 4(2), 2 of the examination regulation.

Conditions
None.

Learning Outcomes

- Mechanical Understanding of Load vs Material Strength
- Empirical Material Behavior
- Physical Understanding of Failure Phenomena
- Statistical Description of Failure
- Material Selection and Understanding Alloying Effects

Content
1 Fatigue
1.1 Introduction
1.2 Statistical Aspects
1.3 Lifetime
1.4 Fatigue Mechanisms
1.5 Material Selection
1.6 Thermomechanical Loading
1.7 Notches and Shape Optimization
1.8 Case Study: ICE-Desaster

2 Creep
2.1 Introduction
2.2 High Temperature Plasticity
2.3 Phänomenological DEsciption of Creep
2.4 Creep Mechanisms
2.5 Alloying Effects

Literature
Elective literature:

1. Engineering Materials, M. Ashby and D.R. Jones (2nd Edition, Butterworth-Heinemann, Oxford, 1998); sehr lesenswert, relativ einfach aber dennoch umfassend, verständlich
2. Mechanical Behavior of Materials, Thomas H. Courtney (2nd Edition, McGraw Hill, Singapur); Klassiker zu den mechanischen Eigenschaften der Werkstoffe, umfangreich, gut
3. Bruchvorgänge in metallischen Werkstoffen, D. Aurich (Werkstofftechnische Verlagsgesellschaft Karlsruhe), relativ einfach aber dennoch umfassender Überblick für metallische Werkstoffe
4. Fatigue of Materials, Subra Suresh (2nd Edition, Cambridge University Press); Standardwerk über Ermüdung, alle Materialklassen, umfangreich, für Einsteiger und Fortgeschrittene

Course: Failure of Structural Materials: Deformation and Fracture [21711]

Coordinators: Weygand
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter term	de

Learning Control / Examinations
The assessment consists of an oral exa (30 min) according to Section 4(2), 2 of the examination regulation.

Conditions
None.

Learning Outcomes

- Mechanical Understanding of Load vs Material Strength
- Empirical Material Behavior
- Physical Understanding of Failure Phenomena

Content
1. Introduction
2. linear elasticity
3. classification of stresses
4. Failure due to plasticity
* tensile test
* dislocations
* hardening mechanisms
* guidelines for dimensioning
5. composite materials
6. fracture mechanics
6.1 hypotheses for failure
6.2 linear elasic fracture mechanics
6.3 crack resitance
6.4 experimental measurement of fracture toughness
6.5 defect measurement
6.6 crack propagation
6.7 application of fracture mechanics
6.8 atomistics of fracture

Literature
Elective literature:

1. Engineering Materials, M. Ashby and D.R. Jones (2nd Edition, Butterworth-Heinemann, Oxford, 1998); sehr lesenswert, relativ einfach aber dennoch umfassend, verständlich
2. Mechanical Behavior of Materials, Thomas H. Courtney (2nd Edition, McGraw Hill, Singapur); Klassiker zu den mechanischen Eigenschaften der Werkstoffe, umfangreich, gut
3. Bruchvorgänge in metallischen Werkstoffen, D. Aurich (Werkstofftechnische Verlagsgesellschaft Karlsruhe), relativ einfach aber dennoch umfassender Überblick für metallische Werkstoffe

Course: Civil Law for Advanced [24650]

Coordinators: Peter Sester
Part of the modules: Private Business Law (p. 138)[WI4JURA5]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Summer term	de

Learning Control / Examinations

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.

Literature
Klunzinger, Eugen: Übungen im Privatrecht, Verlag Vahlen, ISBN 3-8006-3291-8, in der neuesten Auflage

Course: Law of Contracts [24671]

Coordinators: Peter Sester
Part of the modules: Private Business Law (p. 138)[WI4JURA5]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Summer term	de

Learning Control / Examinations

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.

Literature
Tba at the beginning of the course.

Course: Computer Contract Law [24583]

Coordinators: Michael Bartsch
Part of the modules: Intellectual Property Law (p. 137)[WI4JURA4]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Winter term	de

Learning Control / Examinations
The assessment consists of a written exam following §4, Abs. 2, 1 of the SPO.

Conditions
None.

Learning Outcomes
It is the aim of this course to provide students with knowledge in the area of contract formation and formulation in practice that builds upon the knowledge the students have already acquired concerning the legal protection of computer programs. Students shall understand how the legal rules depend upon, and interact with, the economic background and the technical features of the subject. The contract drafts shall be prepared by the students and will be corporately completed during the lecture. It is the aim of the course that students will be able to formulate contracts by themselves.

Content
The course deals with contracts from the following areas:

- Contracts of programming, licencing and maintaining software
- Contracts in the field of IT employment law
- IT projects and IT Outsourcing
- Internet Contracts

From these areas single contracts will be chosen and discussed (e.g. software maintenance, employment contract with a software engineer). Concerning the respective contract the technical features, the economic background and the subsumption in the national law of obligation (BGB-Schuldrecht) will be discussed. As a result different contractual clauses will be developed by the students. Afterwards typical contracts and conditions will be analysed with regard to their legitimacy as standard business terms (AGB). It is the aim to show the effects of the german law of standard business terms (AGB-Recht) and to point out that contracts are a means of drafting business concepts and market appearance.

Media
transparancies

Literature

- Langenfeld, Gerrit Vertragsgestaltung Verlag C.H.Beck, III. Aufl. 2004
- Heussen, Benno Handbuch Vertragsverhandlung und Vertragsmanagement Verlag C.H.Beck, II. Aufl. 2002
- Schneider, Jochen Handbuch des EDV-Rechts Verlag Dr. Otto Schmidt KG, III. Aufl. 2002

Elective literature:
tba in the transparencies

Remarks
The course is lectured in the winterterm 2011/12.

Course: Gear Cutting Technology [2149655]

Coordinators: Felten
Part of the modules: Specialization in Production Engineering (p. 125)[WI4INGMB22]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter term	de

Learning Control / Examinations
The assessment consists of an oral exam (30 min) taking place during the recess period (according to Section 4(2), 1 or 2) of the examination regulation).
The examination takes place every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes
The student

- has the knowledge about the presented content,
- understands the within the lecture taught theory of gears and gear cutting as well as the taught basics and characteristics of the covered gear cutting processes,
- is able to transfer the within the lecture learned knowledge about the basics of the gearing geometry and the manufacturing of gears on new problematic issues and
- is able to analyze and to evaluate the applicability of the taught processes and techniques for various problems.

Content
This lecture is focused on the demands of the modern manufacturing process of gears on the basis of the gearing geometry and the theory of gears and transmission types. For this purpose the processes for manufacturing various gearing types are covered, which are state of the technology in current operational practice. The subdivision of the processes is made in soft and hard machining, in each case in cutting and non-cutting methods. For the comprehensive understanding of the taught processes initially the description of the kinematics, the machine technology, the tools, the fields of application and the speciality as well as the current trends are made. Subsequent for the evaluation and classification in the fields of application and the capability of the processes finally the sequence of manufacturing of gears in mass production and the manufacturing errors are covered in the lecture.
The content of the lecture will be rounded off by demonstrative example parts and the possibility of the visit of real manufacturing environments within two short excursions to gear manufacturing companies.
Inhaltliche Schwerpunkte der Vorlesung:
1. History of gears
2. Basics of gearing geometry
3. Overview of processes for soft machining of gears (subdivided in cutting and non-cutting, description of particular kinematics, machine tools, tools and trends)
4. Overview of processes for hard machining of gears (subdivided in geometrically defined and geometrically undefined cutting edge, description of the particular kinematics, machine tools, tools and trends)
5. Processes for bevel gear manufacturing
6. Manufacturing errors of gears
7. Sequence of manufacturing in mass production

Course: Virtual Engineering for Mechatronic Products [2121370]

Coordinators: Jivka Ovtcharova, Stefan Rude
Part of the modules: Virtual Engineering (p. 88)[WI4INGMB22], Virtual Engineering B (p. 131)[WW4INGMB30], Virtual Engineering A (p. 130)[WW4INGMB29]

ECTS Credits	Hours per week	Term	Instruction language
4	3/0	Winter term	de

Learning Control / Examinations
The assessment is carried out as a general oral exam (20 min.) (according to Section 4(2), 2 of the examination regulation) of the single course of this module. The examination is offered every semester. Re-examinations are offered at every ordinary examination date. The overall grade of the module is the grade of the oral examination.

Conditions
None.

Recommendations
Knowledge of CAx is assumed. Therefore it is recommended to attend the course Virtual Engineering I [2121352] beforehand.

Learning Outcomes
Students should be able to apply the procedure of integrating mechatronic components in products.
Students should understand special requirements of functional networked systems.
Practical relevance of the methods are communicated with examples from automotive industry.

Content
The integration of mechatronic components in products alters geometry-oriented construction activities to function-oriented activities. In this context, the application of IT systems needs to be realigned. The lecture deals with the following issues:

- challenges in the construction process concerning the integration of mechatronic components in products;
- support of task clarification through requirements management;
- problem-solving on based on functional networked systems;
- implementation of solutions on the basis of electronics (sensors, actuators, networked control devices);
- manage distributed software systems through software engineering;
- challenges in tests and validation concerning required system quality.

Media
Lecture notes

Remarks
Block course, duration one week

Course: Virtual Engineering I [2121352]

Coordinators: Jivka Ovtcharova
Part of the modules: Virtual Engineering (p. 88)[WI4INGMB22], Virtual Engineering A (p. 130)[WW4INGMB29]

ECTS Credits	Hours per week	Term	Instruction language
6	2/3	Winter term	de

Learning Control / Examinations
The assessment is carried out as a general oral exam (30 min.) (according to Section 4(2), 2 of the examination regulation) of the single course of this module. The examination is offered every semester. Re-examinations are offered at every ordinary examination date. The overall grade of the module is the grade of the oral examination.

Conditions
The course Virtual Engineering I [2123352] is compulsory and must be examined in the module Virtual Engineering A [WW4IngMB29].

Learning Outcomes
Students are introduced to Product Lifecycle Management to understand its application in the scope of Virtual Engineering. They should be able to apply CAD/PLM systems in different phases of the product development process.
Furthermore, students should have an extensive knowledge of data models, specific modules and functions of CAD systems. They should be conscious about the IT fundament of CAx systems as well as integration issues and possible approaches.
Students are given an overview on various CAE analysis methods along with possible application, constraints and limitations. They learn about different functions of preprocessors, solvers and postprocessors in CAE systems, different approaches for integrating CAD/CAE systems including advantages and disadvantages of the methods.
Students will learn how to integrate CAM modules or systems with CAD systems and are able to define and simulate production processes in CAM modules. Fundamental understanding of the Virtual Engineering philosophy and virtual factory are communicated.
They should be able to identify the advantages of Virtual Engineering compared to conventional approaches.

Content
The lecture communicates IT aspects required for understanding virtual product development processes. For this purpose, the focus is set on systems used in industry supporting the process chain of Virtual Engineering:

- Product Lifecycle Management is an approach for managing product related data across the entire lifecycle of the product, beginning with the concept phase until disassembling and recycling.
- CAx-systems for virtual product development allow modeling digital products regarding design, construction, manufacturing and maintenance.
- Validation systems enable the analysis of products regarding statics, dynamics, safety and manufacturing feasibility.

The objective of the lecture is to clarify the relationship between construction and validation operations by applying virtual prototypes and VR/AR/MR visualization techniques in combination with PDM/PLM-systems. This is taught by introducing each particular system in applied exercises.

Media
Lecture notes

Course: Virtual Engineering II [2122378]

Coordinators:
Part of the modules: Virtual Engineering (p. 88)[WI4INGMB22], Virtual Engineering B (p. 131)[WW4INGMB30]

ECTS Credits	Hours per week	Term	Instruction language
4	2/1	Summer term	de

Learning Control / Examinations
The assessment is carried out as a general oral exam (20 min.) (according to Section 4(2), 2 of the examination regulation) of the single course of this module. The examination is offered every semester. Re-examinations are offered at every ordinary examination date. The overall grade of the module is the grade of the oral examination.

Conditions
The course Virtual Engineering II [2122378] is compulsory and must be examined in the module Virtual Engineering B [WW4IngMB30].

Recommendations
Knowledge of CAx is assumed. Therefore it is recommended to attend the course Virtual Engineering I [2121352] beforehand.

Learning Outcomes
Students are introduced to Virtual Reality, how to achieve stereoscopic visualization and which technologies can be used to create this effect.
They are able to model a scene in VR and store VR data structures. Students should understand the functionality of VR pipelines for visualizing scene. They should be familiar with several interaction systems and devices in a VR environment and should be able to assess the advantages and disadvantages of interaction and tracking devices.
Furthermore, they should know which validation tests could be carried out in product development processes with using virtual mock-up (VMU). The difference between VMU, physical mock-up (PMU) and virtual prototypes (VP) is introduced.
The vision of an integrated virtual product development is communicated to understand the challenges to achieve this vision.

Content
The lecture presents the IT aspects required for understanding virtual product development processes:

- Corresponding models can be visualized in Virtual Reality Systems, from individual parts to complete assembles.
- Virtual Prototypes combine CAD-data and information about properties of components and assemblies for immersive visualization, functionality tests and functional validation in VR/AR/MR environments.
- Integrated Virtual Product Development explains product development processes from the point of view of Virtual Engineering.

The objective of this lecture is to clarify the relationship between construction and validation operations by using virtual prototypes and VR/AR/MR visualization techniques in combination with PDM/PLM-systems. This will be achieved by introducing each particular IT-system with practical-oriented exercises.

Media
Lecture notes

Course: Virtual Reality Practical Course [2123375]

Coordinators: Jivka Ovtcharova
Part of the modules: Virtual Engineering B (p. 131)[WW4INGMB30]

ECTS Credits	Hours per week	Term	Instruction language
4	3	Summer term	de

Learning Control / Examinations
The assessment is carried out as assessment of another type (according to Section 4(2), 3 of the examination regulation) and is made up of a Presentation of the project work (40%), the individual project participation (30%), a written test (20%) and soft skills (10%).

Conditions
Limited number of participants, for selection procedure and registration see course homepage.

Learning Outcomes
The students are able to operate and use virtual reality hardware and software. They can:

- design complex tasks as team members
- solve subtasks in specific work packages keeping the interfaces in mind
- combining all parts to the final product.

Content
The lab course consists of:

1. Introduction and basics in virtual reality (hardware, software, application)
2. Introduction in 3DVIA Virtools tool kit as an application development system
3. IMplermentation and practice by developing a driving simulator in small groups.

Course: Theory of Economic Growth [2520543]

Coordinators: Marten Hillebrand
Part of the modules: Macroeconomic Theory (p. 57)[WI4VWL8], Innovation and growth (p. 59)[WW4VWLIWW1]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	en

Learning Control / Examinations
According to the attendance the assessment consists of a written or an oral exam at the beginning of the recess period (according to Section 4 (2), 1 or 2 of the examination regulation.
The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Recommendations
Basic knowledge in micro- and macroeconomics, as conveyed in the courses *Economics I: Microeconomics* [2600012] and *Economics II: Macroeconomics* [2600014], is assumed.
According the focus of the course quantitativ-mathematical modelling should be in participiant's interest.

Learning Outcomes

Content

Course: Heat Economy [2581001]

Coordinators: Wolf Fichtner
Part of the modules: Energy Industry and Technology (p. 50)[WI4BWLIIP5]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Summer term	de

Learning Control / Examinations
The assessment consists of a written exam according to Section 4(2), 1 of the examination regulation.

Conditions
None.

Learning Outcomes

Content

Media
Media will be provided on the e-learning platform ILIAS.

Course: Elective Foreig Languages [SQ HoC3]

Coordinators: House of Competence
Part of the modules: Seminar Module (p. 141)[WW4SEM]

ECTS Credits	Hours per week	Term	Instruction language
2-4	2-4	Winter / Summer Term	

Learning Control / Examinations

Conditions
Depending on the choice of the language and the level prior knowledge is assumed.
Basic level english language courses can only be attended if english language skills were not acquired in school before.

Learning Outcomes

Content

Course: Elective “Workshops for Competence and Creativity” [SQ HoC2]

Coordinators: House of Competence
Part of the modules: Seminar Module (p. 141)[WW4SEM]

ECTS Credits	Hours per week	Term	Instruction language
3	meist 2	Winter / Summer Term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Elective “Culture - Policy - Science - Technology” [SQ HoC1]

Coordinators: House of Competence
Part of the modules: Seminar Module (p. 141)[WW4SEM]

ECTS Credits	Hours per week	Term	Instruction language
3	meist 2	Winter / Summer Term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Literature
Will be announced in the respective course.

Course: Elective “Personal Fitness & Emotional Competence” [SQ HoC4]

Coordinators: House of Competence
Part of the modules: Seminar Module (p. 141)[WW4SEM]

ECTS Credits	Hours per week	Term	Instruction language
2-3	k.A.	Winter / Summer Term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Literature
Will be announced in the respective course.

Course: Elective “Tutor Programmes” [SQ HoC5]

Coordinators: House of Competence
Part of the modules: Seminar Module (p. 141)[WW4SEM]

ECTS Credits	Hours per week	Term	Instruction language
2 / 3	k.A.	Winter / Summer Term	de

Learning Control / Examinations

Conditions
The participation in this program requires that the student has been or will be a tutor for at least two semesters.
The application for this program takes place via the dean’s office and in consultation with the corresponding chair.

Learning Outcomes

Content

Course: Environment and Hygiene [19246]

Coordinators: Hilke Würdemann
Part of the modules: Environmental Management (p. 100)[WI4INGBGU12]

ECTS Credits	Hours per week	Term	Instruction language
1,5	1	Summer term	de

Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes
Sanitation issues in water and air

Content

- Pollotants in water, soil and air
- Emissions and reduction measures
- Drinking water treatment
- possibilities for drinking water treatment
- wastewater and sludge treatment
- agricultural use of sewage sludge (despite BSW and MKW)
- biological waste treatment

Media
Handouts

Course: Legislation of Water, Soil and Waste [19260]

Coordinators: E. Wolf
Part of the modules: Environmental Management (p. 100)[WI4INGBGU12]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
See module description.

Conditions
None.

Learning Outcomes

Content
Introduction

- sources of law
- legal terms
- EU, federal state

Water Rights

- water resources act (WHG) -> framework for Baden-Württemberg
- EU requirements

Water Act

- objectives
- principles and instruments
- water management
- water, sanitation, engineering
- environmental management

Waste Legislation

- summary of development
- from waste to recycling
- recycling and waste management act

Federal Soil Protection Act

- goals
- legal concept
- risk assessment
- remediation (investigation, planning, measures)

Literature
Legal texts (WHG, Krw-/AbfG, BBodSchG)
Elective literature:
Erbguth, Wilfried, Umweltrecht
Klöpfer, Michael, Umweltrecht

Course: Hydraulic Engineering and Water Ressource Management I [19055]

Coordinators: Franz Nestmann
Part of the modules: Understanding and Prediction of Disasters I (p. 115)[WI4INGINTER1], Understanding and Prediction of Disasters II (p. 116)[WI4INGINTER2], Understanding and Prediction of Disasters III (p. 117)[WI4INGINTER3]

ECTS Credits	Hours per week	Term	Instruction language
6	2/2	Winter term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Remarks
For further information, see http://www.iwk.uni-karlsruhe.de/kurse_grundfachstudium.php

Course: [19207]

Coordinators: Boris Lehmann
Part of the modules: Understanding and Prediction of Disasters I (p. 115)[WI4INGINTER1], Understanding and Prediction of Disasters II (p. 116)[WI4INGINTER2], Understanding and Prediction of Disasters III (p. 117)[WI4INGINTER3]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/1	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Remarks
For further information, see http://www.iwk.uni-karlsruhe.de/kurse_vertiefungsstudium.php

Course: Laboratory Work “Water” [22664]

Coordinators: F.H. Frimmel, G. Abbt-Braun
Part of the modules: Water Chemistry (p. 112)[WI4INGCV5], Water Chemistry I (p. 113)[WI4INGCV6]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter term	de

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 *Laboratory Work “Water”* [22664] ist prerequisited for admission to the module examination.

Conditions
None.

Learning Outcomes
The practical course gives theoretical and practical basics for water examination and water treatment. Knowledge from 22601, 22602 is deepened.

Content
4 technical and 4 water chemical experiments
1. lime solution experiment
2. Flocculation
3. Adsorption
4. Oxidation
5. Atom absorption spectrometry
6. Ion chromatography
7. HPLC
8. Sum parameters

Literature
Elective 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.

Remarks
The successful completion of the *Laboratory Work “Water”* [22664] ist prerequisited for admission to the module examination.

Course: Web Service Engineering [2511502]

Coordinators: Christian Zirpins
Part of the modules: Informatics (p. 60)[WI4INFO1], Emphasis in Informatics (p. 62)[WI4INFO2], Electives in Informatic (p. 64)[WI4INFO3]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations
The assessment consists of an oral exam (20 min) (following §4(2), 2 SPO).

Conditions
The course might be combined with the lecture “Service Oriented Computing 1”.

Learning Outcomes
Students will acquire a deep and systematic understanding of service-oriented software systems and their embedding in organizations. Equipped with practical and research-based knowledge, they will be enabled to engineer state-of-art service-oriented applications with Web technologies and gain a broad understanding of tools and methodologies for their own work.

Content
The lecture “Web Service Engineering” covers technical and organizational aspects with respect to the development of modern service-oriented software as socio-technical systems in enterprises and Web environments. It introduces background, state-of-technology and emerging trends of methods, tools and processes for application development with Web services. The topics of the lecture include e.g.:

- Web service foundations and base technologies
- Service-oriented software and enterprise architectures (SOA)
- SOA life cycle and development processes
- Analysis and requirements engineering for SOA
- Service-oriented design and modeling
- Construction and testing of Web service applications
- Web service development tools
- Trends: e.g. development with service mashups / cloud services

Media
Slides in PDF-format will be provided via the course webpages.

Literature
Compulsory literature will be announced in the course.

Course: Materials of Leightweight Construction [2174574]

Coordinators: Weidenmann
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Summer term	de

Learning Control / Examinations
The assessment consists of an oral exam (20-30 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation). The re-examination is offered upon agreement.

Conditions
Successfull completion of the course *Material Science I* [2125760].
Basic knowledge of natural science and knowledge of the content *Material Science II* [2126782] is recommended.

Learning Outcomes
The students know different lightweight materials, their composition, properties and fields of application and can apply this knowledge effectively and precisely.
They master the hardening mechanisms of lightweight materials and can transfer this knowledge to applied problems.
The students have a basic understanding of basic mechanical models of composites - mainly polymer matrix composites - and can depict differences in the mechanical properties depending on composition and structure.

Content

- Introduction
- Constructive, production-orientied and material aspects of lightweight construction
- Aluminium-based alloys
- Aluminium wrought alloys
- Aluminium cast alloys
- Magnesium-based alloys
- Magnesium wrought alloys
- Magnesium cast alloys
- Titanium-based alloys
- Titanium wrought alloys
- Titanium cast alloys
- High-strength steels
- High-strength structural steels
- Heat-treatable and hardenable steels
- Composites - mainly PMC
- Matrices
- Reinforcements

Media
lecture notes are handed out during the lecture

Literature
Elective literature:

- Anwendungstechnologie Aluminium: Ostermann, F., Springer-Verlag, ISBN: 978-3-540-23882-9, 2007
- Magnesium Technology: Friedrich, H.; Mordike, B. L., Springer-Verlag, ISBN: 978-3-540-20599-9, 2005
- Titanium: Lütjering, G.; Williams, J. C., Springer-Verlag, ISBN: 978-3-540-71397-5, 2007
- Handbuch der Verbundwerkstoffe: Neitzel, M.; Mitschang, P., Hanser Fachbuchverlag, ISBN: 978-3-446-22041-6, 2004
- Werkstoffe 2: Metalle, Keramiken und Gläser, Kunststoffe und Verbundwerkstoffe, Ashby, M. F.; Jones, D. R. H.; Heinzelmann, M. (Hrsg.), Spektrum Akademischer Verlag, ISBN: 978-3-8274-1709-1, 2007

Course: Material Science and Engineering III [2173553]

Coordinators: Wanner
Part of the modules: Specific Topics in Material Science (p. 86)[WI4INGMB18]

ECTS Credits	Hours per week	Term	Instruction language
6	4/1	Winter term	de

Learning Control / Examinations
The assessment consists of an oral exam (30-40 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation). The re-examination is offered upon agreement.

Conditions
The course *Material Science I* [2125760] is a prerequisite.
It is recommeded to have basic knowledge of natural science and knowledge of the content of the course *Material Science II* [2126782].

Learning Outcomes
The students are familiar with the thermodynamic foundations of phase transformations, the kinetics of phase transformations in the solid states (nucleation and growth phenomena), the mechanisms of microstructure formation and microstructure-property relationships. They can assess the effects of heat treatmens and of alloying on the microstructure and the properties of iron-based materials (steels in particular). The can select steels for structural applications in mechanical engineering and subject them to appropriate heat treatmens.

Content
Properties of pure iron; thermodynamic foundations of single-component and of binary systems; nucleation and growth; diffusion processes in crystalline iron; the phase diagram Fe-Fe3C; effects of alloying on Fe-C-alloys; nonequilibrium microstructures; multicomponent iron-based alloys; heat treatment technology; hardenability and hardenability tests.

Media
Lecture notes and working material will be released within the leture.

Literature
Elective literature:

1. VDEh: Werkstoffkunde Stahl, Bd. 1: Grundlagen, Springer-Verlag, 1984
2. Honeycombe, R., Bhadeshia, H.: Steels - Microstructure and Properties, Edward Arnold, 1995
3. Macherauch: Praktikum in Werkstoffkunde, 10. Aufl., 1992

Course: Machine Tools an Industrial Handling [2149900]

Coordinators: Jürgen Fleischer
Part of the modules: Machine Tools an Industrial Handling (p. 134)[WI4INGMB32]

ECTS Credits	Hours per week	Term	Instruction language
9	4/2	Winter term	de

Learning Control / Examinations
The assessment is carried out as written exam of 120 min (according to Section 4(2),1 of the examination regulation) of the course of this module.

Conditions
None.

Learning Outcomes
The student

- has knowledge about the application of machine tools.
- comprehends the assembly and the operation purpose of the major components of a machine tool.
- is able to apply methods of selection and assessment of production machines to new tasks.
- is able to assess the dimensioning of a machine tool.

Content
The lecture overviews the assembly, dimensioning and application of machine tools and industrial handling. A consolidated and practice oriented knowledge is imparted about the choice, dimensioning and assessment of production machines. At first, the major components of machine tools are explained systematically. At this, the characteristics of dimensioning of machine tools are described in detail. Finally, the application of machine tools is demonstrated by means of example machines of the manufacturing processes turning, milling, grinding, massive forming, sheet metal forming and toothing.

Literature
Script of the lecture

Course: Machine Tools and Industrial Handling II [2149901]

Coordinators: Munzinger
Part of the modules: Selected Chapters from Production Engineering II (p. 74)[WI4INGMB2], Selected Chapters from Production Engineering I (p. 73)[WI4INGMB1], Selected Chapters from Production Engineering III (p. 75)[WI4INGMB3]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Competition in Networks [26240]

Coordinators: Kay Mitusch
Part of the modules: Network Economics (p. 53)[WI4VWL4]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	de

Learning Control / Examinations
Result of success is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC). Examination is offered every semester and can be retried at any regular examination date.

Conditions
None.

Recommendations
Basics of microeconomics obtained within the undergraduate programme (B.Sc) of economics are required. Useful, but not necessary, are basic knowledge of industrial economics, prinicpal agent theory, and contract theory.

Learning Outcomes
The lecture provides the students with the basic economic understanding of network industries like telecom, utilities, IT and transport sectors.
Students are prepared for a possible job in the network industries. The student should get a vivid idea of the special characteristics of network industries concerning planning, competition, competitive distortion and state intervention. He should be able to apply abstract concepts and formal methods to use in these fields.

Content
Network or infrastructure industries like telecommunication, transport, and utilities form the backbone of modern economies. The lecture provides an overview of the economic characteristics of network industries. The planning of networks is complicated by the multitude of aspects involved (like spatial differentiation and the like). The interactions of different companies – competition or cooperation or both – are characterized by complex interdependencies within the networks: network effects, economies of scale, effects of vertical integration, switching costs, standardization, compatibility etc. appear increasingly in these sectors and even tend to appear in combination. Additionally, government interventions can often be observed, partly driven by the aims of competition policy and partly driven by the aims industrial policy. All these issues are brought up, analyzed formally (in part) and illustrated by several examples in the lecture.

Literature
Will be announced in the lecture.

Remarks
From WS 2010/2011 on, the lecture gets 4,5 instead of 5 credit points.

Course: Windpower [23381]

Coordinators: Lewald
Part of the modules: Electrical Power Engineering (p. 106)[WI4INGETIT4], Generation and transmission of renewable power (p. 109)[WI4INGETIT7]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Winter term	de

Learning Control / Examinations
The assessment consists of an oral exam (20 min) taking place at the beginn of the recess period (according to Section 4 (2), 2 of the examination regulation). The exam takes place in every winter semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes
The goal is to relay 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: Economics in Public Transport [19324]

Coordinators: Eberhard Hohnecker
Part of the modules: Project in Public Transportation (p. 93)[WI4INGBGU5]

ECTS Credits	Hours per week	Term	Instruction language
1	1	Winter term	de

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.

Conditions
See module description.

Learning Outcomes

Content
basics of economy; evaluation of planing; the transportation services as entrepreneur

Course: Economic Policy [2560280]

Coordinators: Axel Schaffer
Part of the modules: Economic Policy (p. 55)[WI4VWL6]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Seminar Economic Theory [SemWIOR2]

Coordinators: Clemens Puppe
Part of the modules: Seminar Module (p. 141)[WW4SEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations

Conditions
See corresponding module information.
At least one of the courses *Game Theory I* [2520525] and *Welfare Economics* [2520517] should have been attended beforehand.

Learning Outcomes

Content

Literature
Will be announced at the end of the recess period.

Course: Knowledge Management [2511300]

Coordinators: Rudi Studer
Part of the modules: Emphasis in Informatics (p. 62)[WI4INFO2], Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

Learning Control / Examinations
Written Examination (60 min) according to §4, Abs. 2, 1 of the examination regulations or oral examination of 20 minutes according to §4, Abs. 2, 2 of the examination regulations. The exam takes place every semester and can be repeated at every regular examination date.

Conditions
Basics in logic, e.g. from lecture Foundations of Informatics 1.

Learning Outcomes
Making students sensitive to the problems of corporate knowledge management, knowledge about the central dimensions of influence as well as of relevant technologies for supporting knowledge management.

Content
In modern companies, knowledge is increasingly important for fullfilling central tasks (such as continuous business process improvement, increasing innovation, increasing customer satisfaction, strategic planning etc). Therefore, knowledge management has become a critical success factor.
The lecture covers different types of knowledge that play a role in knowledge management, the corresponding knowledge processes (generation, capture, access and usage of knowledge) as well as methodologies for the introduction of knowledge management solutions.
The lecture will emphasize computer-based support for knowledge management, such as:

- Ontology-based Knowledge Management
- Communities of Practice, Collaboration Tools, Social Software
- Business-process Oriented Knowledge Management
- Personal Knowledge Management
- Case Based Reasoning (CBR)
- Linked Open Data

Media
Slides and scientific publications as reading material.

Literature

- I. Nonaka, H. Takeuchi: The Knowledge Creating Company. Oxford University Press 1995.
- G. Probst, S. Raub, K. Romhardt: Wissen managen: Wie Unternehmen ihre wertvollste Ressource optimal nutzen. Gabler, Wiesbaden, 5. überarb. Auflage, 2006.
- S. Staab, R. Studer (eds.): Handbook on Ontologies, ISBN 3-540-70999-1, Springer Verlag, 2009.
- A. Back, N. Gronau, K. Tochtermann: Web 2.0 in der Unternehmenspraxis - Grundlagen, Fallstudien und Trends zum Einsatz von Social Software. Oldenbourg Verlag München 2008.
- C. Beierle, G. Kern-Isberner: Methoden wissensbasierter Systeme, Vieweg, Braunschweig/Wiesbaden, 2. überarb. Auflage, 2005

Elective literature:

1. P. Hitzler, M Krötzsch, S. Rudolph, Y. Sure: Semantic Web: Grundlagen, ISBN 3-540-33993-0, Springer Verlag, 2008
2. Abecker, A., Hinkelmann, K., Maus, H., Müller, H.J., (Ed.): Geschäftsprozessorientiertes Wissensmanagement, Mai 2002.VII, 472 S. 70 Abb. Geb. ISBN 3-540-42970-0, Springer Verlag
3. Dieter Fensel. Spinning the Semantic Web. 2003 (ISBN 0262062321).
4. Tim Berners-Lee. Weaving the Web. Harper 1999 geb. 2000 Taschenbuch.

Course: Welfare Economics [2520517]

Coordinators: Clemens Puppe
Part of the modules: Allocation and Equilibrium (p. 56)[WI4VWL7], Social Choice Theory (p. 58)[WI4VWL9]

ECTS Credits	Hours per week	Term	Instruction language
4.5	2/1	Summer term	de

Learning Control / Examinations
The assessment consists of a written exam at the end of the semester (according to Section 4 (2), 1 or 2 of the examination regulation.
The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes

Content

Literature
Elective literature:

- J. Rawls: *A Theory of Justice*. Harvard University Press (1971)
- J. Roemer: *Theories of Distributive Justice*. Harvard University Press (1996)

Course: Workflow-Management [2511204]

Coordinators: Andreas Oberweis
Part of the modules: Informatics (p. 60)[WI4INFO1], Electives in Informatic (p. 64)[WI4INFO3], Emphasis in Informatics (p. 62)[WI4INFO2]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation in the first week after lecture period.

Conditions
Knowledge of course *Applied Informatics I - Modelling* [2511030] is expected.

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.

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

Elective 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.

198

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.

Inhaltsverzeichnis

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.

200

(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.

202

(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.

(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,

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.

(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

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.

§ 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)

212

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**

Index

F

G

H

I

K

L

M

N

O

T

U

V

W