Karlsruher Institut für Technologie

Industrial Engineering and Management (M.Sc.)

Summer Term 2014
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Department of Economics and Management

KIT - University of the State of Baden-Wuerttemberg and
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Department of Economics and Management
Karlsruhe Institute of Technology (KIT)
76128 Karlsruhe
www.wiwi.kit.edu

Contact: modul@wiwi.kit.edu

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Contents

1 Structure of the Master Programme in Industrial Engineering and Management (M.Sc.)

The master programme in Industrial Engineering and Management (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.

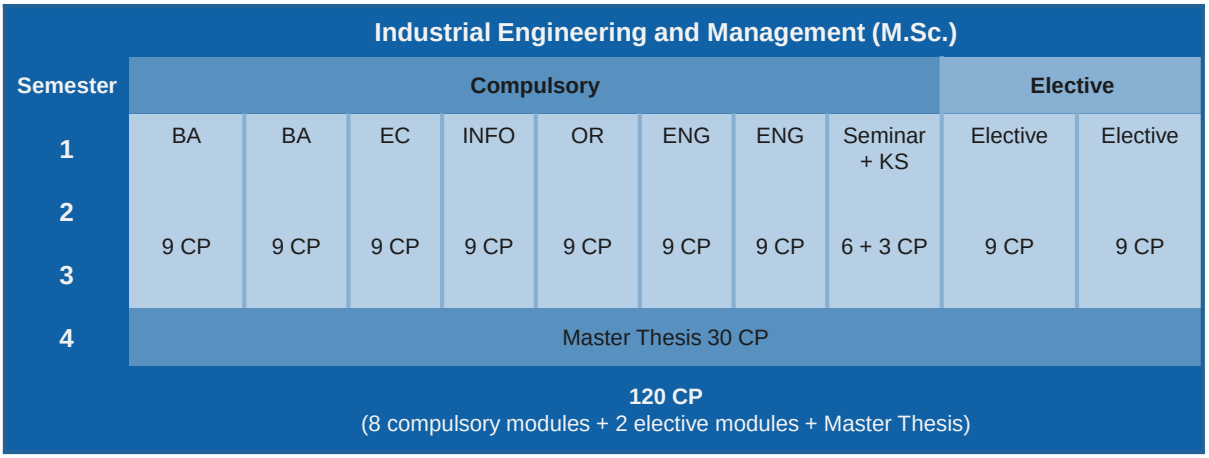

Figure 1: Structure of the Master Programme (Recommendation)

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 Industrial Engineering and Management (M.Sc.) at the Department of Economics and Management 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. Students may choose freely among the offered courses of HoC, ZAK and Sprachenzenrtum.

Art der Schlüsselqualifikation	Masterstudium				
	BWL	VWL	INFO	Seminar	Masterarbeit
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

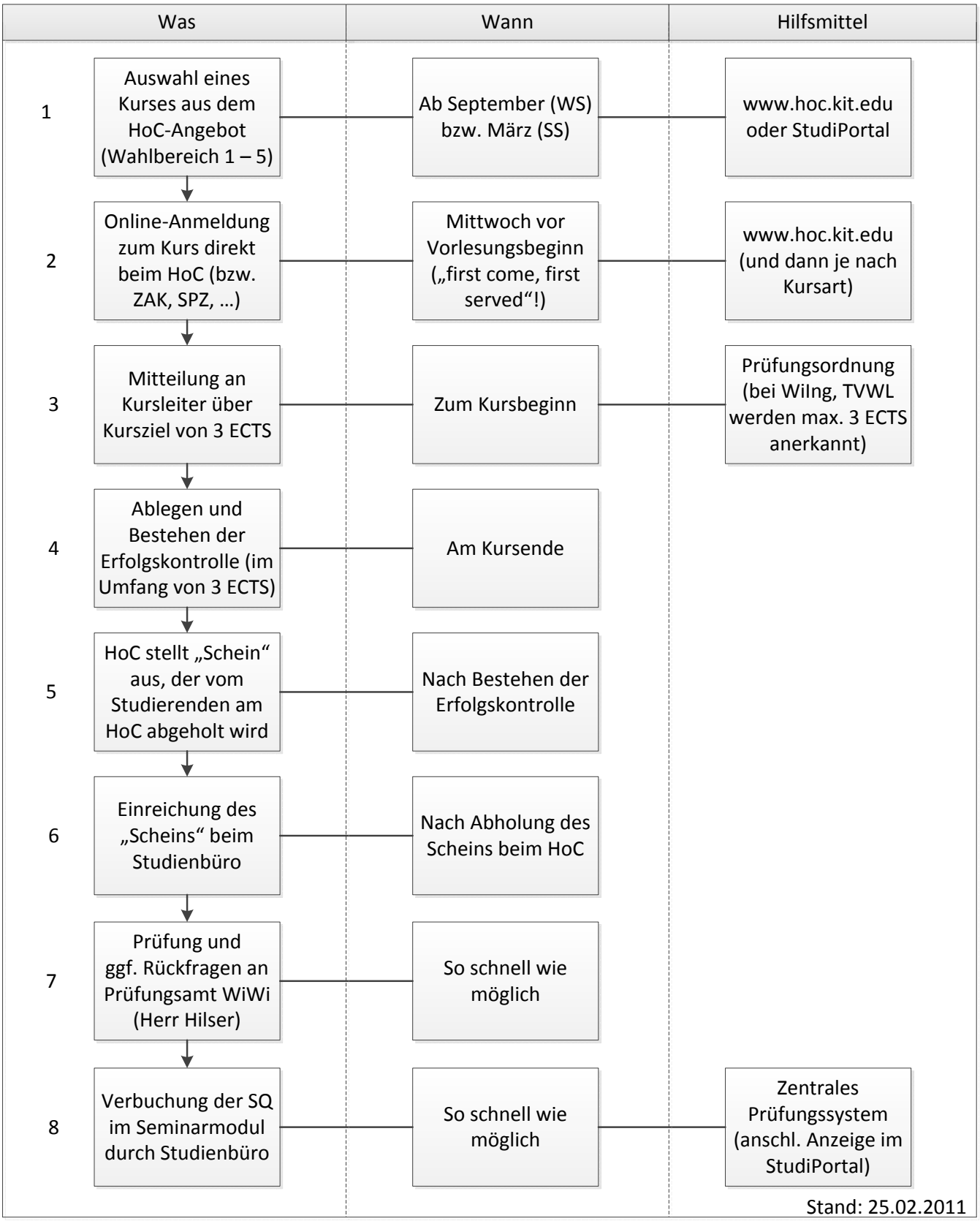

Figure 3: Process of gaining additive key skills

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://studium.kit.edu/Seiten/FAQ.aspx

Repeating exams

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

Bonus accomplishments and additional accomplishments

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

Further information

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

Used abbreviations

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.

WI4BWLISM5 - Communications & Markets (S. 25)

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 module will be offered latest until SS 2014.

WI4BWLISM7 - Information Engineering (S. 27)

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 course “Communications Economics” will be offered latest until summer term 2014. The examination will be offered latest until winter term 2014/15 (repeaters only).

WI4VWL9 - Social Choice Theory (S. 47)

Anmerkungen

See German version.

WI4VWL10 - Telecommunications Markets (S. 48)

Anmerkungen

The module will be offered latest until SS 2014.

WI4STAT1 - Mathematical and Empirical Finance (S. 67)

Anmerkungen

The course Portfolio and Asset Liability Management [2520357] will not be offered any more from summer term 2015 on. The examination will probably be offered latest until summer term 2014.
The course Stochastic Calculus and Finance [2521331] will not be offered any more from winter term 2014/2015 on. The examination will probably be offered latest until winter term 2013/14.

WI4INGMBWBK1 - Automated Manufacturing Systems (S. 90)

Erfolgskontrolle

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

5 Modules

5.1 Business Administration

Module: Finance 1 [WI4BWLFBV1]

Coordination: M. Uhrig-Homburg, M. 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	2/1	S	4,5	M. Uhrig-Homburg
2530212	Valuation	2/1	W	4,5	M. Ruckes
2530555	Asset Pricing	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.

Module: Finance 2 [WI4BWLFBV2]

Coordination: M. Uhrig-Homburg, M. 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	2/1	W	4,5	M. Uhrig-Homburg
2530214	Corporate Financial Policy	2/1	S	4,5	M. Ruckes
2530240	Market Microstructure	2/0	W	3	T. Lüdecke
2530565	Credit Risk	2/1	W	4,5	M. Uhrig-Homburg
2530210	Cost and Management Accounting	2/1	S	4,5	T. Lüdecke
2530555	Asset Pricing	2/1	S	4,5	M. Uhrig-Homburg, M. Ruckes
2530212	Valuation	2/1	W	4,5	M. Ruckes
2530550	Derivatives	2/1	S	4,5	M. Uhrig-Homburg
2530570	International Finance	2	S	3	M. Uhrig-Homburg, Dr. Walter
2530299	Business Strategies of Banks	2	W	3	W. Müller
2530296	Exchanges	1	S	1,5	J. Franke
2530232	Financial Intermediation	3	W	4,5	M. Ruckes
2540454	eFinance: Information Engineering and Management for Securities Trading	2/1	W	4,5	C. Weinhardt

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 *Finance 1* [WI4BWLFBV1]. The module is passed only after the final partial exam of *Finance 1* is additionally passed.

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

Content
The module Finance 2 is based on the module Finance 1. 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
Only in the winter term 2011/2012 the lecture Market Microstructure [2530240] could be replaced by the lecture eFinance: Information Engineering and Management for Securities Trading [2540454] within the corresponding module. Who wanted to replace it in this way had to make the first attempt at passing the examination at the regular examination dates of this winter term 2011/2012. The general regulation concerning the second attempt at passing the examination remains unchanged. The lecture eFinance: Information Engineering and Management for Securities Trading [2540454] must not be chosen in all other cases within this module.

Module: Insurance Management I [WI4BWLFBV6]

Coordination: U. 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)
2550055	Principles of Insurance Management	3/0	S	4,5	U. Werner
2530323	Insurance Marketing	3/0	S	4,5	E. Schwake
2530324	Insurance Production	3/0	W/S	4,5	U. Werner
2530050	Private and Social Insurance	2/0	W	2,5	W. Heilmann, K. Besserer
2530350	Current Issues in the Insurance Industry	2/0	S	2,5	W. Heilmann
2530335	Insurance Risk Management	2/0	S	2,5	H. Maser
INSGAME	P&C Insurance Simulation Game	3	W	3	U. Werner
2530353	International Risk Transfer	2/0	W	2,5	W. Schwehr
2530395	Risk Communication	3/0	W/S	4,5	U. Werner
2530355	Modelling, Measuring and Managing of Extreme Risks	2	S	2,5	U. Werner, S. Hochrainer
2530356	Seminar in Modelling, Measuring and Managing of Extreme Risks	2	S	3	U. Werner, S. 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
None.

Learning Outcomes
See German version.

Content
See German version.

Module: Insurance Management II [WI4BWLFBV7]

Coordination: U. 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	3/0	S	4,5	E. Schwake
2530324	Insurance Production	3/0	W/S	4,5	U. Werner
2530050	Private and Social Insurance	2/0	W	2,5	W. Heilmann, K. Besserer
2530350	Current Issues in the Insurance Industry	2/0	S	2,5	W. Heilmann
2530335	Insurance Risk Management	2/0	S	2,5	H. Maser
2530353	International Risk Transfer	2/0	W	2,5	W. Schwehr
2530395	Risk Communication	3/0	W/S	4,5	U. Werner
INSGAME	P&C Insurance Simulation Game	3	W	3	U. Werner
2550055	Principles of Insurance Management	3/0	S	4,5	U. Werner
2530355	Modelling, Measuring and Managing of Extreme Risks	2	S	2,5	U. Werner, S. Hochrainer
2530356	Seminar in Modelling, Measuring and Managing of Extreme Risks	2	S	3	U. Werner, S. 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 this module in combination with the module *Insurance Management I*. The module is passed only after the final partial exam of *Insurance Management I* has been passed.

Recommendations
The courses chosen from the modules Insurance Management I or Insurance Management II are supposed to complement each other. Advice and information is available from the person responsible for the examination process at the Insurance Department of FBV.

Learning Outcomes
See German version.

Content
See German version.

Remarks
See German version.

Module: Finance 3 [WI4BWLFBV11]

Coordination: M. Uhrig-Homburg, M. 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)
2530555	Asset Pricing	2/1	S	4,5	M. Uhrig-Homburg, M. Ruckes
2530212	Valuation	2/1	W	4,5	M. Ruckes
2530550	Derivatives	2/1	S	4,5	M. Uhrig-Homburg
2530260	Fixed Income Securities	2/1	W	4,5	M. Uhrig-Homburg
2530565	Credit Risk	2/1	W	4,5	M. Uhrig-Homburg
2530214	Corporate Financial Policy	2/1	S	4,5	M. Ruckes
2530240	Market Microstructure	2/0	W	3	T. Lüdecke
2530210	Cost and Management Accounting	2/1	S	4,5	T. Lüdecke
2530232	Financial Intermediation	3	W	4,5	M. Ruckes
2530296	Exchanges	1	S	1,5	J. Franke
2530299	Business Strategies of Banks	2	W	3	W. Müller
2530570	International Finance	2	S	3	M. Uhrig-Homburg, Dr. Walter
2540454	eFinance: Information Engineering and Management for Securities Trading	2/1	W	4,5	C. Weinhardt

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 *Finance 1*[WI4BWLFBV1] and *Finance 2* [WI4BWLFBV2]. The module is passed only after the final partial exams of *Finance 1 and Finance 2* are additionally passed.

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
Only in the winter term 2011/2012 the lecture Market Microstructure [2530240] could be replaced by the lecture eFinance: Information Engineering and Management for Securities Trading [2540454] within the corresponding module. Who wanted to replace it in this way had to make the first attempt at passing the examination at the regular examination dates of this winter term 2011/2012. The general regulation concerning the second attempt at passing the examination remains unchanged. The lecture eFinance: Information Engineering and Management for Securities Trading [2540454] must not be chosen in all other cases within this module.

Module: Strategic Corporate Management and Organization [WI4BWLUO1]

Coordination: H. 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	2	W	4,5	H. Lindstädt
2577902	Managing Organizations	2/0	W	4	H. Lindstädt
2577908	Modeling Strategic Decision Making	2	S	4,5	H. Lindstädt
2577900	Management and Strategy	2/0	S	4	H. Lindstädt
2577910	Problem solving, communication and leadership	1/0	S	2	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
None.

Learning Outcomes

Content
The module emphasizes the following aspects: The students learn models and frameworks which are used in strategic management and managing organizations. In addition, the module provides knowledge about management concepts and their practical application.
The module addresses three focal points: First, the students will learn models, frameworks and theoretical findings of the economic organization theory. Further, questions of a value-based concern leadership are discussed. Finally, the limitations of the basic models of economic decision theory are identified and advanced concepts are developed.

Module: Strategic Decision Making and Organization Theory [WI4BWLUO3]

Coordination: H. 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	2	W	4,5	H. Lindstädt
2577908	Modeling Strategic Decision Making	2	S	4,5	H. Lindstädt
2561127	Public Management	2	W	4,5	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: Management Accounting [WI4BWLIBU1]

Coordination: M. Wouters
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)
2579900	Management Accounting 1	2/2	S	4,5	M. Wouters
2579902	Management Accounting 2	2/2	W	4,5	M. Wouters

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 13 SPO) of the courses of this module. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
None.

Learning Outcomes
Students have knowledge about various management accounting techniques through study of literature and practice.

Content
The module consists of two courses “Management Accounting 1“ and “Management Accounting 2”. The emphasis is on structured learning of management accounting techniques.

Remarks
Students who like this module are probably also interested in the courses

- 2530216 Financial Management
- 2530210 Management Accounting

Module: Advanced CRM [WI4BWLISM1]

Coordination: A. 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	2/1	W	4,5	A. Geyer-Schulz
2540506	Recommender Systems	2/1	S	4,5	A. Geyer-Schulz
2540533	Personalization and Services	2/1	S	4,5	A. Sonnenbichler
2540518	Social Network Analysis in CRM	2/1	S	4,5	A. Geyer-Schulz
2540531	Business Dynamics	2/1	W	4,5	A. Geyer-Schulz, P. Glenn
2595501	Service Analytics	2/1	S	4,5	T. Setzer, H. Fromm

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 Social Network Analysis in CRM [2540518] is currently not offered.

Module: Electronic Markets [WI4BWLISM2]

Coordination: A. 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	Markets and Organizations: Principles	2/1	W	4,5	A. Geyer-Schulz
2540460	Market Engineering: Information in Institutions	2/1	S	4,5	C. Weinhardt, M. Adam
2561232	Telecommunication and Internet Economics	2/1	W	4,5	K. Mitusch
2540531	Business Dynamics	2/1	W	4,5	A. Geyer-Schulz, P. Glenn

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

Module: Market Engineering [WI4BWLISM3]

Coordination: C. 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	2/1	S	4,5	C. Weinhardt, M. Adam
2590408	Auction Theory	2/1	W	4.5	K. Ehrhart
2540454	eFinance: Information Engineering and Management for Securities Trading	2/1	W	4,5	C. Weinhardt
2590458	Computational Economics	2/1	W	4,5	P. Shukla, S. Caton
2540489	Experimental Economics	2/1	W	4,5	M. Adam, C. Weinhardt
2540464	eEnergy: Markets, Services, Systems	2/1	S	4,5	C. van Dinther, 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 *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.

Module: Business & Service Engineering [WI4BWLISM4]

Coordination: C. 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)
2540456	Business Models in the Internet: Planning and Implementation	2/1	S	4,5	H. Gimpel, R. Knapper
2540498	Special Topics in Information Engineering & Management	3	W/S	4,5	C. Weinhardt
2540506	Recommender Systems	2/1	S	4,5	A. Geyer-Schulz
2540533	Personalization and Services	2/1	S	4,5	A. Sonnenbichler
2595468	Service Innovation	2/1	S	5	G. Satzger, M. Kohler, N. Feldmann
2595477	Practical Seminar Service Innovation	3		5	G. Satzger, M. Kohler, H. Fromm, N. Feldmann

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: C. 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	2/1	S	4,5	J. Kraemer
2540460	Market Engineering: Information in Institutions	2/1	S	4,5	C. Weinhardt, M. Adam
2590408	Auction Theory	2/1	W	4.5	K. Ehrhart
2540498	Special Topics in Information Engineering & Management	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.
The module will be offered latest until SS 2014.

Module: Service Management [WI4BWLISM6]

Coordination: C. Weinhardt, H. Fromm
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)
2595484	Business and IT Service Management	2/1	W	5	G. Satzger, J. Kunze von Bischhoffshausen
2595468	Service Innovation	2/1	S	5	G. Satzger, M. Kohler, N. Feldmann
2595501	Service Analytics	2/1	S	4,5	T. Setzer, H. Fromm
2595505	Industrial Services	2/1	W	4,5	H. Fromm, P. Korevaar

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

Learning Outcomes
The students

- understand the basics of developing and managing IT-based services,
- understand and apply OR methods in service management,
- systematically use vast amounts of available data for planning, operation, personalization and improvement of complex service offerings, and
- understand and analyze innovation processes in corporations.

Content
The module service management addresses the basics of developing and managing IT-based services. The lectures contained in this module teach the basics of developing and managing IT-based services and the application of OR methods in the field of service management. Moreover, students learn to systematically analyze vast amounts of data for planning, operation and improvement for complex service offerings. These tools enhance operational and strategic decision support and help to analyze and understand the overall innovation processes in corporations. Current examples from research and industry demonstrate the relevance of the topics discussed in this module.

Remarks
In the summer term fo 2012, the lectures eServices and Management of Business Networks were taken out of this module. They will be continued to be offerd exclusively in the Bachelor modules. Modules correctly opened before the summer term, are not affected by this change.

Module: Information Engineering [WI4BWLISM7]

Coordination: C. 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	2/1	W	5	H. Gimpel, W. Michalk
2540462	Communications Economics	2/1	S	4,5	J. Kraemer
2540460	Market Engineering: Information in Institutions	2/1	S	4,5	C. Weinhardt, M. Adam
2540498	Special Topics in Information Engineering & Management	3	W/S	4,5	C. Weinhardt
2540464	eEnergy: Markets, Services, Systems	2/1	S	4,5	C. van Dinther, 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 *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 course "Communications Economics" will be offered latest until summer term 2014. The examination will be offered latest until winter term 2014/15 (repeaters only).

Module: Industrial Production II [WI4BWLIIP2]

Coordination: F. 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	2/2	W	5,5	F. Schultmann
2581962	Emissions into the Environment	2/0	W	3,5	U. Karl
2581995	Material Flow Analysis and Life Cycle Assessment	2/0	W	3,5	L. Schebek
2581956	International Production	2/0	W	3,5	H. Sasse

Learning Control / Examinations
The assessment is carried out as partial exams (according to section 4 (2), 1 SPO) of the core course *Planning and Managing of Industrial Plants* [2581952] and one further single course of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
The course *Planning and Managing of Industrial Plants* [2581952] and at least one additional activity are compulsory and must be examined.

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.

Remarks
Apart from the core course the courses offered are recommendations and can be replaced by courses from the Module Industrial Production III.

Module: Energy Economics and Energy Markets [WI4BWLIIP4]

Coordination: W. 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	2/1	W	3,5	W. Fichtner
2581020	Energy Trade and Risk Management	2/1	S	3,5	K. Hufendiek
2581959	Energy Policy	2/0	S	3,5	M. Wietschel
2581022	Gas-Markets	2/0	W	3	A. Pustisek
2581025	Simulation Game in Energy Economics	2/0	S	3	W. Fichtner
2560234	Regulation Theory and Practice	2/1	S	4,5	K. Mitusch
2540464	eEnergy: Markets, Services, Systems	2/1	S	4,5	C. van Dinther, C. Weinhardt

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
The lecture *Basics of Liberalised Energy Markets* [2581998] has to be examined.

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

Learning Outcomes
The student

- gains detailed knowledge about the new requirements of liberalised energy markets,
- describes the planning tasks on the different energy markets,
- knows solution approaches to respective planning tasks.

Content
Basics of Liberalised Energy Markets: The European liberalisation process, energy markets, pricing, market failure, investment incentives, market power
Energy Trade and Risk Management: trade centres, trade products, market mechanisms, position and risk management
Gas-Markets: producing countries, provision structures, market places, pricing
Energy Policy: Management of energy flows, energy-political targets and instruments (emission trading etc.)
Simulation Game in Energy Economics: Simulation of the German electricity system

Module: Energy Economics and Technology [WI4BWLIIP5]

Coordination: W. 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	2/1	S	4,5	U. Karl, n.n.
2581958	Strategical Aspects of Energy Economy	2/0	W	3,5	A. Ardone
2581000	Technological Change in Energy Economics	2/0	W	3	M. Wietschel
2581001	Heat Economy	2/0	S	3	W. Fichtner
2581002	Energy Systems Analysis	2/0	W	3	V. Bertsch
2581006	Efficient Energy Systems and Electric Mobility	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.

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

Learning Outcomes
The student

- gains detailed knowledge about present and future energy supply technologies (focus on final energy carriers electricity and heat),
- knows the techno-economic characteristics of plants for energy provision, for energy transport as well as for energy distribution and demand,
- is able to assess the environmental impact of these technologies.

Content
Strategical Aspects of Energy Economy: Long-term planning methods, generation technologies
Technological Change in Energy Economics: Future energy technologies, learning curves, energy demand
Heat Economy: district heating, heating technologies, reduction of heat demand, statutory provisions
Energy Systems Analysis: Interdependencies in energy economics, energy systems modelling approaches in energy economics
Energy and Environment: emission factors, emission reduction measures, environmental impact
Efficient Energy Systems and Electric Mobility: concepts and current trends in energy efficiency, Overview of and economical, ecological and social impacts through electric mobility

Module: Industrial Production III [WI4BWLIIP6]

Coordination: F. 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	2/2	S	5,5	M. Fröhling
2581963	The Management of R&D Projects with Case Studies	2/2	W/S	3,5	H. Schmied
2581961	Supply Chain Management with Advanced Planning Systems	2	S	3,5	M. Göbelt, C. Sürie
2581992	Risk Management in Industrial Supply Networks	2/0	W	3,5	M. Wiens
2581957	Supply Chain Management in the automotive industry	2/0	W	3,5	T. Heupel, H. Lang

Learning Control / Examinations
The assessment is carried out as partial exams (according to section 4 (2), 1 SPO) of the core course *Production and Logistics Management* [2581954] 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 *Production and Logistics Management* [2581954] and at least one additional activity are compulsory and must be examined.

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.

Remarks
Apart from the core course the courses offered are recommendations and can be replaced by courses from the Module Industrial Production II.

Module: Marketing Management [WI4BWLMAR5]

Coordination: M. Klarmann
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)
2571154	Product and Innovation Marketing	2/0	S	3	M. Klarmann
2571150	Market Research	2/1	S	4,5	M. Klarmann
2572167	Behavioral Approaches in Marketing	2/1	W	4,5	B. Neibecker
2571165	Strategic and Innovative Decision Making in Marketing	2/1	S	4,5	B. Neibecker
2572184	Business Plan Workshop	1	S	3	M. Klarmann, O. Terzidis
2571176	Marketing Strategy Business Game	1	S	1,5	M. Klarmann, Mitarbeiter
2571185	Strategic Brand Management	1/0	S	1,5	M. Klarmann, J. Blickhäuser

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the 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
Only one of the following courses can be counted towards the final grade of the module:
Marketing Strategy Business Game, Business Plan Workshop or Strategic Brand Management.

Learning Outcomes

Content
The aim of this module is to deepen central marketing contents in different areas. Therefore the students can choose between the following marketing courses:

- “Product and Innovation Marketing”
- “Market Research” – this course has to be completed successfully by students interested in seminar or master thesis positions at the chair of marketing
- “Strategic and Behavioral Marketing”
- “Strategic and Innovative Decision Making in Marketing”
- “Business Plan Workshop”
- “Marketing and Strategy Business Game”

Remarks
For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

Module: Sales Management [WI4BWLMAR6]

Coordination: M. Klarmann, M. Artz
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)
2572156	Sales Management and Retailing	2	W	3	M. Klarmann
2572157	Pricing	2	W	3	M. Klarmann
2571150	Market Research	2/1	S	4,5	M. Klarmann
2572182	Case Studies in Pricing	1	W	1,5	M. Klarmann, Mitarbeiter
2572180	Sales Strategy and Control	1	W	1,5	M. Artz

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the 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

Content
The aim of the module is to deepen the sales management knowledge of the students. Theoretical approaches often have a combined view on marketing and sales, whereas in practical surroundings the sales department is completely separated from the marketing tasks. Given this fact, we concentrate on pure sales management topics and address different facets of the sales management. Students can choose between the following courses:

- “Sales Management and Retailing”
- “Pricing”
- “Market Research” - this course has to be completed successfully by students interested in seminar or master thesis positions at the chair of marketing
- “Case Studies in Pricing”
- “Sales Strategy and Control”

Remarks
For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

Module: Strategy, Communication, and Data Analysis [WI4BWLMAR7]

Coordination: B. Neibecker
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)
2572167	Behavioral Approaches in Marketing	2/1	W	4,5	B. Neibecker
2571165	Strategic and Innovative Decision Making in Marketing	2/1	S	4,5	B. Neibecker
2571162	Information Technology and Business Information	2/1	S	4,5	B. Neibecker
2572157	Pricing	2	W	3	M. Klarmann

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the 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
Beyond the learning outcomes given with the individual courses the module open the possibility for a systematic consolidation in marketing.

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 drivers of success 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. In addition, consumer behavior approaches in marketing are discussed as an important research area with a strong interdisciplinary and empirical orientation.

Remarks
For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

Module: Entrepreneurship (EnTechnon) [WI4BWLENT1]

Coordination: O. Terzidis, A. Presse
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)
2545001	Entrepreneurship	2	W/S	3	O. Terzidis, W. Runge, A. Presse
2545010	Design Thinking	2	W/S	3	O. Terzidis, B. Kneisel, Dr. H. Haller
2545005	Business Planning	2	W/S	3	O. Terzidis, A. Presse, J. Stohr
2545024	Developing and Validating Business Ideas	2	W	3	H. Haller, C. Hardt, M. Völkel
2545012	Entrepreneurial Leadership & Innovation Management	2	W	3	O. Terzidis, C. Linz
2545003	Managing New Technologies	2/1	S	5	T. Reiß
2572184	Business Plan Workshop	1	S	3	M. Klarmann, O. Terzidis
2545015	Innovation Management	2	S	3	M. Weissenberger-Eibl
2540456	Business Models in the Internet: Planning and Implementation	2/1	S	4,5	H. Gimpel, R. Knapper
2513305	Developing Business Models for the Semantic Web	2	W	3	R. Studer, M. Maleshkova, F. Keppmann
2545019	Case studies seminar: Innovation management	2	W	3	M. Weissenberger-Eibl
2545016	Roadmapping	2	S	3	D. Koch

Learning Control / Examinations
See German version.

Conditions
None.

Learning Outcomes

Content

Module: Innovation Management [WI4BWLENT2]

Coordination: M. Weissenberger-Eibl
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)
2545015	Innovation Management	2	S	3	M. Weissenberger-Eibl
2545016	Roadmapping	2	S	3	D. Koch
2545017	Technology Assessment	2	S	3	D. Koch
2545018	Technologies for Innovation Management	2	W	3	D. Koch
2545019	Case studies seminar: Innovation management	2	W	3	M. Weissenberger-Eibl
2545020	Knowledge Transfer in Innovation Management	2	W	3	M. Weissenberger-Eibl, P. Roth
2545018	Current issues in Innovation Management	2	W/S	3	M. Weissenberger-Eibl
2545001	Entrepreneurship	2	W/S	3	O. Terzidis, W. Runge, A. Presse
2545010	Design Thinking	2	W/S	3	O. Terzidis, B. Kneisel, Dr. H. Haller
2545012	Entrepreneurial Leadership & Innovation Management	2	W	3	O. Terzidis, C. Linz

Learning Control / Examinations
See German version.

Conditions
The lecture “Innovation Management” and one of the seminars of the chair for Innovation and Technology Management are compulsory. The second seminar can be chosen from the courses of the module.

Recommendations
None.

Learning Outcomes
Students develop a comprehensive understanding of the innovation process and its conditionality. There is an additional focus on the concepts and processes which are of particular relevance with regard to shaping the entire process. Various strategies and methods are then taught based on this.
After completing the module, students should have developed a systemic understanding of the innovation process and be able to shape this by developing and applying suitable methods.

Content
The Innovation Management lecture course teaches concepts, strategies and methods which help students to form a systemic understanding of the innovation process and how to shape it. Building on this holistic understanding, the seminar courses then go into the subjects in greater depth and address specific processes and methods which are central to innovation management.

Module: Service Analytics [WI4BWLKSR1]

Coordination: H. Fromm, C. Weinhardt
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)
2595501	Service Analytics	2/1	S	4,5	T. Setzer, H. Fromm
2595505	Industrial Services	2/1	W	4,5	H. Fromm, P. Korevaar
2540498	Special Topics in Information Engineering & Management	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 Service Analytics [2595501] is compulsory and must be examined.

Recommendations
Basic knowledge of Operations Research, Descriptive Statistics, and Inferential Statistics is assumed.

Learning Outcomes
The student should learn to

- Understand different scenarios where analytics is applied in a service context
- Distinguish different analytics methods and concepts and learn when to apply them
- Apply analytics tools in a service context
- Analyze and solve real-world business problems through leveraging analytics

Content
Modern economies have turned into “servitized” economies – with almost 70% of the gross value added being derived from the tertiary sector and with an increasing number of industrial companies proceeding to engage in service-type offerings. The adoption of analytics applied to services for leveraging the full potential of big data is still in its infancy - some areas like web analytics are more advanced, some other areas are just starting. This module strives to provide an overview on analytics methods applied in a service context and introduces different scenarios where analytics is applied to improve different kinds of services. The module offers the opportunity to apply and deepen this knowledge in hands-on tutorials and seminars.

Module: Service Design Thinking [WI4BWLKSR2]

Coordination: C. 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)
2595600	Service Design Thinking	6	W/S	9	C. Weinhardt

Learning Control / Examinations
The assessment is carried out as a general exam (according to Section 4(2), 3 of the examination regulation). The overall grade of the module is the grade of the examination (according to Section 4(2), 3 of the examination regulation).

Conditions
The course Service Design Thinking is compulsory and must be examined.

Recommendations
This course is held in English – proficiency in writing and communication is required.

Learning Outcomes

- Deep knowledge of the innovation method “Design Thinking”, as introduced and promoted by Stanford University
- Development of new, creative solutions through extensive observation of oneself and one’s environment, in particular with regard to the relevant service users
- Know how to use prototyping and experimentation to visualize one’s ideas, to test and iteratively develop them, and to converge on a solution
- Communicate, work and present in an interdisciplinary and international project setting

Content

- Paper Bike: Learning about the basic method elements by building a paper bike that has to fulfill a given set of challenges.
- Design Space Exploration: Exploring the problem space through customer and user observation.
- Critical Function Prototype: Identification of critical features from the customer’s perspective that can contribute to the solution of the overarching problem. Building and testing prototypes that integrate these functionalities.
- Dark Horse Prototype: Inverting earlier assumptions and experiences, which leads to the inclusion of new features and solutions.
- Funky Prototype: Integration of the individually tested and successful functions to a complete solution, which is further tested and developed.
- Functional Prototype: Further selection and convergence of existing ideas. Building a higher resolution prototype that can be tested by customers.
- Final Prototype: Preparing and presenting the final solution to the customer.

Remarks
Due to the project nature of the course, the number of participants is limited. For further information see the course description.

Module: Real Estate Economics and Sustainability [WI4BWLÖÖW1]

Coordination: D. Lorenz
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Business Administration

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)
2586407/2586408	Real Estate Economics and Sustainability Part 1: Basics and Valuation	2/1	W	4,5	D. Lorenz
2585406/2585407	Real Estate Economics and Sustainability Part 2: Reporting and Rating	2/1	S	4,5	D. Lorenz

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 examination for the courses generally consist of a 60 minute written exam. A 20 minute oral exam is only offered after the second failure of the written exam. The exams for the respective parts (Part 1: Basics and Valuation and Part 2: Reporting and Rating) happen in the same semester in which the lectures take place.
Therefore, Part I currently only takes place in the winter semester and Part II takes place in the summer semester. In each semester there are two alternative dates for the exam and exams can be re-sat at any regular exam date.
The overall grade of the module is the average of the grades of each course weighted by the credits and truncated after the first decimal.
It is possible to include the grade of a seminar paper, dealing with a topic from the area of Real Estate Economics and Sustainability, into the final grade of the module (according to Section 4(2), 3 of the examination regulation). The seminar has a weight of 20 percent.

Conditions
None.

Recommendations
A combination with courses in the area of
• Finance
• Insurance
• Civil engineering and architecture
is recommended.
Particularly recommended is the successful completion of the following Bachelor-Modules:
- Real Estate Management I and II
- Design, Construction and Assessment of Green Buildings I and II

Learning Outcomes
The student

- possesses an overview of key interrelationships within the real estate industry concerning macro- and microeconomic questions as well as the interaction of the industry's key players;
- is aware of the basics concerning the sustainable development debate and knows about the possible contribution of buildings and the real estate industry to a more sustainable development;
- knows the basics, key methods and tools of property valuation and is able to apply them;
- is aware of the key influencing factors of a building's market value and is able to factor in sustainability considerations into market value estimates;
- possess an overview of important other methods and processes – besides property valuation – which are applied within the real estate industry to assess property related risks (e.g. property ratings) and to communicate property performance towards third parties (e.g. sustainability assessment of buildings and sustainability reporting of companies).

Content
The implementation of sustainable development principles within the real estate industry requires taking into account sustainability considerations within real estate related procedures and decision making processes. Within this context, property valuation and valuation professionals play an important role.
Property valuations are carried out in almost any phase of the building life cycle and support, for example, financing as well as by and sell decisions.
Valuation methods and procedures, however, have to be adjusted to changing market participants' preferences and their willingness to pay. For this reason, the issue of "valuation and sustainability" is of particular topicality and relevance.
Within the real estate industry professionals are sought which combine micro- and macroeconomic knowledge and real estate specific expertise with knowledge and skills regarding the sustainability of buildings and building stocks.
The real estate industry offers attractive working and career opportunities. This teaching module / course therefore offers insights into key methods applied within the real estate industry (particularly valuation) and places them into the context of sustainable development. The focus of the module / course, however, is not only on theoretical content but also on the provisioning of linkages to real estate practice; this will be realized, amongst other issues, by practical tutorials which are offered in addition to the course lectures.

Remarks
See German version.

5.2 Economics

Module: Applied Strategic Decisions [WI4VWL2]

Coordination: P. Reiss
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)
n.n.	Advanced Game Theory	2/1	W	4,5	P. Reiss, C. Puppe
2590408	Auction Theory	2/1	W	4.5	K. Ehrhart
2540460	Market Engineering: Information in Institutions	2/1	S	4,5	C. Weinhardt, M. Adam
2540489	Experimental Economics	2/1	W	4,5	M. Adam, C. Weinhardt
2520402/ 2520403	Predictive Mechanism and Market Design	2/1	W	4,5	P. Reiss
2530214	Corporate Financial Policy	2/1	S	4,5	M. Ruckes
2530232	Financial Intermediation	3	W	4,5	M. Ruckes
2520365	Decision Theory	2/1	S	4,5	K. Ehrhart

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 *Advanced Game Theory* is obligatory. Exception: The course *Introduction to Game Theory* [2520525] was completed.

Recommendations
Basic knowledge in game theory is assumed.

Learning Outcomes
Students

- can model and analyze complex situations of strategic interaction using advanced game theoretic concepts;
- are provided with essential and advanced game theoretic solution concepts on a rigorous level and can apply them to understand real-life problems;
- learn about the experimental method, ranging from designing an economic experiment to data analysis.

Content
The module provides solid skills in game theory and offers a broad range of game theoretic applications. To improve the understanding of theoretical concepts, it pays attention to empirical evidence as well.

Remarks
The course *Advanced Game Theory* is not offered before Winter 2014/15.
The course *Predictive Mechanism and Market Design* is not offered each year.

Module: Economic Policy II [WI4VWL3]

Coordination: J. 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	2/1	W	4,5	J. Kowalski
2560236	Innovationtheory and -policy	2/1	S	4,5	I. Ott
2560254	International Economic Policy	2/1	S	4,5	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: K. 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	2/1	W	4,5	K. Mitusch
2560234	Regulation Theory and Practice	2/1	S	4,5	K. Mitusch
2560230	Transport Economics	2/1	S	4,5	G. Liedtke, E. Szimba
2561232	Telecommunication and Internet Economics	2/1	W	4,5	K. Mitusch
2520527	Advanced Topics in Economic Theory	2/1	S	4,5	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, unless it has been passed during the Bachelor studies.

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: K. 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	2/1	W	5	R. Walz
2560548	Environmental and Ressource Policy	2	S	4	R. Walz
2581003	Energy and Environment	2/1	S	4,5	U. Karl, n.n.
24140	Environmental Law	2	W	3	G. Sydow
2560230	Transport Economics	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
Environmental degradation and increasing resource use are global challenges, which have to be tackled on a worldwide level. The module addresses these challenges from the perspective of economics, and imparts the fundamental knowledge of environmental and sustainability economics, and environmental and resource policy to the students. Additional courses address environmental law, environmental pressure, and applications to the transport sector.

Module: Allocation and Equilibrium [WI4VWL7]

Coordination: C. 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	2/1	S	4,5	M. Hillebrand, K. Mitusch
2520517	Welfare Economics	2/1	S	4,5	C. Puppe
25549	Theory of Business Cycles	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.

Conditions
None.

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

Learning Outcomes

Content

Remarks
See German version.

Module: Macroeconomic Theory [WI4VWL8]

Coordination: M. Hillebrand
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	2/1	S	4,5	M. Hillebrand
25549	Theory of Business Cycles	2/1	W	4,5	M. Hillebrand
2561503	Theory of endogenous growth	2/1	W	4,5	I. Ott

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.

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: C. 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	2/1	S	4,5	C. Puppe
2520525	Introduction to Game Theory	2/1	S	4,5	C. Puppe, P. Reiss
25539	Mathematical Theory of Democracy	2/1	W	4,5	A. Melik-Tangyan

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.

Conditions
None.

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

Learning Outcomes

Content

Remarks
See German version.

Module: Telecommunications Markets [WI4VWL10]

Coordination: K. Mitusch
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)
2561232	Telecommunication and Internet Economics	2/1	W	4,5	K. Mitusch
2540462	Communications Economics	2/1	S	4,5	J. Kraemer

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
None.

Learning Outcomes
The module shall provide students with a general understanding of the economic correlations and structures of modern telecommunications markets. A broad overview over market structures, actors and relations of the different markets will be given and students shall acquire the means to analyze the interactions between different actors both qualitatively and by applying methods of industrial economics. On this basis students are able to examine practical issues from different perspectives and to assess the different practices.

Content
Accompanied by rapid technological developments the telecommunications markets have undergone substantial changes since their liberalization in the late 90s. Besides the former state-owned monopoly incumbents, a large number of new actors has established on different levels of the industry. While particularly on the service level, intensive competition has developed, some infrastructure elements still qualify as natural monopolies and are subject to regulation. With the rising number of actors, services and applications the economic correlations of these markets are getting more and more complex. Growing data volumes and technological developments give rise to ne new infrastructure investments. Actors have to consider direct and indirect network effects as they operate on several markets simultaneously and regulators need to keep the balance between fostering competition and incentivizing investments. The rapidly developing markets pose many issues that are worth to be discussed.
The two sector specific courses are complementary and address the most relevant aspects and economic effects that have influenced the development of telecommunications markets in the recent past and will most probably influence them in the future. For some topics the methods of industrial economics are applied, which makes the third course of the module, *Industrial Organization*, a perfect supplement to either of the two courses.

Remarks
The module will be offered latest until SS 2014.

Module: Transport infrastructure policy and regional development [WI4VWL11]

Coordination: K. Mitusch
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)
2560230	Transport Economics	2/1	S	4,5	G. Liedtke, E. Szimba
2561260 / 2561261	Spatial Economics	2/1	W	4,5	I. Ott
2561220	Assessment of Public Policies and Projects 1	2	W	3	A. Kopp
2560220	Assessment of Public Policies and Projects 2	2	S	3	A. Kopp

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
None.

Learning Outcomes
The module shall provide interested students with a broad understanding of the economic issues related to transport and regional development. A main focus will be laid on economic policy issues generated by the relationship of transport and regional development with the public sector. After finishing the module, students shall be able to compare the different considerations of politics, regulation and the private sector and to analyze and assess the respective decision problems both qualitatively and by applying appropriate methods from economic theory. The successful participation in the module shall prepare students particularly for careers in the public sector, partially public companies, politics, regulatory agencies or related consultancies. The module also targets future employees of mayor construction companies and infrastructure project corporations.

Content
The development infrastructure (e.g. transport, energy, telecommunications) has always been one of the most relevant factors for economic development and particularly influences the development of the regional economy. From the repertoire of state actions, investments into transport infrastructure are often regarded the most important measure to foster regional economic growth. Besides the direct effects of transport policy on passenger and freight transport, a variety of individual economic activities is significantly dependent on the available or potential transport options. Decisions on the planning, financing and realization of mayor infrastructure projects require a solid and far-reaching consideration of direct and indirect growth effects with the occurring costs.
Through its combination of lectures the module reflects the complex interdependencies between infrastructure policy, transport industry and regional policy and provides its participants with a comprehensive understanding of the functionalities of one of the most important sectors of the economy and its relevance for economic policy.

Remarks
The course *Assessment of Public Policies and Projects I* (winter term) and *Assessment of Public Policies and Projects II* (summer term) are both held as block courses. Dates will be announced at the beginning of each semester.

Module: Growth and Agglomeration [WI4VWL12]

Coordination: I. Ott
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)
2561503	Theory of endogenous growth	2/1	W	4,5	I. Ott
2561260 / 2561261	Spatial Economics	2/1	W	4,5	I. Ott
2560254	International Economic Policy	2/1	S	4,5	J. Kowalski

Learning Control / Examinations
The assessment is carried out as partial written exams (see the lectures descriptions).
The overall grade for the module is the average of the grades for each course weighted by the credits.

Conditions
Successful completion of the courses *Economics I: Microeconomics* [2600012] and *Economics II: Macroeconomics* [2600014] is required.

Recommendations
Attendance of the course *Introduction Economic Policy* [2560280] is recommended.

Learning Outcomes
The student

- gains deepened knowledge of micro-based general equilibrium models
- understands how based on individual optimizing decisions aggregate phenomena like economic growth or agglomeration (cities / metropolises) result
- is able to understand and evaluate the contribution of these phenomena to the development of economic trends
- can derive policy recommendations based on theory

Content
The module includes the contents of the lectures *Endogenous Growth Theory* [2561503], *Spatial Economics* [2561260] and *International Economic Policy* [2560254]. While the first two lectures have a more formal-analytic focus, the third lecture approaches fundamental ideas and problems from the field of international economic policy from a more verbal perspective.
The common underlying principle of all three lectures in this module is that, based on different theoretical models, economic policy recommendations are derived.

Module: Agglomeration and Innovation [WI4VWL13]

Coordination: I. Ott
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)
2561260 / 2561261	Spatial Economics	2/1	W	4,5	I. Ott
2560236	Innovationtheory and -policy	2/1	S	4,5	I. Ott
2520527	Advanced Topics in Economic Theory	2/1	S	4,5	M. Hillebrand, K. Mitusch

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 add up to at least 9.
The overall grade for the module is the average of the grades for each course weighted by the credits.

Conditions
Successful completion of the courses *Economics I: Microeconomics* [2600012] and *Economics II: Macroeconomics* [2600014] is required.

Learning Outcomes
The student

- applies quantitative methods in the context of economic models
- learns advanced micro- and macroeconomic theories
- is able to derive policy recommendations based on theory
- can identify the importance of alternative incentive mechanisms for the development and spread of innovations
- begins to understand the connections between market form and the development of innovations
- analyzes the determinants of the spatial distribution of economic activity
- understands how processes of concentration result from the interplay of agglomeration and dispersion forces

Content
The module comprises theories of incentives for the development of innovations as well as theories of wage-based labor mobility, which leads to spatial concentration processes. The microfounded optimality decisions of the actors are in each case transformed into macroeconomic results. In the context of the theory of innovations the diffusion of technological knowledge and the resulting effect on growth due to technological progress is discussed and economic-policy implications are derived. Spatial economics adds to the picture of economic activity by introducing a spatial point of view.

Remarks
See German version.

Module: Economic Theory and its Application in Finance [WI4VWL14]

Coordination: K. 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)
2520527	Advanced Topics in Economic Theory	2/1	S	4,5	M. Hillebrand, K. Mitusch
2530214	Corporate Financial Policy	2/1	S	4,5	M. Ruckes
2530232	Financial Intermediation	3	W	4,5	M. Ruckes
2530555	Asset Pricing	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 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
The course „Advanced Topics in Economic Theory“ is compulsory and must be examined.
It is only possible to choose this module in the Elective Programme.

Recommendations
None.

Learning Outcomes
Students will learn the methods of formal economic modeling, particularly of General Equilibrium Theory and contract theory, as well as their applications to the topics in Finance, specifically the areas of financial markets and institutions and corporate finance. This will yield many useful insights into the relationship between firms and investors and the functioning of financial markets.

Content
The mandatory course „Advanced Topics in Economic Theory“ is devoted in equal parts to General Equilibrium Theory and to contract theory. The course „Asset Pricing“ will apply techniques of General Equilibrium Theory to valuation of financial assets. The courses „Corporate Financial Policy” and „Finanzintermediation“ will apply the techniques of contract theory to issues of corporate finance and financial institutions.

Module: Microeconomic Theory [WI4VWL15]

Coordination: C. 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)
n.n.	Advanced Game Theory	2/1	W	4,5	P. Reiss, C. Puppe
2520527	Advanced Topics in Economic Theory	2/1	S	4,5	M. Hillebrand, K. Mitusch
n.n.	Social Choice Theory	2/1	S	4,5	C. Puppe

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.

Conditions
None.

Recommendations
None.

Learning Outcomes

Content

Module: Collective Decision Making [WI4VWL16]

Coordination: C. 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)
25539	Mathematical Theory of Democracy	2/1	W	4,5	A. Melik-Tangyan
n.n.	Social Choice Theory	2/1	S	4,5	C. Puppe
2561127	Public Management	2	W	4,5	B. Wigger, Assistenten

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.

Conditions
None.

Recommendations
None.

Learning Outcomes

Content

Module: Experimental Economics [WI4VWL17]

Coordination: P. Reiss
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)
2540489	Experimental Economics	2/1	W	4,5	M. Adam, C. Weinhardt
2520402/ 2520403	Predictive Mechanism and Market Design	2/1	W	4,5	P. Reiss
n.n.	Topics in Experimental Economics	2/1	S	4,5	P. Reiss

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 *Experimental Economics* [2540489] is compulsory and must be examined.

Recommendations
Basic knowledge in mathematics, statistics, and game theory is assumed.

Learning Outcomes
Students

- are acquainted with the methods of Experimental Economics along with its strengths and weaknesses;
- understand how theory-guided research in Experimental Economics interacts with the development of theory;
- are provided with foundations in data analysis;
- design an economic experiment and analyze its outcome.

Content
The module Experimental Economics offers an introduction into the methods and topics of Experimental Economics. It also fosters and extends knowledge in theory-guided experimental economics and its interaction with theory development. Throughout the module, readings of selected papers are required.

Remarks

- The course *Advanced Game Theory* is not offered before Winter 2014/15.
- The course *Predictive Mechanism and Market Design* is not offered each year.

Module: Innovation and growth [WI4VWLIWW1]

Coordination: I. Ott
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)
2520543	Theory of Economic Growth	2/1	S	4,5	M. Hillebrand
2560236	Innovationtheory and -policy	2/1	S	4,5	I. Ott
2561503	Theory of endogenous growth	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.

5.3 Informatics

Module: Informatics [WI4INFO1]

Coordination: H. Schmeck, A. Oberweis, D. Seese, R. Studer, S. 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	2/1	W	5	H. Schmeck
2511030	Applied Informatics I - Modelling	2/1	W	5	A. Oberweis, R. Studer, S. Agarwal
2511032	Applied Informatics II - IT Systems for e-Commerce	2/1	S	5	S. Tai
2511400	Complexity Management	2/1	S	5	D. Seese
2511200	Database Systems	2/1	S	5	A. Oberweis, Dr. D. Sommer
2511500	Service Oriented Computing 1	2/1	W	5	S. Tai
2511300	Knowledge Management	2/1	W	5	R. Studer
2511504	Cloud Computing	2/1	W	5	S. Tai
2511202	Database Systems and XML	2/1	W	5	A. Oberweis
2511212	Document Management and Groupware Systems	2	S	4	S. Klink
2511100	Efficient Algorithms	2/1	S	5	H. Schmeck
2511600	Enterprise Architecture Management	2/1	W	5	T. Wolf
2511402	Intelligent Systems in Finance	2/1	S	5	D. Seese
2511404	IT Complexity in Practice	2/1	W	5	D. Seese, Kreidler
2511302	Knowledge Discovery	2/1	W	5	R. Studer
2511214	Management of IT-Projects	2/1	S	5	R. Schätzle
2511210	Business Process Modelling	2/1	W	5	A. Oberweis
2511106	Nature-inspired Optimisation Methods	2/1	S	5	S. Mostaghim, P. Shukla
2511104	Organic Computing	2/1	S	5	H. Schmeck, S. Mostaghim
2590458	Computational Economics	2/1	W	4,5	P. Shukla, S. Caton
2511216	Capability maturity models for software and systems engineering	2	S	4	R. Kneuper
2511308	Service Oriented Computing 2	2/1	S	5	R. Studer, S. Agarwal, B. Norton
2511208	Software Technology: Quality Management	2/1	S	5	A. Oberweis
25700sp	Special Topics of Efficient Algorithms	2/1	W/S	5	H. Schmeck
SBI	Special Topics of Enterprise Information Systems	2/1	W/S	5	A. Oberweis
KompMansp	Special Topics of Complexity Management	2/1	W/S	5	D. Seese
SSEsp	Special Topics of Software- and Systemsengineering	2/1	W/S	5	A. Oberweis, D. Seese
25860sem	Special Topics of Knowledge Management	2/1	W/S	5	R. Studer
2511602	Strategic Management of Information Technology	2/1	S	5	T. Wolf
2511204	Workflow-Management	2/1	S	5	A. Oberweis
25810	Practical Seminar Knowledge Discovery	2	S	4	R. Studer
PraBI	Computing Lab Information Systems	2	W/S	4	A. Oberweis, D. Seese, R. Studer
25700p	Advanced Lab in Efficient Algorithms	3	W/S	4	H. Schmeck
25762p	Computing Lab in Intelligent Systems in Finance	3	W/S	4	D. Seese

25818	Computing Lab in Complexity Management	3	W/S	4	D. Seese
25820	Lab Class Cloud Computing	3	W	4	S. Tai
25740p	Exercises in Knowlegde Management	3	W/S	4	R. Studer
2511218	Requirements Analysis and Requirements Management	2/0	W	4	R. Kneuper
2511506	Business Activity Management	2/1	S	5	C. Janiesch
2511310	Semantic Web Technologies	2/1	S	5	R. Studer, A. Harth

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

Conditions
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], *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 innovativeness 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: H. Schmeck, A. Oberweis, D. Seese, R. Studer, S. 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	2/1	W	5	H. Schmeck
2511030	Applied Informatics I - Modelling	2/1	W	5	A. Oberweis, R. Studer, S. Agarwal
2511032	Applied Informatics II - IT Systems for e-Commerce	2/1	S	5	S. Tai
2511400	Complexity Management	2/1	S	5	D. Seese
2511200	Database Systems	2/1	S	5	A. Oberweis, Dr. D. Sommer
2511500	Service Oriented Computing 1	2/1	W	5	S. Tai
2511300	Knowledge Management	2/1	W	5	R. Studer
2511202	Database Systems and XML	2/1	W	5	A. Oberweis
2511212	Document Management and Groupware Systems	2	S	4	S. Klink
2511100	Efficient Algorithms	2/1	S	5	H. Schmeck
2511600	Enterprise Architecture Management	2/1	W	5	T. Wolf
2511402	Intelligent Systems in Finance	2/1	S	5	D. Seese
2511404	IT Complexity in Practice	2/1	W	5	D. Seese, Kreidler
2511302	Knowledge Discovery	2/1	W	5	R. Studer
2511214	Management of IT-Projects	2/1	S	5	R. Schätzle
2511210	Business Process Modelling	2/1	W	5	A. Oberweis
2511106	Nature-inspired Optimisation Methods	2/1	S	5	S. Mostaghim, P. Shukla
2511104	Organic Computing	2/1	S	5	H. Schmeck, S. Mostaghim
2590458	Computational Economics	2/1	W	4,5	P. Shukla, S. Caton
2511216	Capability maturity models for software and systems engineering	2	S	4	R. Kneuper
2511308	Service Oriented Computing 2	2/1	S	5	R. Studer, S. Agarwal, B. Norton
2511208	Software Technology: Quality Management	2/1	S	5	A. Oberweis
SBI	Special Topics of Enterprise Information Systems	2/1	W/S	5	A. Oberweis
25700sp	Special Topics of Efficient Algorithms	2/1	W/S	5	H. Schmeck
KompMansp	Special Topics of Complexity Management	2/1	W/S	5	D. Seese
SSEsp	Special Topics of Software- and Systemsengineering	2/1	W/S	5	A. Oberweis, D. Seese
25860sem	Special Topics of Knowledge Management	2/1	W/S	5	R. Studer
2511602	Strategic Management of Information Technology	2/1	S	5	T. Wolf
2511204	Workflow-Management	2/1	S	5	A. Oberweis
PraBI	Computing Lab Information Systems	2	W/S	4	A. Oberweis, D. Seese, R. Studer
25700p	Advanced Lab in Efficient Algorithms	3	W/S	4	H. Schmeck
25762p	Computing Lab in Intelligent Systems in Finance	3	W/S	4	D. Seese
25818	Computing Lab in Complexity Management	3	W/S	4	D. Seese
25810	Practical Seminar Knowledge Discovery	2	S	4	R. Studer
25820	Lab Class Cloud Computing	3	W	4	S. Tai

25740p	Exercises in Knowlegde Management	3	W/S	4	R. Studer
2511504	Cloud Computing	2/1	W	5	S. Tai
2511218	Requirements Analysis and Requirements Management	2/0	W	4	R. Kneuper
2511506	Business Activity Management	2/1	S	5	C. Janiesch
2511310	Semantic Web Technologies	2/1	S	5	R. Studer, A. Harth

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
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], *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: Electives in Informatics [WI4INFO3]

Coordination: H. Schmeck, A. Oberweis, D. Seese, R. Studer, S. 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	2/1	W	5	H. Schmeck
2511030	Applied Informatics I - Modelling	2/1	W	5	A. Oberweis, R. Studer, S. Agarwal
2511032	Applied Informatics II - IT Systems for e-Commerce	2/1	S	5	S. Tai
2511400	Complexity Management	2/1	S	5	D. Seese
2511200	Database Systems	2/1	S	5	A. Oberweis, Dr. D. Sommer
2511500	Service Oriented Computing 1	2/1	W	5	S. Tai
2511300	Knowledge Management	2/1	W	5	R. Studer
2511202	Database Systems and XML	2/1	W	5	A. Oberweis
2511212	Document Management and Groupware Systems	2	S	4	S. Klink
2511100	Efficient Algorithms	2/1	S	5	H. Schmeck
2511600	Enterprise Architecture Management	2/1	W	5	T. Wolf
2511402	Intelligent Systems in Finance	2/1	S	5	D. Seese
2511404	IT Complexity in Practice	2/1	W	5	D. Seese, Kreidler
2511302	Knowledge Discovery	2/1	W	5	R. Studer
2511214	Management of IT-Projects	2/1	S	5	R. Schätzle
2511210	Business Process Modelling	2/1	W	5	A. Oberweis
2511106	Nature-inspired Optimisation Methods	2/1	S	5	S. Mostaghim, P. Shukla
2511104	Organic Computing	2/1	S	5	H. Schmeck, S. Mostaghim
2590458	Computational Economics	2/1	W	4,5	P. Shukla, S. Caton
2511216	Capability maturity models for software and systems engineering	2	S	4	R. Kneuper
2511308	Service Oriented Computing 2	2/1	S	5	R. Studer, S. Agarwal, B. Norton
2511208	Software Technology: Quality Management	2/1	S	5	A. Oberweis
SBI	Special Topics of Enterprise Information Systems	2/1	W/S	5	A. Oberweis
25700sp	Special Topics of Efficient Algorithms	2/1	W/S	5	H. Schmeck
KompMansp	Special Topics of Complexity Management	2/1	W/S	5	D. Seese
SSEsp	Special Topics of Software- and Systemsengineering	2/1	W/S	5	A. Oberweis, D. Seese
25860sem	Special Topics of Knowledge Management	2/1	W/S	5	R. Studer
2511602	Strategic Management of Information Technology	2/1	S	5	T. Wolf
2511204	Workflow-Management	2/1	S	5	A. Oberweis
PraBI	Computing Lab Information Systems	2	W/S	4	A. Oberweis, D. Seese, R. Studer
25700p	Advanced Lab in Efficient Algorithms	3	W/S	4	H. Schmeck
25762p	Computing Lab in Intelligent Systems in Finance	3	W/S	4	D. Seese
25810	Practical Seminar Knowledge Discovery	2	S	4	R. Studer
25818	Computing Lab in Complexity Management	3	W/S	4	D. Seese
25820	Lab Class Cloud Computing	3	W	4	S. Tai

25740p	Exercises in Knowlegde Management	3	W/S	4	R. Studer
2511504	Cloud Computing	2/1	W	5	S. Tai
2511218	Requirements Analysis and Requirements Management	2/0	W	4	R. Kneuper
2511506	Business Activity Management	2/1	S	5	C. Janiesch
2511310	Semantic Web Technologies	2/1	S	5	R. Studer, A. Harth

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

Conditions
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: S. 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	2/1	W	4,5	S. Nickel
2550488	Tactical and Operational Supply Chain Management	2/1	S	4,5	S. Nickel
2550480	Operations Research in Supply Chain Management	2/1	W/S	4,5	S. Nickel
2550495	Operations Research in Health Care Management	2/1	W/S	4,5	S. Nickel
2550493	Hospital Management	2/0	W/S	3	S. Nickel, Hansis
2550498	Practical seminar: Health Care Management (with Case Studies)	2/1/2	W/S	7	S. Nickel
2550497	Software Laboratory: OR Models II	2/1	S	4,5	S. Nickel
2550488	Discrete-event Simulation in Production and Logistics	2/1	S	4,5	S. Nickel, S. Spieckermann
2550494	Supply Chain Management in the Process Industry	2/1	W	4,5	S. Nickel

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
See German version.

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.

Module: Mathematical Programming [WI4OR6]

Coordination: O. 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	2/1	S	4,5	O. Stein
25140	Mixed Integer Programming II	2/1	W	4,5	O. Stein
2550128	Special Topics in Optimization I	2/1	W/S	4,5	O. Stein
2550126	Special Topics in Optimization II	2/1	W/S	4,5	O. Stein
2550484	Graph Theory and Advanced Location Models	2/1	W/S	4,5	S. Nickel
2550111	Nonlinear Optimization I	2/1	S	4,5	O. Stein
2550113	Nonlinear Optimization II	2/1	S	4,5	O. Stein
2550134	Global Optimization I	2/1	W	4,5	O. Stein
2550136	Global Optimization II	2/1	W	4,5	O. Stein
2550120	Convex Analysis	2/1		4,5	O. Stein
2550115	Parametric Optimization	2/1		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
See German version.

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: K. 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	2/1/2	W	5	K. Waldmann
2550682	Markov Decision Models II	2/1/2	S	4,5	K. Waldmann
2550674	Quality Control I	2/1/2	W/S	4,5	K. Waldmann
25659	Quality Control II	2/1/2	W/S	4,5	K. Waldmann
25687	Optimization in a Random Environment	2/1/2	W/S	4,5	K. Waldmann
2550662	Simulation I	2/1/2	W/S	4,5	K. Waldmann
2550665	Simulation II	2/1/2	W/S	4,5	K. Waldmann
25688	OR-oriented modeling and analysis of real problems (project)	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
See German version.

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

Content
Topics overview:
Markov Decision Models I: Markov Chains, Poisson Processes.
Markov Decision Models II: Queuing Systems, Stochastic Decision Processes
Simulation I: Generation of random numbers, Monte Carlo integration, Discrete event simulation, Discrete and continuous random variables, Statistical analysis of simulated data.
Simulation II: Variance reduction techniques, Simulation of stochastic processes, Case studies.
Quality Control I: Statistical Process Control, Acceptance Sampling, Design of experiments
Quality Control II: Reliability of complexe systems with and without repair, Maintenance
OR-orientied modeling and analysis of real problems: project-based modelling and analysis

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

5.5 Statistics

Module: Mathematical and Empirical Finance [WI4STAT1]

Coordination: W. Heller
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Statistics

ECTS Credits	Cycle	Duration
9	Irregular	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2520357/2520358	Portfolio and Asset Liability Management	2/1	S	5	W. Heller
2521331	Stochastic Calculus and Finance	2/1	W	4,5	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
None.

Learning Outcomes

Content

Remarks
The course Portfolio and Asset Liability Management [2520357] will not be offered any more from summer term 2015 on. The examination will probably be offered latest until summer term 2014.
The course Stochastic Calculus and Finance [2521331] will not be offered any more from winter term 2014/2015 on. The examination will probably be offered latest until winter term 2013/14.

Module: Statistical Methods in Risk Management [WI4STAT2]

Coordination: W. Heller
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)
2520337	Stochastic and Econometric Models in Credit Risk Management	2/2	S	5	Y. Kim
2520357/2520358	Portfolio and Asset Liability Management	2/1	S	5	W. Heller
2520375	Data Mining	2	W/S	5	G. Nakhaeizadeh
2520317	Multivariate Methods	2/2	S	5	W. Heller
2521353	Statistical Methods in Financial Risk Management	2/1		4,5	A. Nazemi
2521325/2521326	Statistics and Econometrics in Business and Economics	2/2	W	4,5	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
None.

Learning Outcomes

Content

5.6 Engineering Sciences

Module: Automotive Engineering [WI4INGMB5]

Coordination: F. 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	Automotive Engineering I	4	W	6	F. Gauterin, H. Unrau
2114835	Automotive Engineering II	2	S	3	F. Gauterin, H. Unrau
2115817	Project Workshop: Automotive Engineering	3	W/S	4,5	F. Gauterin
2113814	Fundamentals for Design of Motor-Vehicles Bodies I	1	W	1,5	H. Bardehle
2114840	Fundamentals for Design of Motor-Vehicles Bodies II	1	S	1,5	H. Bardehle
2114093	Fluid Technology	2	W	3	M. Geimer
2114092	BUS-Controls	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] and *Engineering Mechanics II* [8001092] 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
See course descriptions.

Module: Handling Characteristics of Motor Vehicles [WI4INGMB6]

Coordination: F. 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	2	W	3	F. Gauterin
2114825	Vehicle Comfort and Acoustics II	2	S	3	F. Gauterin
2113807	Handling Characteristics of Motor Vehicles I	2	W	3	H. Unrau
2114838	Handling Characteristics of Motor Vehicles II	2	S	3	H. Unrau
2113816	Vehicle Mechatronics I	2	W	3	D. Ammon
2115817	Project Workshop: Automotive Engineering	3	W/S	4,5	F. Gauterin
2114850	Global vehicle evaluation within virtual road test	2	S	3	B. 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
See courses.

Module: Vehicle Development [WI4INGMB14]

Coordination: F. 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: Automotive Engineering	3	W/S	4,5	F. Gauterin
2113816	Vehicle Mechatronics I	2	W	3	D. Ammon
2113812	Fundamentals in the Development of Commercial Vehicles I	1	W	1,5	J. Zürn
2114844	Fundamentals in the Development of Commercial Vehicles II	1	S	1,5	J. Zürn
2113810	Fundamentals of Automobile Development I	1	W	1,5	R. Frech
2114842	Fundamentals of Automobile Development II	1	S	1,5	R. Frech
2114843	Basics and Methods for Integration of Tires and Vehicles	2	S	3	G. Leister
2114095	Simulation of Coupled Systems	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
See courses.

Module: Mobile Machines [WI4INGMB15]

Coordination: M. 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 Technology	2	W	3	M. Geimer
2114095	Simulation of Coupled Systems	2	S	3	M. Geimer
2114092	BUS-Controls	2	S	3	M. Geimer
2114073	Mobile Machines	4	S	6	M. Geimer
2113812	Fundamentals in the Development of Commercial Vehicles I	1	W	1,5	J. Zürn
2114844	Fundamentals in the Development of Commercial Vehicles II	1	S	1,5	J. 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 I [WI4INGMB18]

Coordination: H. 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	4/2	W	9	U. 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
See course.

Module: Combustion Engines II [WI4INGMB19]

Coordination: H. 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	2/1	S	5	U. Spicher
21112	Supercharging of Internal Combustion Engines	2	S	4	R. Golloch
2133109	Motor Fuels for Combustion Engines and their Verifications	2	W	4	J. Volz
2134138	Fundamentals of catalytic exhaust gas aftertreatment	2	S	4	E. Lox
21134	Methods in Analyzing Internal Combustion	2	S	4	U. Wagner
2134137	Engine Measurement Technologies	2	S	4	S. Bernhardt
21114	Simulation of Spray and Mixture Formation in Internal Combustion Engines	2	W	4	C. 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
See courses.

Module: Combustion Engines I [WI4INGMB34]

Coordination: H. 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)
2133103	Combustion Engines I	2/1	W	5	H. Kubach, T. Koch
2133120	Thermodynamics and Energy Conversion in Internal Combustion Engines	2	W	4	T. Koch, H. Kubach

Learning Control / Examinations
The assessment consists of an oral exam (60 min) taking place in the recess period (according to §4 (2), 2 of the examination regulation). The exam takes place in every semester. Reexaminations are offered at every ordinary examination date.

Conditions
None.

Recommendations
None.

Learning Outcomes
The student can name and explain the working princile of combustion engines. He is able to analyse and evaluate the combustion process. He is able to evaluate influences of gas exchange, mixture formation, fuels and exhaust gas aftertreatment on the combustion performance. He can solve basic research problems in the field of engine development.
The student can name all important influences on the combustion process. He can analyse and evaluate the engine process considering efficiency, emissions and potential.

Content
Introduction, History, Concepts
Working Principle and Termodynamics
Characteristic Parameters
Air Path
Fuel Path
Energy Conversion
Fuels
Emissions
Exhaust Gas Aftertreatment
Reaction kinetics
Gas exchange
Ignition
Flow field of gasoline engines
Working process
Pressure trace analysis
Thermodynamic analysis of the high pressure process
Exergy analysis and waste heat recuperation
Aspects of sustainability

Module: Combustion Engines II [WI4INGMB35]

Coordination: H. Kubach
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)
2134131	Combustion Engines II	2/1	S	5	H. Kubach, T. Koch
2133108	Fuels and Lubricants for Combustion Engines	2	W	4	B. Kehrwald, J. Volz
2134138	Fundamentals of catalytic exhaust gas aftertreatment	2	S	4	E. Lox
2134134	Analysis tools for combustion diagnostics	2	S	4	U. Wagner
2134137	Engine measurement techniques	2	S	4	S. Bernhardt
2134141	Gas Engines	2	S	4	R. Golloch
2134150	Analysis of Exhaust Gas und Lubricating Oil in Combustion Engines	2	S	4	M. Gohl
2134139	Model based Application Methods	2	S	4	F. Kirschbaum

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.* The module is passed only after the final partial exam of *Combustion Engines I* is additionally passed.
The course *Combustion Engines II* [2134131] has to be attended.

Recommendations
Basic skills in thermodynamics are recommended.

Learning Outcomes

Content

Module: Introduction to Logistics [WI4INGMB20]

Coordination: K. 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	3/1	W	6	K. Furmans
2118090	Quantitative Methods for Supply Chain Risk Management	3/1	S	6	A. Cardeneo
2118083	IT for facility logistics	3/1	S	6	F. Thomas
2118097	Warehousing and distribution systems	2	S	4	M. Schwab, J. Weiblen
2117056	Airport logistics	2	W	4	A. Richter
2117061	Safety engineering	2	W	4	H. Kany
2117064	Application of technical logistics in modern crane systems	2	W	4	M. Golder
2118089	Application of technical logistics in sorting- and distribution technology	2	S	4	J. Föller
2118085	Automotive Logistics	2	S	4	K. Furmans
2118094	Information Systems in Logistics and Supply Chain Management	2	S	4	C. Kilger
2117500	Energy efficient intralogistic systems	2	W	4	F. Schönung
2117095	Basics of Technical Logistics	3/1	W	6	M. Mittwollen, Madzharov
2117096	Elements of Technical Logistics	3/1	W	6	M. Mittwollen, Madzharov

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*
- *Basics of technical logistics*
- *Elements and Systems of Technical Logistics*
- *Quantitative Risk Management of Logistic Systems*

Elements and systems of Technical Logistics is only allowed to be examined if *Basics of Technical Logistics* is passed successfully in this or an other module. For simultaneous attending of both courses, examination dates are sequenced accordingly.

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.

Module: Specialization in Production Engineering [WI4INGMB22]

Coordination: V. 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)
2149667	Quality Management	2	W	4	G. Lanza
2149669	Materials and Processes in Automotive Lightweight Construction	2	W	4	S. Kienzle, D. Steegmüller
2150681	Metal Forming	2	S	4	T. Herlan
2150683	Control Technology	2	S	4	C. Gönnheimer
2149655	Gear Cutting Technology	2	W	4	M. Klaiber

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

Conditions
None.

Learning Outcomes
The students

- are able to apply the methods of production science to new problems.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques for a specific problem.
- are able to use their knowledge target-oriented to achieve an efficient production technology.
- are able to analyze new situations and choose methods of production science target-oriented based on the analyses, as well as justifying their selection.
- are able to describe and compare complex production processes exemplarily.

Content
Within this module the students will get to know and learn about production science. Manifold lectures and excursions as part of several lectures provide specific insights into the field of production science.

Module: Manufacturing Technology [WI4INGMB23]

Coordination: V. 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 Technology	4/2	W	9	V. Schulze, F. Zanger

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

Conditions
None.

Learning Outcomes
The students

- can name different manufacturing processes, can describe their specific characteristics and are capable to depict the general function of manufacturing processes and are able to assign manufacturing processes to the specific main groups.
- are enabled to identify correlations between different processes and to select a process depending on possible applications.
- are capable to describe the theoretical basics for the manufacturing processes they got to know within the scope of the course and are able to compare the processes.
- are able to correlate based on their knowledge in materials science the processing parameters with the resulting material properties by taking into account the microstructural effects.
- are qualified to evaluate different processes on a material scientific basis.

Content
Within this engineering sciences-oriented module the students will get to learn principle aspects of manufacturing technology. Further information can be found at the description of the lecture “Manufacturing Technology”.

Module: Integrated Production Planning [WI4INGMB24]

Coordination: V. 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	4/2	S	9	G. Lanza

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

Conditions
None.

Learning Outcomes
The students

- can discuss basic questions of production technology.
- are able to apply the methods of integrated production planning they have learned about to new problems.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques they have learned about for a specific problem.
- can apply the learned methods of integrated production planning to new problems.
- can use their knowledge targeted for efficient production technology.

Content
Within this engineering sciences-oriented module the students will get to learn principle aspects of organization and planning of production systems. Further information can be found at the description of the lecture “Integrated Production Planning”.

Module: Material Flow in Logistic Systems [WI4INGMB25]

Coordination: K. 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	3/1	W	6	K. Furmans
2118097	Warehousing and distribution systems	2	S	4	M. Schwab, J. Weiblen
2117056	Airport logistics	2	W	4	A. Richter
2118085	Automotive Logistics	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* [2117051] is compulsory and must be examined.

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
If the course 2117051 „Materialfluss in Logistiksystemen“ had been taken already, one of the modules [WI4INGMB26], [WI4INGMB27] and [WI4INGMB28] can be chosen.

Module: Material Flow in Networked Logistic Systems [WI4INGMB26]

Coordination: K. 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)
2117060	Analytical methods in material flow methodology (mach and wiwi)	3/1	W	6	J. Stoll, E. Özden
2118097	Warehousing and distribution systems	2	S	4	M. Schwab, J. Weiblen
2117056	Airport logistics	2	W	4	A. Richter
2118085	Automotive Logistics	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 course *Analytical Models for Material Flow* [2117060] 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.

Module: Technical Logistics [WI4INGMB27]

Coordination: K. 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)
2117095	Basics of Technical Logistics	3/1	W	6	M. Mittwollen, Madzharov
2117096	Elements of Technical Logistics	3/1	W	6	M. Mittwollen, Madzharov
2118088	Selected Applications of Technical Logistics and Project	3/1	S	6	M. Mittwollen, Madzharov
2118087	Selected Applications of Technical Logistics	2/1	S	4	M. Mittwollen, Madzharov
2118083	IT for facility logistics	3/1	S	6	F. Thomas
2118097	Warehousing and distribution systems	2	S	4	M. Schwab, J. Weiblen
2117061	Safety engineering	2	W	4	H. Kany
2117064	Application of technical logistics in modern crane systems	2	W	4	M. Golder
2118089	Application of technical logistics in sorting- and distribution technology	2	S	4	J. Föller
2117500	Energy efficient intralogistic systems	2	W	4	F. 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 lecture *basics of technical logistics* has to be chosen. If the lecture *Basics of technical logistics* has been succesfully examinated in another module, the lecture *elements and systems of technical logistics* can be choosen instead. If both lectures are examinated successfully, one can chose selected applications of technical logistics or selected applications of technical logistics and project instead.

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.

Module: Logistics in Value Chain Networks [WI4INGMB28]

Coordination: K. 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	3/1	S	6	K. Furmans
2117062	Supply chain management	3/1	W	6	K. Alicke
2118097	Warehousing and distribution systems	2	S	4	M. Schwab, J. Weiblen
2118090	Quantitative Methods for Supply Chain Risk Management	3/1	S	6	A. Cardeneo
2117056	Airport logistics	2	W	4	A. Richter
2118085	Automotive Logistics	2	S	4	K. Furmans
2118094	Information Systems in Logistics and Supply Chain Management	2	S	4	C. 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
One of the lectures

- *Logistics – Organization, Design and Control of Logistic Systems* [2118078]
- *Supply Chain Management* [2117062]
- *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.

Module: Virtual Engineering A [WW4INGMB29]

Coordination: J. 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	2/3	W	6	J. Ovtcharova
2121370	Virtual Engineering for Mechatronic Products	3	W	4	S. Rude
2122387	Computer Integrated Planning of New Products	2	S	4	R. Kläger
2123375	Virtual Reality Laboratory	3	W/S	4	J. Ovtcharova
2122376	PLM for product development in mechatronics	2/0	S	4	M. Eigner

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.

Module: Virtual Engineering B [WW4INGMB30]

Coordination: J. 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	2/1	S	4	J. Ovtcharova
2121370	Virtual Engineering for Mechatronic Products	3	W	4	S. Rude
2122387	Computer Integrated Planning of New Products	2	S	4	R. Kläger
2123375	Virtual Reality Laboratory	3	W/S	4	J. Ovtcharova
2123356	CATIA CAD training course	2	W/S	2	J. Ovtcharova
2123355	CAD-NX training course	2	W/S	2	J. Ovtcharova
2122376	PLM for product development in mechatronics	2/0	S	4	M. Eigner

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) and current product development processes.

Module: Global Production and Logistics [WI4INGMB31]

Coordination: V. Schulze, G. 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	2	W	4	G. Lanza
2149600	Global Production and Logistics - Part 2: Global Logistics	2	S	4	K. Furmans
2118085	Automotive Logistics	2	S	4	K. Furmans
2118094	Information Systems in Logistics and Supply Chain Management	2	S	4	C. Kilger
2149667	Quality Management	2	W	4	G. Lanza
2149001	Production Technology and Management in Automotive	2	W	4	V. Stauch, S. Peters
2150601	Integrative Strategies in Production and Development of High Performance Cars	2	S	4	K. Schlichtenmayer

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

Conditions
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* [WI4INGMB28] (in this case the course *Material flow in Logistic Systems* is not obligatory).

Learning Outcomes
The students

- are able to analyze the main topics of global production and logistics.
- can explain the main topics about planning and operations of global supply chains and are able to use simple models for planning.
- are capable to name the main topics about planning of 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 economic backgrounds, opportunities and risks of global 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.

Module: Machine Tools and Industrial Handling [WI4INGMB32]

Coordination: J. 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)
2149902	Machine Tools and Industrial Handling	4/2	W	9	J. Fleischer

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

Conditions
None.

Learning Outcomes
The students

- are capable to explain the use and application of machine tools and handling devices as well as differentiate their characteristics and structure.
- are able to name and describe the essential components (frame, main spindles, feed axis, peripheral equipment, control) of machine tools.
- Are capable to distinguish and select and describe the essential components regarding structure, characteristics advantages and disadvantages.
- are enabled to dimension the main components of machine tools.
- are able to name and describe the control principles of machine tools.
- are capable to name examples of machine tools and industrial handling as well as to deduce compare the essential components. Additionally they can allocate manufacturing processes.
- are enabled to identify drawbacks as well as derive and asses measures for improvements.
- are qualified to apply methods for selection and evaluation of machine tools.
- are experienced to deduce the particular failure characteristics of a ball screw.

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.

Module: Specific Topics in Materials Science [WI4INGMB33]

Coordination: M. 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)
2194643	Constitution and Properties of Wear resistant materials	2	S	4	S. Ulrich
2177601	Constitution and Properties of Protective Coatings	2	W	4	S. Ulrich
2125757	Introduction to Ceramics	3/1	W	6	M. Hoffmann
2173560	Welding Lab Course, in groupes	3	W	4	J. Hoffmeister
2174575	Foundry Technology	2	S	4	C. Wilhelm
2193010	Grundlagen der Herstellungsverfahren der Keramik und Pulvermetallurgie	2	W	4	R. Oberacker
2182642	Laser in automotive engineering	2	S	4	J. Schneider
2183640	Laboratory “Laser Materials Processing”	3	W/S	1	J. Schneider, W. Pfleging
2181612	Physical basics of laser technology	2/1	W	5	J. Schneider
2173590	Polymer Engineering I	2	W	4	P. Elsner
2174596	Polymer Engineering II	2	S	4	P. Elsner
2125751	Practical Course Technical Ceramics	2	W	1	R. Oberacker
21565/21570	Welding Technology I/II	2	W/S	4	Spies
2126784	Functional Ceramics	2	S	4	M. Hoffmann, M. Bäurer
2177618	Superhard Thin Film Materials	2	W	4	S. Ulrich
2174576	Systematic Selection of Materials	2/1	S	5	J. Hoffmeister
2181715	Failure of Structural Materials: Fatigue and Creep	2	W	4	O. Kraft, P. Gumbsch, P. Gruber
2181711	Failure of structural materials: deformation and fracture	2	W	4	P. Gumbsch, O. Kraft, D. Weygand
2173553	Materials Science and Engineering III	4/1	W	6	M. Heilmeier
2126749	Advanced powder metals	2	S	4	R. Oberacker
2126775	Structural Ceramics	2	S	4	M. Hoffmann
2126730	Ceramics Processing	2	S	4	J. Binder

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
Students acquire special basic knowledge in selected areas of materials science and engineering and can apply them to technical problems. Specific teaching objectives are agreed with the respective coordinator of the course.

Content
See courses.

Module: Automated Manufacturing Systems [WI4INGMBWBK1]

Coordination: J. Fleischer
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)
2150904	Automated Manufacturing Systems	4/2	S	9	J. Fleischer

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

Conditions
None.

Learning Outcomes
The students

- are able to analyze implemented automated manufacturing systems and describe their components.
- are capable to assess the implemented examples of implemented automated manufacturing systems and apply them to new problems.
- are able to name automation tasks in manufacturing plants and name the components which are necessary for the implementation of each automation task.
- are capable with respect to a given task to plan the configuration of an automated manufacturing system and to determine the necessary components to its realization.
- are able to design and select components for a given use case of the categories: “Handling Technology”, “Industrial Robotics”, “Sensory” and “Controls”.
- are capable to compare different concepts for multi-machine systems and select a suitable concept for a given use case.

Content
Within this engineering sciences-oriented module the students will get to learn principle aspects of automated manufacturing systems. Further information can be found at the description of the lecture “Automated Manufacturing Systems”.

Module: BioMEMS [WI4INGMBIMT1]

Coordination: V. Saile
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)
2143875	Introduction to Microsystem Technology - Practical Course	2	W/S	3	A. Last
2143892	Selected Topics on Optics and Microoptics for Mechanical Engineers	2	W/S	3	T. Mappes
2141864	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I	2	W	3	A. Guber
2142883	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II	2	S	3	A. Guber
2142879	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III	2	S	3	A. Guber
2142881	Microactuators	2	S	3	M. Kohl
2143893	Replication processes in micro system technologies	2	W/S	3	M. Worgull
2142140	Bionics for Engineers and Natural Scientists	2	S	3	H. Hölscher
2143873	Actual topics of BioMEMS	2	W/S	3	A. Guber, Wegner, L.ars; Cattaneo, Giorgio

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 BioMEMS I [2141864] is compulsory and must be examined.

Recommendations
See descriptions of individual lectures

Learning Outcomes
The student

- Has basic as well as extensive knowledge about different fields of applications of BioMEMS
- Understands continuative aspects of the related subjects optics and microoptics, micro actuators, replications techniques and bionics

Content
Operations through small orifices, a pill which will take pictures on its way through your body or lab results right at the point of care - the need for easier and faster ways to help people is an important factor in research. The module BioMEMS (Bio(medical)-Micro-Electro-Mechanical-Systems) describes the application of microtechnology in the field of Life-Science, medical applications and Biotechnology and will teach you the necessary skills to understand and develop biological and medical devices.
The BioMEMS lectures will cover the fields of minimal invasive surgery, lab-on-chip systems, NOTES-Technology (Natural Orifice Transluminal Endoscopic Surgery), as well as endoscopic surgery and stent technology.
Additionally to the BioMEMS lectures you can specialize in various related fields like fabrication, actuation, optics and bionics. The course Replication processes will teach you some cost efficient and fast ways to produce parts for medical or biological

devices. In the course Microactuation it is discussed how to receive movements in micrometer scale in a microsystem, this could be e.g. to drive micro pumps or micro valves. The necessary tools for optical measurement and methods of analysis to gain high resolution pictures are also part of this module. To deepen your knowledge and to get a hands-on experience this module contains a one week lab course. In the lecture bionics you can see how biological effects can be transferred into technical products.

Remarks
If you have any questions concerning the module, please contact Prof. Dr. Andreas E. Guber

Module: Microfabrication [WI4INGMBIMT2]

Coordination: V. Saile
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)
2143875	Introduction to Microsystem Technology - Practical Course	2	W/S	3	A. Last
2142890 / 2142891	Physics for Engineers	2/2	S	6	P. Gumbsch, A. Nesterov-Müller, D. Weygand, A. Last
2143882	Fabrication Processes in Microsystem Technology	2	W/S	3	K. Bade
2143893	Replication processes in micro system technologies	2	W/S	3	M. Worgull
2143500	Chemical, physical and material science aspects of plastics in the micro technology	2	W/S	3	M. Worgull, D. Häringer
2142007	Fundamentals of X-ray optics	2	W	3	A. Last
2181712	Nanotribology and -Mechanics	2		3	M. Dienwiebel, H. Hölscher

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 Manufacturing Processes of Microsystem Technology [2143882] is compulsory and must be examined.

Recommendations
Knowledge of microsystem technology, mechanics, optics and physics is recommended.

Learning Outcomes
The student

- gains advanced knowledge concerning fabrication techniques in micrometer scale
- aquires knowledge in up-to-date developing research
- can detect and use causal relation in microfabrication process chains.

Content
This engineering module allows the student to gain advanced knowledge in the area of microfabrication. Different manufacturing methods are described and analyzed in an advanced manner. Necessary interdisciplinary knowledge from physics, chemistry, materials science and also up-to-date developments (nano and x-ray optics) in micro fabrication is offered.

Remarks
If you have any questions concerning the module, please contact Prof. Dr. Andreas E. Guber.

Module: Microoptics [WI4INGMBIMT3]

Coordination: V. Saile
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)
2143875	Introduction to Microsystem Technology - Practical Course	2	W/S	3	A. Last
2142884	Microoptics and Lithography	2	S	3	T. Mappes
2143892	Selected Topics on Optics and Microoptics for Mechanical Engineers	2	W/S	3	T. Mappes
2142881	Microactuators	2	S	3	M. Kohl
2142007	Fundamentals of X-ray optics	2	W	3	A. Last
23840	Laser Physics	2/1	W	4,5	M. Eichhorn
23462/23463	Optical Sources and Detectors	2/1	S	4,5	C. Koos
23464/23465	Optical Waveguides and Fibers	2/1	W	4,5	C. Koos
2142007	Fundamentals of X-ray optics II	2	S	3	A. Last

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 Microoptics and Lithography [2142884] is compulsory and must be examined.

Recommendations
Basic knowlegde in electro dynamics is expected.
Attending Grundlagen der Mikrosystemtechnik I [2141861] and Grundlagen der Mikrosystemtechnik II [2142874] is recommended.

Learning Outcomes

- basic knowlegde for the applications of microoptical systems
- understanding fabrication processes of microoptical elements & systems
- analyzing strengths and weaknesses of lithography processes
- knowledge on the basics of optical sources and detectors and their use in technical systems
- fundamental knowledge on different lasers and their design
- knowlegde on X-ray imaging methodes

Content
Optical imaging, measuring and sensor systems are a base for modern natural sciences. In particular life sciences and telecommunications have an intrinsic need for the application of optical technologies. Numerous fields of physics and engineering, e.g. astronomy and material sciences, require optical techniques. Micro optical systems are introduced in medical diagnostics and biological sensing as well as in products of the daily life.
In this module, an introduction to the basics of optics is provided; optical effects are presented with respect to their technical use.
Optical elements and instruments are presented. Fabrication processes of micro optical systems and elements, in particular lithography, are discussed.
In addition X-ray optics and X-ray imaging systems are presented as well as elements of optical telecommunication. A closer look on the physics behind lasers, being one of the most important technical light sources, is provided. As high end technology

and clean room equipment is present in all the lectures of this module, the students will have a hands-on training with several experiments in micro optics.

Remarks
If you have any questions concerning the module, please contact Prof. Dr. Andreas E. Guber.

Module: Microsystem Technology [WI4INGMBIMT4]

Coordination: V. Saile
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)
2141861	Introduction to Microsystem Technology I	2	W	3	A. Guber
2142874	Introduction to Microsystem Technology II	2	S	3	A. Guber
2143875	Introduction to Microsystem Technology - Practical Course	2	W/S	3	A. Last
2142890 / 2142891	Physics for Engineers	2/2	S	6	P. Gumbsch, A. Nesterov-Müller, D. Weygand, A. Last
2143892	Selected Topics on Optics and Microoptics for Mechanical Engineers	2	W/S	3	T. Mappes
2142883	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II	2	S	3	A. Guber
2142879	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III	2	S	3	A. Guber
2142881	Microactuators	2	S	3	M. Kohl
2141865	Novel Actuators and Sensors	2	W	3	M. Kohl, M. Sommer
2143876	Nanotechnology with Clusterbeams	2	W/S	3	J. Gspann
2142140	Bionics for Engineers and Natural Scientists	2	S	3	H. Hölscher
23486 / 23487	Optoelectronic Components	2 / 1	S	4,5	W. Freude
2141853	Polymers in MEMS A: Chemistry, Synthesis and Applications	2	W	3	B. Rapp
2141854	Polymers in MEMS B: Physics, Microstructuring and Applications	2	W	3	M. Worgull

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 Basics of microsystem technology I [2141861] is compulsory and must be examined.

Learning Outcomes

- construction and production of e. g. mechanical, optical, fluidic and sensory microsystems.

Content
The module offers courses in microsystem technology. Knowledge is imparted in various fields like basics in construction and production of e. g. mechanical, optical, fluidic and sensory microsystems.

Remarks
If you have any questions concerning the module, please contact Prof. Dr. Andreas E. Guber.

Module: Nanotechnology [WI4INGMBIMT5]

Coordination: V. Saile
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)
2143875	Introduction to Microsystem Technology - Practical Course	2	W/S	3	A. Last
2142860	Nanotechnologie using Scanning Probe Methods	2	S	3	H. Hölscher, M. Dienwiebel, S. Walheim
2141865	Novel Actuators and Sensors	2	W	3	M. Kohl, M. Sommer
2143876	Nanotechnology with Clusterbeams	2	W/S	3	J. Gspann
2181712	Nanotribology and -Mechanics	2		3	M. Dienwiebel, H. Hölscher
2142140	Bionics for Engineers and Natural Scientists	2	S	3	H. Hölscher
23476	Quantum Functional Devices and Semiconductor Technology	2	S	3	M. Walther

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 Nanotechnology with Scanning Probe Methods [2142860] is compulsory and must be examined.

Recommendations
Knowledge in physics, mathematics, and chemistry is assumed.

Learning Outcomes
The student

- has detailed knowledge in the field of nanotechnology
- is able to evaluate the specific characteristics of nanosystems.

Content
The module deals with the most important principles and fundamentals of modern nanotechnology. The compulsory module “Nanotechnology with scanning probe methods” introduces the basics of nanotechnology and nanoanalytics. The specific phenomena and properties found in nanoscale systems are the main topic of the module.

Remarks
If you have any questions concerning the module, please contact Prof. Dr. Andreas E. Guber.

Module: Optoelectronics and Optical Communication [WI4INGMBIMT6]

Coordination: V. Saile
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)
2143882	Fabrication Processes in Microsystem Technology	2	W/S	3	K. Bade
2141865	Novel Actuators and Sensors	2	W	3	M. Kohl, M. Sommer
23616 / 23618	Communication Systems and Protocols	2/1	S	4,5	J. Leuthold, J. Becker, M. Hübner
23840	Laser Physics	2/1	W	4,5	M. Eichhorn
23476	Quantum Functional Devices and Semiconductor Technology	2	S	3	M. Walther
23462/23463	Optical Sources and Detectors	2/1	S	4,5	C. Koos
23464/23465	Optical Waveguides and Fibers	2/1	W	4,5	C. Koos
23460 / 23461	Optical Communication Systems	2/1	W	4,5	J. Leuthold, W. Freude

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 Optical Communication Systems [23460 / 23461] is compulsory and must be examined.
The course Manufacturing Processes of Microsystem Technology [2143882] can only be examined if the module Microfabrication is not chosen.

Recommendations
See descriptions of individual lectures.

Learning Outcomes

- Student has basic knowledge of optical communication systems and related device and fabrication technologies:
- He/she can apply this knowledge to specific problems.

Content
This module covers practical and theoretical aspects in the areas of optical communications and optoelectronics. System aspects of communication networks are complemented by fundamental principles and device technologies of optoelectronics as well as and microsystem fabrication technologies.

Remarks
If you have any questions concerning the module, please contact Prof. Dr. Andreas E. Guber.

Module: Energy and Process Technology I [WI4INGMBITS1]

Coordination: H. Wirbser
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)
2157961	Energy and Process Technology I	4/2	W	9	H. Bauer, M. Gabi, A. Velji, H. Wirbser

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 13 SPO) of the courses of this module, whose sum of credits must meet the 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.

Recommendations
Good skills in physics and chemistry and German.

Learning Outcomes
In this modul students achieve a basic understanding of the technical properties of energy conversion processes and machines.

Content
Energy and Process Technology 1:
1. thermodynamic basics and cycle processes (ITT)
2. basics of piston engines (IFKM)
3. basics of turbomachines (FSM)
4. basics of thermal turbomachines (ITS)

Remarks
The module “Energy and Process technology” replaces the former module “Maschinenkunde/ Energie- und Umwelttechnik” in the diploma studies “Wirtschaftsingenieurwesen” since WS 2012/2013. The content hast been slightly changed which will be explained in the first lecture unit. Examination of the lectures “Maschinenkunde I und II” of the old module is possible on request. All lectures and exams are hold in German only.

Module: Energy and Process Technology II [WI4INGMBITS2]

Coordination: H. Wirbser
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)
2170832	Energy and Process Technology II	4/2	S	9	K. Dullenkopf

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 13 SPO) of the courses of this module, whose sum of credits must meet the 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.

Recommendations
Good skills in German and knowledge of the content of the lecture „Energy and Process Technology I“.

Learning Outcomes
In this modul students achieve the ability to evaluate solitary and interconnected energy systems with respect to societal and economical aspects

Content
Energy and Process Technology 1:
1. basics in combustion and pollutant formation (ITT)
2. technical realisation and application of piston engines (IFKM) fluid flow engines (FSM) and thermal turbomachines (ITS)
3. technical aspects of energy supply systems and networks (ITS)

Remarks
The module “Energy and Process technology” replaces the former module “Maschinenkunde/ Energie- und Umwelttechnik” in the diploma studies “Wirtschaftsingenieurwesen” since WS 2011/2012. The content hast been slightly changed which will be explained in the first lecture unit. Examination of the lectures “Maschinenkunde I und II” of the old module is possible on request. All lectures and exams are hold in German only.

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

Coordination: R. 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	2/0	S	3	R. Roos
6233801	Design and Construction of Highways	1/1	S	3	R. Roos
6233802	Operation and Maintenance of Highways	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 conjoined oral exam about the lectures *Design and Construction Highways* [6233801] and *Operation and Maintenance Highways* [6233802] (according to §4(2), 2 of the examination regulation) (duration: 30 min.).
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
Writing a student research paper with the topics of the course *Design Basics in Highway Engineering* [19026] is obligatory.

Learning Outcomes

Content

Module: Highway Engineering [WI4INGBGU2]

Coordination: R. 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)
6233801	Design and Construction of Highways	1/1	S	3	R. Roos
6233802	Operation and Maintenance of Highways	2	S	3	R. Roos
6233804	Environmental Impact Assessment	1	S	1,5	R. Roos
6233807	Special Topics in Highway Engineering	1	S	1,5	R. Roos

Learning Control / Examinations
The assessment of the module consists of a conjoined oral exam about the lectures Special Topics in Highway Engineering [6233807] and *Environmental Impact Assessment* [6233804] (according to §4(2), 2 of the examination regulation) (duration: 15 min.) and a conjoined oral exam about the lectures *Design and Construction Highways* [6233801] and *Operation and Maintenance Highways* [6233802] (according to §4(2), 2 of the examination regulation) (duration: 30 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
None.

Recommendations
The successful completion of the course *Design Basics in Highway Engineering* [19026] is assumed. This course may be attended in a previous study programme.

Learning Outcomes

Content

Remarks
Writing a student research paper with the topics of the course *Design Basics in Highway Engineering* [19026] is obligatory.

Module: Safety, Computing and Law in Highway Engineering [WI4INGBGU9]

Coordination: R. 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)
6233901	IT-based Road Design	1/1	W	3	M. Zimmermann
6233906	Safety Management in Highway Engineering	1/1	W	3	M. Zimmermann
6233803	Laws concerning Traffic and Roads	2/0	S	3	D. Hönig

Learning Control / Examinations
See German version.

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: Water Supply and Sanitation [WI4INGBGU13]

Coordination: E. 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)
6223801	Process Technologies in Storm Water Treatment	1/1	S	3	S. Fuchs, E. Hoffmann
6223803	Process Technologies in Water Supply and Wastewater Disposal	1/1	S	3	E. Hoffmann
6220902	Urban Water Management	2/2	W	6	S. Fuchs, P. Klingel, U. Mohrlok
0170603		1/1	S	3	S. Fuchs
0170110	Environmental Chemistry	1/1	W	3	J. Winter
0170605		2	S	3	J. Winter

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
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: Environmental Management [WI4INGBGU14]

Coordination: E. 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)
6223701	Mass Fluxes	2	W	3	S. Fuchs
19058	Principles of Bioengineering	1/1	S	3	J. Winter
6223805	Surface Water Quality	1/2	S	4,5	S. Fuchs
6221811	Groundwater Quality	1/0	S	1,5	U. Mohrlok
19241		2	W	3	J. Winter

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 *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: Fundamentals of Transportation [WI4INGBGU15]

Coordination: P. Vortisch
Degree programme: Wirtschaftsingenieurwesen (M.Sc.)
Subject: Engineering Science

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

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
19027	Fundamentals of Transportation Planning and Traffic Engineering	2/0	S	3	P. Vortisch, M. Kagerbauer
19035	Exercises in Transportation Planning and Traffic Engineering	0/1	S	1,5	P. Vortisch, M. Kagerbauer
6232806	Characteristics of Transportation Systems	2/0	S	3	P. Vortisch
6232808	Freight Transport	1/1	S	3	B. Chlond
6232904	Long-distance and Air Traffic	2/0	W	3	B. Chlond, N.N., Wilko Manz
6232807	Tendering, Planning and Financing in Public Transport	2/0	S	3	W. Weißkopf
6232801	Assessment and Evaluation Techniques	1/0	S	1,5	P. Vortisch, B. Chlond
6232903	Seminar in Transportation	2	W/S	3	P. Vortisch, B. Chlond
2595475	Seminar Mobility Services	2	W	4	W. Michalk, B. Chlond, U. Leyn, H. Fromm

Learning Control / Examinations
The assessment is carried out as partial exams (according to § 4(2), 2-3 of the examination regulation) of the core course(s) and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The overall grade of the module is the average of the grades for each course weighted by the credits.
The partial exams will take place jointly (if possible) at individually appointed dates.

Conditions
One course has to be chosen from the core courses. Core courses are: Fundamentals of Transportation Planning and Traffic Engineering [19027] and Characteristics of Transportation Systems [6232806]. To achieve the required ECTS Credits, additional courses have to be chosen from the remaining courses.
From the courses Exercises in Transportation Planning and Traffic Engineering [19035], Seminar in Transportation [6232903] and Seminar Mobility Services [2595475] only one course can be chosen.

Recommendations
Without any basic knowledge of transportation it is strongly recommended to choose both core courses, Fundamentals of Transportation Planning and Traffic Engineering [19027] and Characteristics of Transportation Systems [6232806]. Otherwise only the core course Characteristics of Transportation Systems [6232806] should be chosen.

Learning Outcomes

Content

Module: Transportation Modelling and Traffic Management [WI4INGBGU16]

Coordination: P. Vortisch
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)
6232701	Methods and Models in Transportation Planning	1/1	W	3	P. Vortisch, M. Kagerbauer
6232703	Traffic Engineering	1/1	W	3	P. Vortisch
6232802	Traffic Management and Transport Telematics	1/1	S	3	P. Vortisch
6232804	Traffic Flow Simulation	1/1	S	3	P. Vortisch
6232901	Transportation Data Analysis	1/1	W	3	M. Kagerbauer, T. Streit
6232808	Freight Transport	1/1	S	3	B. Chlond
6232904	Long-distance and Air Traffic	2/0	W	3	B. Chlond, N.N., Wilko Manz
6232807	Tendering, Planning and Financing in Public Transport	2/0	S	3	W. Weißkopf
6232801	Assessment and Evaluation Techniques	1/0	S	1,5	P. Vortisch, B. Chlond
6232903	Seminar in Transportation	2	W/S	3	P. Vortisch, B. Chlond
2595475	Seminar Mobility Services	2	W	4	W. Michalk, B. Chlond, U. Leyn, H. Fromm

Learning Control / Examinations
The assessment is carried out as partial exams (according to § 4(2), 2-3 of the examination regulation) of the core courses and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The overall grade of the module is the average of the grades for each course weighted by the credits.
The partial exams will take place jointly (if possible) at individually appointed dates.

Conditions
Two courses have to be chosen from the core courses. Core courses are: *Methods and Models in Transportation Planning* [6232701], *Traffic Engineering* [6232703], *Traffic Management and Transport Telematics* [6232802] and *Traffic Flow Simulation* [6232804]. To achieve the requiered ECTS Credits, additional courses have to be chosen from the remaining courses. From the two possible seminars, only one can be chosen.

Recommendations
Basic knowledge of transportation is required.

Learning Outcomes

Content

Module: Mechnical Process Engineering in Construction [WI4INGBGU17]

Coordination: S. Haghsheno, H. Schneider, H. Schlick
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)
6241704	Construction Equipment and Mechanical Process Engineering	2/1	W	4,5	H. Schneider, H. Schlick
6241814	Construction Methods in Environmental Engineering	1/1	S	3	H. Schneider
6241703	Fundamental Mechanics of Construction Equipment	1	W	1,5	S. Gentes, Mitarbeiter
6241821	Test Procedures in Construction	1	S	1,5	H. Schneider
6241911	Operation Methods for Foundation and Marine Construction	1	W	1,5	H. Schneider
6241916	Construction Equipment Seminar	2	W	3	H. Schneider
6241913	Operation Methods for Earthmoving	1	W	1,5	H. Schlick

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.
The exam must be repeated at the latest 1 semester after the first try. The exam will be based on the content of the latest lecture.
Examination of courses Construction Equipment and Mechanical Process Engineering [6241704] und Fundamental Mechanics of Construction Equipment [6241703] is carried out written. Combinations of courses Construction Equipment Seminar [6241916], Operation Methods for Foundation Construction [6241911], Operation Methods for Earthmoving [6241913], Construction Methods in Environmental Engineering [6241814] and Test Procedures in Construction [6241821] are examined jointly orally.

Conditions
The course *Construction Equipment and Mechanical Process Engineering* [6241704] is compulsory and must be examined.

Recommendations
It is recommended to take the module Fundamentals of construction [WI3INGBGU3] from the Bachelor's degree program.

Learning Outcomes
Students understand construction methods and the related construction equipment, their technology, capabilities and constraints. Students can define construction methods consisting of machinery and devices. They can evaluate existing methods through knowledge about process performance and operating conditions, and the can identify potential for improvement.

Content
Within the frame of this module, various construction methods und aggregate production processes will be presented as well as performance calculations conducted. Students learn about the construction machinery and devices of these methods. Transmission, generation, conversion and controlling of power are explained with the help of various practical examples. Moreover, the module includes possibilities for an on-site familiarization.

Remarks
Information regarding lectures and possible schedule changes is available in the timetable at http://www.tmb.kit.edu/Studium_und_Lehre.php
Students can build additional customized modules of the courses offered by TMB. Please consult with the lecturers of this module.

Module: Project in Public Transportation [WI4INGBGU18]

Coordination: M. 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)
6234810	Determination of Demand, Timetable Construction and Alignment	1/2	S	4,5	E. Hohnecker
6234904	Standard Valuation in Public Transport. Using an Example	0/1	W	1,5	E. Hohnecker
6234902	Economic Efficiency of Guided Transport Systems	1	W	1,5	E. Hohnecker
6232807	Tendering, Planning and Financing in Public Transport	2/0	S	3	W. Weißkopf
6234903	Law Aspects of Guided Transport Systems	1	W	1,5	R. Schweinsberg

Learning Control / Examinations
See German version.

Conditions
See German version.

Recommendations
See German version.

Learning Outcomes
See German version.

Content
See courses.

Remarks
See German version.

Module: Public Transportation Operations [WI4INGBGU19]

Coordination: M. 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)
6234804	Operation Systems and Track Guided Infrastructure Capacity	2	S	3	E. Hohnecker
6234805	Management in Public Transport	2	S	3	E. Hohnecker
6234901	Environmental Aspects of Guided Transport Systems	2	W	3	E. Hohnecker
6234903	Law Aspects of Guided Transport Systems	1	W	1,5	R. Schweinsberg
19307s / 6234809	Construction and Maintenance of Track Infrastructure	1	S	1,5	E. Hohnecker, H. Müller

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
See German version.

Recommendations
See German version.

Learning Outcomes
See German version.

Content
See courses.

Remarks
See German version.

Module: Guided Transport Systems / Engineering [WI4INGBGU20]

Coordination: M. Weigel
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)
6234806	Infrastructure Dimensioning and Railway Traffic	1/1	S	3	E. Hohnecker
6234808	Infrastructure Equipment of Railway Tracks	1	S	1,5	E. Hohnecker, Mitarbeiter
19307s / 6234809	Construction and Maintenance of Track Infrastructure	1	S	1,5	E. Hohnecker, H. Müller
6232808	Freight Transport	1/1	S	3	B. Chlond
2114346	Electrical Rail Vehicles	2	S	3	G. Clos
6234903	Law Aspects of Guided Transport Systems	1	W	1,5	R. Schweinsberg

Learning Control / Examinations
See German version.

Conditions
See German version.

Recommendations
See German version.

Learning Outcomes
See German version.

Content
See courses.

Remarks
See German version.

Module: Logistics and Management of Guided Transport Systems [WI4INGBGU21]

Coordination: M. Weigel
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)
6234701	Track Guided Transport Systems - Technical Design and Components	3/1	W	6	E. Hohnecker
6234805	Management in Public Transport	2	S	3	E. Hohnecker
6234903	Law Aspects of Guided Transport Systems	1	W	1,5	R. Schweinsberg
6234902	Economic Efficiency of Guided Transport Systems	1	W	1,5	E. Hohnecker

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
See German version.

Recommendations
See German version.

Learning Outcomes
See German version.

Content
See courses.

Remarks
See German version.

Module: Control Engineering II [WI4INGETIT2]

Coordination: M. 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	3/1	W	6	M. Kluwe
23160	Automation of Discrete Event and Hybrid Systems	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
None.

Recommendations
For this module a basic knowledge in system theory and control engineering is assumed. These subjects can be found in the course *System Dynamics and Control Engineering* [23155] (within the Bachelor module *Control Engineering* [WW3INGETIT2]), which is recommended to have been attended beforehand.

Learning Outcomes
The students

- have deeper knowledge in the field of control theory and system dynamics,
- are able to analyze multivariable systems in state space and frequency domain 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 I/O-models in frequency domain and mainly state space models are regarded, for which several 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: W. 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	2	W	3	W. Menesklou
23232	Experimental Laboratories in Sensors and Actuators	4	S	6	W. Menesklou
23209	Systematic Product Development in Sensor Technology	1/1	W	3	E. Ivers-Tiffée, Riegel
23240	Sensor Systems (Integrated Sensor Actuator Systems)	2	S	3	W. Wersing
23233/23234	Seminar: Sensorik	2	W/S	3	W. Menesklou
21881	Microactuators	2	S	3	M. 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: W. 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	4	S	6	W. Menesklou
23209	Systematic Product Development in Sensor Technology	1/1	W	3	E. Ivers-Tiffée, Riegel
23240	Sensor Systems (Integrated Sensor Actuator Systems)	2	S	3	W. Wersing
23233/23234	Seminar: Sensorik	2	W/S	3	W. Menesklou
21881	Microactuators	2	S	3	M. 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: High-Voltage Technology [WI4INGETIT6]

Coordination: T. Leibfried, B. Hoferer
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)
23360/23362	High-Voltage Technology I	2/1	W	4,5	R. Badent
23361/23363	High-Voltage Technology II	2/1	S	4,5	R. 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 electrical power engineering,
- is capable to analyse and develop 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.

Module: Generation and transmission of renewable power [WI4INGETIT7]

Coordination: T. Leibfried, B. Hoferer
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)
23372/23374	Power Transmission and Power Network Control	2/1	S	4,5	T. Leibfried
23371/23373	Power Network Analysis	2/2	W	6	T. Leibfried
23381	Windpower	2/0	W	3	N. Lewald
23380	Photovoltaic Systems Technology	2/0	S	3	Schmidt
23392/23394	High-Voltage Test Technique	2/1	W	4,5	R. 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 course Power Transmission and Power Network Control [23372/23374] or *Power Network Analysis [23371/23373]* is obligatory. *Power Network Analysis* can also be taken within the Bachelor's programme.

Learning Outcomes
The student

- has wide knowledge of electrical power engineering,
- is capable to analyse and develop 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.

Module: Principles of Food Process Engineering [WI4INGCV3]

Coordination: V. 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	2/0	W	4	V. Gaukel
22214	Principles of Process Engineering referring to Food II	2/0	S	4	V. Gaukel
22205/6	Quality Management of Food Processing	1/1	S	3	Schuchmann
22207	Food Science and Functionality	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: V. 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	1/1	S	3	Schuchmann
22207	Food Science and Functionality	2	W	4	Watzl
22209	Microbiology of Food	2	W	4	Franz
22215	Product Design	2	S	4	Schuchmann
22218	Modern Measurement Techniques for Process Optimization	2	S	4	Regier
22417	Scale up in Biology and Engineering	2	W	4	Hausmann
6602	Fundamentals of Food Chemistry	2	W/S	4	Loske
22229	Emulsifying and Dispersing	2	S	4	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
See courses.

Module: Water Chemistry and Water Technology I [WI4INGCV6]

Coordination: H. Horn
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	2	W	4	H. Horn
22602	Excercises in Chemical Technology of Water	1	W	2	H. Horn, Mitarbeiter
22664	Laboratory Work “Water”	2	W	4	H. Horn, 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

Module: Water Chemistry and Water Technology II [WI4INGCV7]

Coordination: H. Horn
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	2	W	4	G. Abbt-Braun
22618	Fundamentals of Waste Water Treatment	2	S	4	S. Lackner
22612	Oxidation and Desinfection Processes	2	S	4	H. Horn
22605	Membrane Separation in Water Treatment	2	W	4	H. Horn, F. Saravia

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.

Module: Understanding and Prediction of Disasters 1 [WI4INGINTER7]

Coordination: M. Kunz
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)
19203	Morphodynamics of Rivers and Streams	1/1	S	3	F. Nestmann
19212	Environment Communication	2/1	W	4	Kämpf
8048	River Engineering and Ecology I	2	W	3	E. Dister
8056	River Engineering and Ecology II	2	S	2	E. Dister
2600211/212	Geophysical Engineering	1/1	S	4	Wenzel, A. Barth
0170617	Water Resource Management and Engineering Hydrology	1/1	S	3	Ihringer
2501031	Advanced Measurement Methods	2	W	3,5	Kottmeier
9050/9051	Hydrogeology	2/2	W	5	N. Goldscheider

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
None.

Learning Outcomes
See German version.

Content
See German version.

Remarks
Students, who successfully completed both modules “Understanding and Prediction of Disasters” I and II (alternatively: one of the modules in Bachelor and Master) can get a certificate of the module coordinator (CEDIM). This certificate lists the successful completed courses within the two modules.

Module: Understanding and Prediction of Disasters 2 [WI4INGINTER8]

Coordination: M. Kunz
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)
19203	Morphodynamics of Rivers and Streams	1/1	S	3	F. Nestmann
19212	Environment Communication	2/1	W	4	Kämpf
8048	River Engineering and Ecology I	2	W	3	E. Dister
8056	River Engineering and Ecology II	2	S	2	E. Dister
2600211/212	Geophysical Engineering	1/1	S	4	Wenzel, A. Barth
0170617	Water Resource Management and Engineering Hydrology	1/1	S	3	Ihringer
2501031	Advanced Measurement Methods	2	W	3,5	Kottmeier
9050/9051	Hydrogeology	2/2	W	5	N. Goldscheider

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
None.

Learning Outcomes
See German version.

Content
See German version.

Remarks
Students, who successfully completed both modules “Understanding and Prediction of Disasters” I and II (alternatively: one of the modules in Bachelor and Master) can get a certificate of the module coordinator (CEDIM). This certificate lists the successful completed courses within the two modules.

Module: Extracurricular Module in Engineering [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: Z. (ZAR)
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	2/0	S	3	T. Dreier
24011	Commercial and Corporate Law	2/0	W	3	Z. (ZAR), O. Knöfel
24017	Exercises in Civil Law	2/0	W/S	3	T. Dreier

Learning Control / Examinations
The assessment is conducted according to § 4(2), 2 of the study and examination regulations in form of exams. 2 of the 5 exams must be passed. The exams take place in the course *Exercises in Civil Law*.

Conditions
None.

Learning Outcomes
The student

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

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

Module: Intellectual Property Law [WI4JURA4]

Coordination: T. 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)
24354	Internet Law	2/0	W	3	T. Dreier
24121	Copyright	2/0	W	3	T. Dreier
24656	Patent Law	2/0	S	3	P. Bittner
24136 / 24609	Trademark and Unfair Competition Law	2/0	W/S	3	Y. Matz
VGE	Computer Contract Law	2/0	W	3	M. Bartsch

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
See courses.

Module: Private Business Law [WI4JURA5]

Coordination: Z. (ZAR)
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	2/0	S	3	Z. (ZAR)
24671	Law of Contracts	2/0	S	3	Z. (ZAR)
24167	Employment Law I	2	W	3	A. Hoff
24668	Employment Law II	2	S	3	A. Hoff
24168	Tax Law I	2/0	W	3	D. Dietrich
24646	Tax Law II	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
The module provides the student with knowledge in special matters in business law, like employment law, tax law and business law, which are essential for managerial decisions.

Module: Public Business Law [WI4JURA6]

Coordination: G. Sydow
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	2/0	S	3	G. Sydow
24082	Public Media Law	2	W	3	C. Kirchberg
24666	European and International Law	2/0	S	3	G. Sydow
24140	Environmental Law	2	W	3	G. Sydow
24018	Data Protection Law	2/0	W	3	G. Sydow

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: Governance, Risk & Compliance [WI4INGRC]

Coordination: T. Dreier
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)
24121	Copyright	2/0	W	3	T. Dreier
24018	Data Protection Law	2/0	W	3	G. Sydow
24168	Tax Law I	2/0	W	3	D. Dietrich
24671	Law of Contracts	2/0	S	3	Z. (ZAR)
GRC	Corporate Compliance	2	W	3	T. Dreier, N.N.
GRCsem	Seminar: Governance, Risk & Compliance	2	S	3	T. Dreier, N.N.

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

5.8 Sociology

Module: Sociology [WI4SOZ1]

Coordination: G. 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	2	W/S	2	G. Nollmann, Pfadenhauer, Haupt, Grenz, Eisewicht, Kunz, Albrecht, Enderle, Dukat
spezSoz	Special Sociology	2	W/S	4	G. Nollmann, Pfadenhauer, Haupt, Grenz, Eisewicht, Kunz, Dukat, Albrecht, Enderle
SozSem	Projectseminar	2	W/S	4	G. Nollmann, Kunz, Haupt, Grenz, Eisewicht, Enderle, Dukat, Albrecht

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
Keine.

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	2	W/S	3	R. Studer, A. Oberweis, T. Wolf, R. Kneuper
SemAIFB2	Seminar Efficient Algorithms	2	W/S	3	H. Schmeck
SemAIFB3	Seminar Complexity Management	2	W/S	3	D. Seese
SemAIFB4	Seminar Knowledge Management	2	W	3	R. Studer
SemAIFB5	Seminar eOrganization	2	S	3	S. Tai
2530280	Seminar in Finance	2	W/S	3	M. Uhrig-Homburg, M. Ruckes
SemFBV1	Seminar in Insurance Management	2	W/S	3	U. Werner
n.n.	Seminar Financial Economics and Risk Management	2	W/S	3	M. Ulrich
2577915	Seminar: Management and Organization	2	W/S	3	H. Lindstädt
2579904	Seminar Management Accounting	2	W/S	3	M. Wouters
2579905	Special Topics in Management Accounting	2		3	M. Wouters, S. Morales, M. Kirchberger
SemIIP3	Seminar Business Ethics	2	W/S	3	A. Wollert
SemTuE1	Entrepreneurship Seminar			3	O. Terzidis
SemTuE2	Seminar Innovation management			3	M. Weissenberger-Eibl
2577919	„Good Governance“ at German Corporations	2	W/S	6	T. Reitmeyer
2572197	Seminar in strategic and behavioral marketing	2	W	3	B. Neibecker
SemETU2	Seminar in Marketing and Sales (Master)	2	W	3	M. Klarmann
SemIIP2	Seminar in Industrial Production	2	W/S	3	F. Schultmann, M. Fröhling
2585420/2586420	Topics of Sustainable Management of Housing and Real Estate	2	W/S	3	T. Lützkendorf, D. Lorenz
SemEW	Seminar Energy Economics	2	W/S	3	W. Fichtner, P. Jochem, D. Keles, R. McKenna, V. Bertsch
2540510	Master Seminar in Information Engineering and Management	2	W	3	A. Geyer-Schulz
SemIW	Seminar Information Engineering and Management	2	W/S	3	C. Weinhardt
2595470	Seminar Service Science, Management & Engineering	2	W/S	3	C. Weinhardt, R. Studer, S. Nickel, H. Fromm, W. Fichtner
2595477	Practical Seminar Service Innovation	3		5	G. Satzger, M. Kohler, H. Fromm, N. Feldmann
2595475	Seminar Mobility Services	2	W	4	W. Michalk, B. Chlond, U. Leyn, H. Fromm
SemWIOR2	Seminar Economic Theory	2	W/S	3	C. Puppe
SemWIOR3	Seminar in Experimental Economics	2	W/S	3	N. N.
n.n.	Seminar in Behavioral and Experimental Economics	2	W/S	3	P. Reiss
n.n.	Seminar on Morals and Social Behavior	2	W/S	3	N. Szech
SemIWW2	Seminar in International Economy	2/0	W/S	3	J. Kowalski
SemIWW3		2	W/S	3	I. Ott
SemETS3	Seminar on Macroeconomic Theory	2		3	M. Hillebrand

2560130	Seminar Public Finance	2	W/S	3	B. Wigger, Assistenten
2560263	Seminar on Network Economics	2	W/S	3	K. Mitusch
2561209	Seminar Transport Economics		W/S	3	
2550491	Seminar in Discrete Optimization	2	W/S	3	S. Nickel
2550131	Seminar in Continous Optimization	2	W/S	3	O. Stein
SemWIOR1	Seminar Stochastic Models	2	W/S	3	K. Waldmann
SemING	Seminar in Engineering Science	2	W/S	3	Fachvertreter ingenieurwissenschaftlicher Fakultäten
SemIFL	Seminar Conveying Technology and Logistics	2	W/S	3	K. Furmans
21690sem	Seminar paper "Production Engineering"	2	W/S	3	V. Schulze, G. Lanza, J. Fleischer
SemMath	Seminar in Mathematics	2	W/S	3	Fachvertreter der Fakultät für Mathematik
RECHT	Seminar: Legal Studies	2	W/S	3	Inst. ZAR
SQ HoC1	Working and Studying Effectively	meist 2	W/S	2-4	HoC
SQ HoC2	Oral Presentation and Communication Skills	meist 2	W/S	2-3	HoC
SQ HoC3	Scientific Writing	meist 2	W/S	2-3	HoC
SQ HoC4	Teaching and Learning Foreign Languages	k.A.	W/S	2-3	HoC
SQ HoC5	Qualitative Methods	k.A.	W/S	2-3	HoC
SQ HoC6	Law and Economics	k.A.	W/S	2-3	HoC
SQ HoC7	Competencies as a Research Topic	k.A.	W/S	2-3	HoC
SQ HoC 8	Transferring Knowledge in School, University and at the Workplace	k.A.	W/S	2-3	HoC
SQ HoC9	Professional Orientation and Job Specific Competencies	k.A.	W/S	2-3	HoC
SQ PEW1	Elective „Educational development for student teachers"	k.A.	W/S	2 / 3	Personalentwicklung
SQ ZAK1	Key qualifications ZAK	k.A.	W/S	1-3	ZAK

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 Department of Economics and Management 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 Department of Economics and Management (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 Department of Economics and Management. 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 [HoC, ZAK, Sprachenzentrum].

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 Industrial Engineering and Management. 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 Department of Economics and Management, 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 Industrial Engineering and Management and has to refer to subject-specific or interdisciplinary problems.

6 Anhang: Qualifikationsziele Wirtschaftsingenieurwesen (M.Sc.)

Die Absolvent/innen des interdisziplinären Masterstudiengangs Wirtschaftsingenieurwesen verfügen über ein erweitertes und vertieftes Wissen in den Fächern Betriebswirtschaftslehre, Volkswirtschaftslehre, Informatik, Operations Research und den Ingenieurwissenschaften. Dieses ist schwerpunktmäßig auf die Betriebswirtschaftslehre und die Ingenieurwissenschaften ausgerichtet. Entsprechend den individuellen Interessen können weitere Schwerpunkte gelegt werden. Je nach Wahl können zusätzlich Kenntnisse aus dem Bereich Statistik, den Rechtswissenschaften oder der Soziologie vorliegen. Innerhalb der einzelnen Fächer besitzen die Absolvent/innen generalisierte oder spezialisierte Fachkenntnisse.

Die Absolvent/innen sind in der Lage, die Besonderheiten, Grenzen, Terminologien und Lehrmeinungen in den gewählten Themenbereichen dieser Fächer zu definieren, zu beschreiben, zu interpretieren, den aktuellen Forschungsstand wiederzugeben sowie punktuell weiterzuentwickeln. Ihr breites Wissen ermöglicht ihnen, interdisziplinär zu denken und Themen aus verschiedenen Blickwinkeln zu betrachten.

Sie können geeignete Handlungsalternativen zu forschungsrelevanten Themenkomplexen auswählen und kombinieren. Diese können sie auf spezifische Problemstellungen übertragen und anwenden. Umfangreiche Probleme sowie Informationen und aktuelle Anforderungen können sie differenziert betrachten und mit geeigneten Methoden und Konzepten analysieren, vergleichen und bewerten. Dabei schätzen sie Komplexität und Risiken ab, erkennen Verbesserungspotentiale und wählen nachhaltige Lösungsverfahren und Verbesserungsmethoden aus. Dadurch sind sie in der Lage, verantwortungsvolle und wissenschaftlich fundierte Entscheidungen zu treffen. Sie entwickeln innovative Ideen und können diese umsetzen.

Diese Vorgehensweisen können sie selbständig oder in Teams durchführen. Dabei sind sie in der Lage, ihre Entscheidungen zu erläutern und darüber zu diskutieren. Die gewonnenen Ergebnisse können sie eigenständig interpretieren, validieren und illustrieren.

Der interdisziplinäre Umgang mit dem Fachwissen erfolgt unter Berücksichtigung von gesellschaftlichen, wissenschaftlichen und ethischen Erkenntnissen.

Die Absolvent/innen können sich mit Fachvertretern auf wissenschaftlichem Niveau austauschen und herausgehobene Verantwortung auch in einem internationalen Team übernehmen. Karlsruher Wirtschaftsingenieure zeichnen sich durch ihre interdisziplinäre Denkweise sowie ihre Innovations- und Managementfähigkeit aus. Sie sind insbesondere für Tätigkeitsfelder in der Industrie, im Dienstleistungssektor oder in der öffentlichen Verwaltung sowie für eine nachgelagerte wissenschaftliche Laufbahn (Promotion) qualifiziert.

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