

Appendix C: Module catalogue

for the study programme Industrial Engineering and Management B.Sc.

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Please note: The German version of this document is the legally binding version. The English translation provided here is for information purposes only.

General Business Administration						BWL		
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:			
1002	150 h	5	1st semester	Annual (Winter)	1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study	
	Lecture	60 students	3	SCH	45	h	67.5	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	<p>Learning outcomes/competences:</p> <p>The students know the basic organisational and legal structures of companies and are familiar with the optimisation tasks in selected entrepreneurial functional areas as well as with the basic principles and success criteria of economic action in order to be able to classify their engineering activities in a business management context and to evaluate the economic consequences of their activities. The students master methods and tools for problem solving in selected corporate functional areas. They can apply business management instruments and calculation methods in a target-oriented manner and assess their effects.</p>							
3	<p>Contents:</p> <ul style="list-style-type: none"> • Basic concepts of business administration / basic principles of economic action • Overview of the entrepreneurial functional areas of the goods economy, financial economy and information economy level • Corporate goals and corporate key figures / key figure systems • Basic concepts of private and commercial law • Corporate legal forms 							
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with case studies / exercises</p>							
5	<p>Participation requirements:</p> <p>Formal:</p> <p>Content:</p>							
6	<p>Forms of assessment:</p> <p>Written examination, combination examination, performance examination or oral examination</p>							
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>							
8	<p>Application of the module (in the following study programmes)</p> <p>Industrial Engineering and Management B.Sc.</p>							
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>							
10	<p>Module coordinator:</p> <p>Prof. Dr. rer. pol. Hildegard Manz-Schumacher</p>							
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>							
12	<p>Language:</p> <p>German</p>							

Industrial Plant Layout						APL		
Identification number:	Workload:	Credits:	Study semester:		Frequency of the offer	Duration:		
1010	150 h	5	4th or 6th semester		Annual (Summer)	1 semester		
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22	h
	Exercise	20 students	1	SCH	15	h	23	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	<p>Learning outcomes/competences: After successful completion of the module System Planning, the students are able to systematically evaluate a planning task in low voltage and medium/high voltage and to critically question the solution. This includes the structuring of the planning task and the analysis of the task. The students can defend the solutions.</p>							
3	<p>Contents: Systematic approach to plant planning and design. Design, dimensioning and assessment of energy production plants using the example of biogas plants. Planning and projecting of electrical energy systems and electrical energy generation systems, especially regenerative energy generation systems. Current aspects of new construction and the expansion planning of electrical power supply systems.</p>							
4	<p>Forms of teaching: Lecture and seminar</p>							
5	Participation requirements:							
	Formal:	None						
	Content:	None						
6	<p>Forms of assessment: Written examination or oral examination</p>							
7	<p>Prerequisite for the award of credit points: module examination pass and course assessment</p>							
8	<p>Application of the module (in the following study programmes) Electrical Engineering B.Eng., Renewable Energies B.Eng. and Industrial Engineering and Management B.Sc.</p>							
9	<p>Importance of the grade for the final grade: according to BRPO</p>							
10	<p>Module coordinator: Prof. Dr.-Ing. Jens Haubrock</p>							
11	<p>Other information: Literature will be announced at the beginning of the course. Renewable Energies study programme, specialisation in Energy Efficient Systems: Elective subject</p>							
12	<p>Language: German</p>							

Automation						AUT		
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:			
1014	150 h	5	4th semester	Annual (Summer)	1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	2	SCH	30	h	45	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	<p>Learning outcomes/competences: Name and explain the basic concepts and laws of automation technology. Recognise and describe the elementary interrelationships in the structure of automation solutions. Understand the practical significance of automation. Master the basic means of description and analysis of industrial automation. Classify the current application areas of automation technology. Enable the development of independent solutions in simple areas of application for automation.</p>							
3	<p>Contents: Historical overview and current developments in automation technology, definitions of terms, production measurement technology, measurement accuracy and errors, the concept of capability, sensors and actuators, control technology tasks, description systems for control technology tasks, linear transmission elements, linearisation, description forms of transmission elements, analogue and digital controls, pneumatic and hydraulic systems, programming systems for automation tasks, networks and bus systems, control cabinet design, computers for automation tasks, embedded systems, safety packages in automation technology, automation control systems</p>							
4	Forms of teaching: Lectures and exercises							
5	Participation requirements:							
	Formal:	None						
	Content:	None						
6	Forms of assessment: Written examination, combination examination, performance examination or oral examination							
7	Prerequisite for the award of credit points: Module examination pass							
8	Application of the module (in the following study programmes) Industrial Engineering and Management B.Sc.							
9	Importance of the grade for the final grade: according to BRPO							
10	Module coordinator: Prof. Dr.-Ing. Reinhard Kaschuba							
11	Other information: Literature will be announced at the beginning of the course.							
12	Language: German							

Bachelor Thesis						BA		
Identification number: 1291	Workload: 360 h	Credits: 12	Study semester: 6th or 7th semester		Frequency of the offer each semester	Duration: 12 weeks		
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study	
	Lecture	60 students	0	SCH	0	h	360	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	<p>Learning outcomes/competences: With the bachelor thesis, each candidate demonstrates that he/she is able to complete a practice-oriented task from his/her subject area within a specified period of time, both in its subject-specific details and in the interdisciplinary contexts, working independently and according to scientific methods.</p>							
3	<p>Contents: The bachelor thesis is usually an independent investigation with an engineering science or engineering technology task. It should deal with the subject matter in detailed descriptions and explanations and be prepared as a written paper.</p>							
4	Forms of teaching:							
5	Participation requirements:							
	Formal:	None						
	Content:	Coordinated topic from the student's special subject area						
6	Forms of assessment:							
7	Prerequisite for the award of credit points:							
8	<p>Application of the module (in the following study programmes) Apparative Biotechnology B.Sc., Electrical Engineering B.Eng., Engineering Computer Sciences B.Eng., Mechanical Engineering B.Eng., Mechatronics B.Sc., Renewable Energies B.Eng. and Industrial Engineering and Management B.Sc.</p>							
9	Importance of the grade for the final grade: according to BRPO							
10	Module coordinator: Prof. Dr.-Ing. Anton Klar							
11	Other information: Literature will be announced at the beginning of the course.							
12	Language: German							

Occupationally Orientated Work						BOA						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1020	150 h	5	1st semester	Annual (Winter)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study					
	Lecture	60 students	3	SCH	45	h	67.5	h				
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	0	SCH	0	h	0	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>The students are familiar with the range of activities of industrial engineers. They are sensitised to current business management and technological problems/trends and are able to grasp the interdisciplinary complexity, economic and technical significance and entrepreneurial consequences of these topics.</p> <p>They have mastered the basics of scientific work and can use these as a basis for working out issues in a team, communicating them to fellow students in presentations and discussing them. In addition, they know the organisational basics of project management in order to be able to work in a team-orientated, time- and result-orientated manner and to be able to meet the requirements of their future field of application in project management.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - Range of tasks/job market prospects of the industrial engineer - Industrial engineering as an interface between business administration and technology using practical examples - Excursion to regional companies / presentation by external speakers - Basics of technical communication - Introduction to the organisation of projects - Introduction to the basics of scientific work and writing and to presentation techniques - Main topics from the field of the globalised world of work 											
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching, project work</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>None</td> </tr> </table>								Formal:	None	Content:	None
Formal:	None											
Content:	None											
6	<p>Forms of assessment:</p> <p>Written examination, combination examination, performance examination, project work or oral examination</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass and course assessment</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											
10	<p>Module coordinator:</p> <p>Prof. Dr.-Ing. Franz Feyerabend</p>											
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>											

12	Language: German
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External Accounting						BRE						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1021	150 h	5	3rd semester	Annual (Winter)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	2	SCH	30	h	45	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	0	SCH	0	h	0	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>The students are proficient in the systematics of double-entry bookkeeping and can explain and assess the effects of business transactions on the structure of a balance sheet as well as on the success of a company. They are able to depict and reflect critically on economic facts in the commercial balance sheet according to HGB. The students know the basic principles of accounting policy and are able to reflect real business events differently in the commercial balance sheet due to various accounting and valuation options as well as existing discretionary powers. They can develop and present their own balance sheet policy solutions.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - Introduction to external accounting - Systematics of double-entry bookkeeping - Basics of the annual financial statement under commercial law - Accounting and valuation according to HGB - Annual financial statement policy 											
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with case studies and examples</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>The module General Business Administration (1002) should have been completed</td> </tr> </table>								Formal:	None	Content:	The module General Business Administration (1002) should have been completed
Formal:	None											
Content:	The module General Business Administration (1002) should have been completed											
6	<p>Forms of assessment:</p> <p>Written examination, combination examination, performance examination or oral examination</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											
10	<p>Module coordinator:</p> <p>Prof. Dr. rer. pol. Hubertus Wameling</p>											
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>											
12	<p>Language:</p> <p>German</p>											

Operating Systems							BS	
Identification number:	Workload:	Credits:	Study semester:		Frequency of the offer	Duration:		
1023	150 h	5	6th semester		Annual (Summer)	1 semester		
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	22.5	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	Learning outcomes/competences: <ul style="list-style-type: none"> • The students know the basic tasks and basic architectures of operating systems. • They have mastered the operation of unixoid operating systems at the command line. • They explain how processors provide hardware support for many tasks of modern operating systems. • They can explain thread and process management and scheduling. • They compare and evaluate synchronisation mechanisms and apply them in a targeted and measured way to avoid race conditions. • They analyse situations of deadlock. • They can present how the file management and the input /output management are realised in unixoid operating systems. • They master basic system calls, e.g. for process handling, and apply them in programming close to the operating system. • They create programmes that are close to the operating system, e.g. a simple shell. This includes the creative application of the knowledge acquired in the module to openly formulated problems. 							
3	Contents: <ul style="list-style-type: none"> • General introduction to operating systems (tasks, basic architectures, history) • Practical handling of Linux • Necessary hardware support in processors for modern operating systems • Process management and scheduling (incl. multi-threading) • Memory management (including page management and virtual memory) • Synchronisation mechanisms (from atomic operations to semaphores) • Deadlocks and strategies for resolving them • File management • Input/output management 							
4	Forms of teaching: Lecture, seminar-style teaching with exercises, and practical course with implementation of programming projects related to operating systems (with a short paper or presentation)							
5	Participation requirements:							
	Formal:	None						

	Content:	<ul style="list-style-type: none"> • Basic computer science and programming skills (especially in C) • Basic knowledge of computer architectures Modules: 1105 Computer Science 1; 1109 Computer Science 2; 1231 Computer Architectures;
6	Forms of assessment:	Written examination or oral examination
7	Prerequisite for the award of credit points:	Module examination pass and course assessment
8	Application of the module (in the following study programmes)	Engineering Computer Sciences B.Eng. and Industrial Engineering and Management B.Sc.
9	Importance of the grade for the final grade:	according to BRPO
10	Module coordinator:	Prof. Dr.-Ing. Wolfram Schenck
11	Other information:	Literature will be announced at the beginning of the course.
12	Language:	German

Business Taxation						BSL		
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:			
1284	150 h	5	6th semester	Annual (Summer)	1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study	
	Lecture	60 students	3	SCH	45	h	67.5	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	Learning outcomes/competences: The students master the basics of the most important income taxes, especially tax on income and corporate income tax. They are capable of pointing out the fiscal consequences of straightforward situations. Students will be able to appreciate the tax consequences of entrepreneurial decisions and provide selected tax-structuring recommendations. They know the objectives and advantage criteria of business tax policy and can use these in a targeted manner to independently solve tax-planning issues. They can develop and present their own solutions to questions of tax policy.							
3	Contents: - Introduction to business taxation - Basics of taxation - Income tax - Corporate income tax - Trade tax - Value added tax - Other selected tax types - Instruments of business tax policy - Tax planning							
4	Forms of teaching: Lecture, seminar-based teaching with case studies and examples							
5	Participation requirements:							
	Formal:	None						
	Content:	None						
6	Forms of assessment: Written examination, combination examination, performance examination or oral examination							
7	Prerequisite for the award of credit points: Module examination pass							
8	Application of the module (in the following study programmes) Industrial Engineering and Management B.Sc.							
9	Importance of the grade for the final grade: according to BRPO							
10	Module coordinator: Prof. Dr. rer. pol. Hubertus Wameling							
11	Other information: Literature will be announced at the beginning of the course.							

12	Language: German
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Machine Vision						BIL						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1029	150 h	5	5th semester	Annual (Winter)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	1	SCH	15	h	22.5	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>Name and explain the basic concepts, elementary connections and laws of machine vision. Demonstrate and apply the basic descriptive tools and analytical methods of machine vision. Name the current areas of application. Understand and interpret the practical significance of machine vision. Capable of developing independent solutions in simple application areas of machine vision.</p>											
3	<p>Contents:</p> <p>Historical overview and current developments in machine vision, sensor systems for image data acquisition, basics of technical optics for the acquisition of scenes, illumination and object positioning, programming systems, handling machine vision programmes, LUT and grey value programming, contour analysis and edge detection, filters in the spatial and frequency range, morphology, template matching, colour image processing, applications of machine vision as a quality assurance tool, biotechnological and medical applications, design of machine vision systems, machine vision software, design of vision systems for process monitoring.</p>											
4	<p>Forms of teaching:</p> <p>Lecture, practicals and exercises</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>None</td> </tr> </table>								Formal:	None	Content:	None
Formal:	None											
Content:	None											
6	<p>Forms of assessment:</p> <p>Written examination, combination examination, performance examination or oral examination</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass and course assessment</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Apparative Biotechnology B.Sc., Electrical Engineering B.Eng., Mechatronics B.Sc. and Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											
10	<p>Module coordinator:</p> <p>Prof. Dr.-Ing. Reinhard Kaschuba</p>											
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>											
12	<p>Language:</p> <p>German</p>											

CAD						CAD						
Identification number:	Workload:	Credits:	Study semester:		Frequency of the offer	Duration:						
1037	150 h	5	3rd or 5th semester		Annual (Winter)	1 semester						
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	0	SCH	0	h	0	h				
	Exercise	20 students	2	SCH	30	h	45	h				
	Practical or seminar	15 students	0	SCH	0	h	0	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>By successfully completing the CAD module, the student is able to apply the methods and systems for modelling three-dimensional individual parts and assemblies. On this basis, each participant will be able to assess the performance of a commercially available, associative and modular 3D CAD system and to use it in practice.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - Solid modelling - Coordinate systems, sketches, skeleton and auxiliary geometry - Free, relative or associative positioning - CSG models and BREP models - Generation techniques for basic bodies - Hybrid volume models and associated history tree - Parameterised features - Introduction to assembly modelling - 3D CAD modelling methodology with regard to individual parts, assemblies and free-form surfaces - 3D animation of simple kinematics - Introduction to the product life cycle and related data management - Product Lifecycle Management in companies 											
4	<p>Forms of teaching:</p> <p>Lecture and exercises. Projection of more complex processes</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>Technical Drawing (1265), Fasteners (1271)</td> </tr> </table>								Formal:	None	Content:	Technical Drawing (1265), Fasteners (1271)
Formal:	None											
Content:	Technical Drawing (1265), Fasteners (1271)											
6	<p>Forms of assessment:</p> <p>Oral examination or examination accompanying the course</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Mechanical Engineering B.Eng. and Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											
10	<p>Module coordinator:</p> <p>Prof. Dr.-Ing. Raimund Kisse</p>											
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>											

12	Language: German
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Controlling						CON						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1040	150 h	5	4th semester	Annual (Summer)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	2	SCH	30	h	45	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	0	SCH	0	h	0	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>Students master the most important concepts and techniques of controlling. By linking planning, monitoring, information and control, they can contribute to securing a company's ability to make decisions and take action in everyday operations. The students understand controlling as a cross-functional management instrument and master selected operative and strategic instruments of controlling. They are proficient in the common cost accounting systems of controlling and are thoroughly familiar with the complex of topics "Information supply". They are able to independently set up, interpret and present key figures and key figure systems.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - Introduction to Controlling - Functions and areas of responsibility of controlling - Operational controlling - Strategic controlling - Cost accounting systems in controlling - External accounting as a task area of controlling - Reporting - Key figures and key figure systems 											
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with case studies and examples</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>The modules Business Accounting (1021), Cost and Performance Accounting (1130), Investment and Financing (1118) should have been completed.</td> </tr> </table>								Formal:	None	Content:	The modules Business Accounting (1021), Cost and Performance Accounting (1130), Investment and Financing (1118) should have been completed.
Formal:	None											
Content:	The modules Business Accounting (1021), Cost and Performance Accounting (1130), Investment and Financing (1118) should have been completed.											
6	<p>Forms of assessment:</p> <p>Written examination, combination examination, performance examination or oral examination</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											
10	<p>Module coordinator:</p> <p>Prof. Dr. rer. pol. Hubertus Wameling</p>											
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>											

12	Language: German
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Electronics						EL		
Identification number: 1065	Workload: 150 h	Credits: 5	Study semester: 2nd semester	Frequency of the offer Annual (Summer)	Duration: 1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	22.5	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	<p>Learning outcomes/competences:</p> <p>In relation to the contents listed below, the students use the elementary methods of electronics in a targeted manner and can confidently apply the associated basic terms of electronics. They use the most important components and basic circuits used in electronics. They can analyse, design and evaluate basic electronic circuits. As future industrial engineers, they identify the importance of electronics in technical systems and can thus assess its share in value creation. In addition, they will be able to understand essential aspects of the development and manufacturing of electronic systems and assemblies.</p>							
3	<p>Contents:</p> <ul style="list-style-type: none"> - Passive components - Fundamentals of semiconductor physics - Semiconductor components, in particular diodes and transistors and their basic circuits - Operational amplifiers and their applications - Basics of digital and analogue circuits - Integrated Circuits/Microelectronics - Electronics development and manufacturing 							
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with exercises, practical course</p>							
5	Participation requirements:							
	Formal:	None						
	Content:	Electrical engineering (1070)						
6	<p>Forms of assessment:</p> <p>Written examination, combination examination, performance examination or oral examination</p>							
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass and course assessment</p>							
8	<p>Application of the module (in the following study programmes)</p> <p>Industrial Engineering and Management B.Sc.</p>							
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>							
10	<p>Module coordinator:</p> <p>Prof. Dr.-Ing. Joachim Waßmuth</p>							
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>							
12	<p>Language:</p> <p>German</p>							

Electrical Engineering						ET						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1070	150 h	5	1st semester	Annual (Winter)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	1	SCH	15	h	22.5	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>In relation to the contents listed below, the students can identify and present the elementary electrotechnical correlations and laws in technical systems, and they can confidently apply the associated basic terms of electrical engineering. The students analyse, describe and calculate simple DC power systems. By gaining an insight into current areas of application, they can classify and assess the practical and economic significance of electrical engineering.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - Basic knowledge - Charge, current and voltage, electric field - Resistance and resistive behaviour, Ohm's law - Energy and power - Direct current circuits, counting arrow systems, Kirchhoff theorems, voltage divider, ideal and real sources, series and parallel connection, bridge network - Network calculation - Capacitance, RC networks - Magnetic field, Faraday's law, inductance, force effect in the magnetic field, Lorentz force - Static and dynamic processes, sinusoidal excitation, impedance 											
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with exercises, practical course</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>None</td> </tr> </table>								Formal:	None	Content:	None
Formal:	None											
Content:	None											
6	<p>Forms of assessment:</p> <p>Written examination, combination examination, performance examination or oral examination</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass and course assessment</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											
10	<p>Module coordinator:</p> <p>Prof. Dr.-Ing. Joachim Waßmuth</p>											
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>											

12	Language: German
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Electrical Engineering 2						ET2		
Identification number:	Workload:	Credits:	Study semester:		Frequency of the offer	Duration:		
1076	150 h	5	3rd or 5th semester		Annual (Winter)	1 semester		
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	22.5	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	<p>Learning outcomes/competences:</p> <p>In relation to the contents listed below, the students can identify and present the extended electrotechnical correlations and laws in the area of alternating current; they can confidently apply the associated terms and methods for describing dynamic processes in electrotechnical systems. Students analyse, describe and calculate AC networks. By gaining an insight into current areas of application, they can classify and evaluate the practical and economic significance. Students will be able to identify, design and apply advanced electrotechnical boundary conditions for applications typical of the course of study.</p>							
3	<p>Contents:</p> <p>Basic feature: Basic electrical engineering terms System term, linearity Dynamic systems, classification: static, transient, stationary Complex quantities Periodic signals, sinusoidal signals, exponential oscillation Impedance, admittance Reactive power, apparent power, active power Three-phase current Frequency response, Nyquist plot RLC circuits, resonant circuits, resonance behaviour Transfer function, frequency response, amplitude and phase response Passive filters Fourier analysis</p>							
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with exercises, practical course</p>							
5	<p>Participation requirements:</p>							
	Formal:	None						
	Content:	Electrical Engineering (1070 or 1073), Electronics (1063 or 1065)						
6	<p>Forms of assessment:</p> <p>Written examination, combination examination, performance examination or oral examination</p>							
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass and course assessment</p>							
8	<p>Application of the module (in the following study programmes)</p> <p>Mechatronics B.Sc. and Industrial Engineering and Management B.Sc.</p>							

9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Joachim Waßmuth
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Embedded Systems						ESYS		
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:			
1079	150 h	5	6th semester	Annual (Summer)	1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	22.5	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	Learning outcomes/competences:							
	<p>Students:</p> <ul style="list-style-type: none"> - name and explain the different hardware concepts on which common embedded systems are based. - explain the underlying hardware technologies, name advantages and disadvantages and evaluate the applicability for various practical problems. - implement combinatorial and sequential function blocks in a synthesis language (e.g. VHDL) and use common toolchains to bring the synthesised functions to a target hardware (e.g. FPGA). - develop a complex logic component according to specifications based on the previously developed function modules. - evaluate algorithms with regard to their implementability in hardware or software (hardware/software co-design). - explain design concepts for the hardware-related processing of discrete and continuous signals. - distinguish the parallel design of algorithms for the hardware synthesis from conventional programming. - compare their synthesis results with those of the other students and discuss differences in small groups. 							
3	Contents:							
	<ul style="list-style-type: none"> - Introduction to the topic of embedded systems (reactive, transforming systems, etc.) - Classification of embedded hardware (microcontrollers, microprocessors, FPGAs, SoCs, etc.) - Hardware technologies for the implementation of digital logic (SPLDs, CPLDs, FPGAs, ASICs) - Repetition of combinatorial and sequential logic (pipelining etc.) - Concepts of reliability, efficiency, hard and soft real time - Hardware description languages (synthesis languages such as VHDL, VERILOG) compared to programming languages - Introduction to VHDL - Implementation of combinatorial and sequential logic components such as adders, multiplexers, automata, etc. in VHDL and their synthesis for an FPGA - Synchronisation of the communication of asynchronous systems (synchronisation, metastability) - Implementation of simple bus systems - Aspects of hardware/software co-design 							

	- Control of mechatronic systems such as robots	
4	Forms of teaching: Lecture, seminar-based teaching, practical course	
5	Participation requirements:	
	Formal:	None
	Content:	Basic knowledge in the fields of digital technology, programming and computer architectures Modules: 1045 Digital Electronics II; 1070 Digital Electronics I; 1104 Computer Science 1
6	Forms of assessment: Written examination, combination examination or oral examination	
7	Prerequisite for the award of credit points: Module examination pass and course assessment	
8	Application of the module (in the following study programmes) Electrical Engineering B.Eng., Engineering Computer Sciences B.Eng., Mechatronics B.Sc. and Industrial Engineering and Management B.Sc.	
9	Importance of the grade for the final grade: according to BRPO	
10	Module coordinator: Prof. Dr. rer. nat. Axel Schneider	
11	Other information: Literature will be announced at the beginning of the course.	
12	Language: German	

Factory Planning						FPL						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1089	150 h	5	5th semester	Annual (Winter)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	1	SCH	15	h	22.5	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>Students know the elements and methods of structured planning of production facilities. They have knowledge of essential subtasks of factory planning, e.g. building planning, planning and creation of the production plant layout, planning of supply and disposal (material flow planning) as well as the linking of the production plants with each other and the integration in upstream and downstream process stages.</p> <p>They are able to comply with legal requirements, e.g. workplace regulations, company regulations, occupational safety and others, using concrete examples. They have the competences to carry out factory planning holistically, with appropriate use of resources. They are able to evaluate the planning work technically and economically, and to design and manage the necessary measures.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - Planning basis and production requirements - Production concepts - Ability to change - Material flow planning - Ergonomics - Workplace design - Workspace design - Building design - Concept and detailed planning - Economic and technical evaluation of the planning - Analysis of factory planning issues with a commercial tool 											
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with exercises and practical exercises</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>None</td> </tr> </table>								Formal:	None	Content:	None
Formal:	None											
Content:	None											
6	<p>Forms of assessment:</p> <p>Written examination, combination examination, performance examination or oral examination; each with preliminary examination</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass with preliminary examination</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											

10	Module coordinator: Prof. Dr.-Ing. Hans-Peter Barbey
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Manufacturing Processes						FER								
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:									
1090	150 h	5	4th semester	Annual (Summer)	1 semester									
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study							
	Lecture	60 students	2	SCH	30	h	45	h						
	Tuition in seminars	30 students	0	SCH	0	h	0	h						
	Exercise	20 students	2	SCH	25	h	35	h						
	Practical or seminar	15 students	1	SCH	5	h	10	h						
	Supervised self-study	60 students	0	SCH	0	h	0	h						
2	<p>Learning outcomes/competences:</p> <p>The students have basic knowledge of the processes of production engineering. They have practical experience in the manual and machine processing of construction materials in mechanical engineering. They can carry out basic calculations for the fundamental manufacturing processes and are able to systematically select suitable manufacturing processes for specific development tasks and assess their feasibility and economic efficiency.</p> <p>The students are able to design mechanical engineering components for production.</p> <p>They are familiar with the tools of CAD-CAM and can execute a CAD-CAM process on their own.</p>													
3	<p>Contents:</p> <p>Basics of production technology according to DIN 8580 with consideration of the material groups. Detailed presentation of selected manufacturing processes of the process groups forming, forming, cutting and joining. Mode of operation, design rules and basic calculations for selected manufacturing processes.</p> <p>General descriptions of manufacturing processes. CAD-CAM using the example of a 3-axis milling machine.</p>													
4	<p>Forms of teaching:</p> <p>Lecture, exercise and practical course</p>													
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>none</td> </tr> <tr> <td>Modules:</td> <td>1124 Construction;</td> </tr> </table>								Formal:	None	Content:	none	Modules:	1124 Construction;
Formal:	None													
Content:	none													
Modules:	1124 Construction;													
6	<p>Forms of assessment:</p> <p>Written examination or course assessment</p>													
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass and course assessment</p>													
8	<p>Application of the module (in the following study programmes)</p> <p>Industrial Engineering and Management B.Sc.</p>													
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>													
10	<p>Module coordinator:</p> <p>Prof. Dr.-Ing. Herbert Funke</p>													
11	<p>Other information:</p> <p>Literature:</p> <p>Awiszus/Bast/Dürr/Matthes: Grundlagen der Fertigungstechnik</p>													

	Fritz/Schulze: Fertigungstechnik Further literature will be announced at the beginning of the course.
12	Language: German

Gender and Diversity: Success Factors for Companies							GUD	
Identification number:	Workload:	Credits:	Study semester:		Frequency of the offer	Duration:		
3135	150 h	5	5th semester		Annual (Winter)	1 semester		
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	2	SCH	30	h	45	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	Learning outcomes/competences:							
	<p>The students ..</p> <ul style="list-style-type: none"> • know the terms, history and differences of gender/ gender mainstreaming and diversity/ diversity management. • know legal principles in the context of gender and diversity (e.g. EU Anti-Discrimination Directive, General Equal Treatment Act • are sensitised to human heterogeneity in the corporate context. • independently recognise stereotyping and can develop ideas for possible changes in the business environment. • are able to independently collect relevant information on established concepts such as gender mainstreaming and diversity management and to assess their relevance for professional practice. • are familiar with selected theories and approaches in the current discourse on diversity management and, building on this, are able to develop conceptual ideas for the implementation of holistic diversity management in a corporate context. 							
3	Contents:							
	<ul style="list-style-type: none"> • Definitions and delimitation of gender and diversity Concepts and approaches to equal opportunities (e.g. diversity management, gender mainstreaming) • Legal bases and political influences (e.g. EU Anti-Discrimination Directive). General Equal Treatment Act (<i>German</i> abbreviation: AGG)) • Subjective and social values, attitudes and prejudices in the context of diversity • Possible approaches for taking diversity characteristics (e.g. gender and age) into account in selected areas of business (marketing, product development, human resources) • Concept for the sustainable introduction of holistic diversity management • Case studies and application examples from business practice 							
4	Forms of teaching:							
	Lecture, seminar-based teaching, presentation, group work, presentation of seminar paper							
5	Participation requirements:							
	Formal:							
	Content:	None						
6	Forms of assessment:							

	Term paper, written examination, project work or oral examination
7	Prerequisite for the award of credit points: Module examination pass
8	Application of the module (in the following study programmes) Applied Mathematics B.Sc., Apparative Biotechnology B.Sc., Electrical Engineering B.Eng., Engineering Computer Sciences B.Eng., Mechanical Engineering B.Eng., Mechatronics B.Sc., Renewable Energies B.Eng. and Industrial Engineering and Management B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Andrea Kaimann
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Industrial Engineering / Lean Management						INLM						
Identification number:	Workload:	Credits:	Study semester:		Frequency of the offer	Duration:						
1102	150 h	5	4th or 6th semester		Annual (Summer)	1 semester						
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	1	SCH	15	h	22.5	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>The students are able to work out tasks and strategies of problem solving for service production processes in companies. They are able to redesign, plan and optimise processes. The course enables students to solve technical and economic tasks in a results- and action-oriented manner. The students possess fundamental knowledge to develop interdisciplinary tasks within their company. They expand their methodological competence through the use of lean management techniques.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - Definition, delimitation and sub-areas of Industrial Engineering, Lean Management and Lean Production - Significance to industry - Principle and interaction of process elements - Analysis of performance processes - Identifying and eliminating waste - Process orientation and overproduction - Work organisation and workplace design 											
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with exercises, practical course</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>None</td> </tr> </table>								Formal:	None	Content:	None
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Content:	None											
6	<p>Forms of assessment:</p> <p>Written examination, combination examination, performance examination, project work or oral examination</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass and course assessment</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Mechatronics B.Sc. and Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											
10	<p>Module coordinator:</p> <p>Prof. Dr.-Ing. Franz Feyerabend</p>											
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>											
12	<p>Language:</p> <p>German</p>											

Industrial Marketing						IGM	
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:		
1275	150	5	5th Semester	Annual (Winter)	1 semester		
1	Course:	Planned group sizes	Scope	Actual contact time / classroom teaching	Self-study		
	Lecture	60 students	3 SCH	45 h	67.5 h		
	Tuition in seminars	30 students	1 SCH	15 h	22.5 h		
	Exercise	20 students	0 SCH	0 h	0 h		
	Practical or seminar	15 students	0 SCH	0 h	0 h		
	Supervised self-study	60 students	0 SCH	0 h	0 h		
2	Learning outcomes/competences: After attending the lecture, students will be able to <ul style="list-style-type: none"> name and explain the characteristics and systematisation alternatives of industrial marketing as well as the central contents of type-specific marketing and cross-type approaches. classify the contents of industrial marketing in the context of the knowledge of principles of marketing acquired in other courses and to identify differences. apply the special features and tasks of industrial marketing to selected practical examples and case studies and independently solve the associated tasks and present the results. critically reflect on the special features and tasks of industrial marketing. recapitulate the course content independently and enhance their knowledge during self-study. Ideally, they will form learning groups that last throughout the entire study period. 						
3	Contents: <ol style="list-style-type: none"> Building blocks of marketing, especially characterisation of industrial marketing Type-specific marketing and selected problems: The marketing of (a) raw materials as well as semi-processed and processed materials, (b) parts and components, (c) machines, (d) plants, (e) system technologies Cross-type approaches for the realisation of sustainable competitive advantages in the business-to-business field 						
4	Forms of teaching: Lecture, seminar-based teaching with exercises, case studies/cases						
5	Participation requirements:						
	Formal:	None					
	Content:	Knowledge of the module Marketing (1143)					
6	Forms of assessment: Written examination						
7	Prerequisite for the award of credit points: Module examination pass						
8	Application of the module (in the following study programmes) Mechatronics B.Sc. and Industrial Engineering and Management B.Sc.						
9	Importance of the grade for the final grade: according to BRPO						

10	Module coordinator: Prof. Dr. rer. oec. Klaus Rüdiger
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Computer Science						INF		
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:			
1103	150 h	5	2nd semester	Annual (Summer)	1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	22.5	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	<p>Learning outcomes/competences:</p> <p>The students know basic methods of computer science and possess programming skills with which they can solve simple real-world problems. They can assess the benefits and problems of the use of computer systems in technology and business, and can develop plans for their use.</p>							
3	<p>Contents:</p> <ul style="list-style-type: none"> - Information and its presentation - Number systems and computer arithmetic - Representation and properties of simple algorithms - Concepts and constructs of a high-level programming language (e.g. C) - Basic features of imperative programming 							
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with exercises, practical course</p>							
5	Participation requirements:							
	Formal:	None						
	Content:	None						
6	<p>Forms of assessment:</p> <p>Written examination</p>							
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass and course assessment</p>							
8	<p>Application of the module (in the following study programmes)</p> <p>Industrial Engineering and Management B.Sc.</p>							
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>							
10	<p>Module coordinator:</p> <p>Prof. Dr. rer. nat. Georgios Lajios</p>							
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>							
12	<p>Language:</p> <p>German</p>							

Innovation and Change Management						IVM						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1113	150 h	5	5th semester	Annual (Winter)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	2	SCH	30	h	45	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	0	SCH	0	h	0	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>The students are able to describe different innovation and change processes in the company. They can independently and action-oriented apply suitable methods for planning, organising and implementing innovation and change processes. The students can assess the complexity of the processes and select suitable procedures that can be implemented with step-by-step problem solving. The course enables the students to act independently in the field of innovation and change environment in which a company operates.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - Innovation and innovation management - Innovation process the early phases (emergence of innovations) - Innovation process the late phases (process control, success assessment) - Product management and intellectual property rights - Change management, boundary conditions and success factors - Methodical management of innovation and change - Cooperation in innovation and change teams - The market as a driver of innovation and change 											
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>None</td> </tr> </table>								Formal:	None	Content:	None
Formal:	None											
Content:	None											
6	<p>Forms of assessment:</p> <p>Written examination, combination examination, performance examination, project work or oral examination</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass and course assessment</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Mechatronics B.Sc. and Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											
10	<p>Module coordinator:</p> <p>Prof. Dr.-Ing. Franz Feyerabend</p>											
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>											
12	<p>Language:</p> <p>German</p>											

Intelligent Sensor Systems						ISS		
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:			
1311	150 h	5	6th semester	Annual (Summer)	1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	22.5	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	<p>Learning outcomes/competences:</p> <p>In relation to the contents listed below, the students can classify and assess sensors as essential components of mechatronic systems. They can select and configure sensors suitable for mechatronic production processes in a targeted manner, and design and develop sensors relevant for mechatronic products. They confidently apply the necessary means and methods of describing sensor systems as an essential step in overall system design. The students use the basic knowledge of signal processing in the field of sensor technology to design intelligent sensor systems. They analyse trends and current fields of application in the area of modern sensor technology and the associated development methodology.</p>							
3	<p>Contents:</p> <p>Sensors: Definition of terms, categorisation according to transducer technologies, categorisation according to applications, sensor characterisation (accuracy, resolution, sensitivity, linearity)</p> <p>Sensor signal chain: Signal processing and conditioning, design and realisation of analogue filters, ADU/DAU, sampling theorem</p> <p>Sensor signal processing: Sensor error correction, discrete-time processing of analogue signals, spectral analysis/FFT, windowing, design and implementation of digital filters</p> <p>Construction of technical sensor systems: Integration levels, intelligent sensors, indirect/virtual sensors, aspects of embedded systems (mC, DSP, FPGA), connectivity/network connection</p> <p>Development methodology and applications</p>							
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with computer exercises, practical course</p>							
5	<p>Participation requirements:</p> <p>Formal:</p> <p>Content: Electrical Engineering (1073 and 1076 Mechatronics. 1070 Engineering Computer Sciences, 1070 Industrial Engineering and Management), Electronics (1063 Mechatronics. 1067 and 1069 Engineering Computer Sciences, 1065 Industrial Engineering and Management), Electrical Engineering 2</p>							
6	<p>Forms of assessment:</p> <p>Written examination, combination examination, performance examination or oral examination</p>							

7	Prerequisite for the award of credit points: Module examination pass and course assessment
8	Application of the module (in the following study programmes) Electrical Engineering B.Eng., Engineering Computer Sciences B.Eng., Mechatronics B.Sc. and Industrial Engineering and Management B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Joachim Waßmuth
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

International Management/Marketing							IMM	
Identification number:	Workload:	Credits:	Study semester:		Frequency of the offer		Duration:	
1115	150 h	5	6th semester		Annual (Summer)		1 semester	
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	32	h	43	h
	Tuition in seminars	30 students	2	SCH	32	h	43	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	<p>Learning outcomes/competences:</p> <p>After attending the lecture, students will be able to</p> <ul style="list-style-type: none"> • name and explain the importance of international market development for the success of a company and the associated special features and tasks of international marketing. • classify the special features and tasks of international marketing in the context of the knowledge of principles marketing acquired in other courses and identify differences. • apply the special features and tasks of international marketing to selected practical examples and case studies and independently solve the associated tasks and present the results. • critically reflect on the special features and tasks of international marketing. • recapitulate the course content independently and deepen their knowledge through self-study. Ideally, they will form learning groups that last throughout the entire study period. 							
3	<p>Contents:</p> <p>Introduction to International Marketing</p> <ul style="list-style-type: none"> • International marketing as a Co-ordinative task • Environmental analysis • Risk analysis • Planning marketing objectives • Market entry decisions • Marketing instruments in international marketing 							
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with exercises, case studies/ case studies</p>							
5	Participation requirements:							
	Formal:	None						
	Content:	Knowledge of the contents of the module Marketing (1143) Knowledge of English						
6	<p>Forms of assessment:</p> <p>Written examination</p>							
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>							

8	Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng., Mechatronics B.Sc. and Industrial Engineering and Management B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr. rer. oec. Klaus Rüdiger
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Investment and Financing							FIN		
Identification number:	Workload:	Credits:	Study semester:		Frequency of the offer	Duration:			
1118	150 h	5	2nd, 4th or 6th semester		Annual (Summer)	1 semester			
1	Course:	Planned group sizes		Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students		3	SCH	45	h	67.5	h
	Tuition in seminars	30 students		1	SCH	15	h	22.5	h
	Exercise	20 students		0	SCH	0	h	0	h
	Practical or seminar	15 students		0	SCH	0	h	0	h
	Supervised self-study	60 students		0	SCH	0	h	0	h
2	<p>Learning outcomes/competences:</p> <p>The students gain knowledge of the methods of investment calculation and of the basic forms of financing in their possibilities and limits. They can assess the importance of rational investment and financing decisions for the success of a company. They are familiar with the various instruments of investment appraisal and can apply them to specific cases and evaluate the calculation results realised with regard to the practical implementation of investment decisions. Students know the basic forms of finance and can classify them. Students can allocate the appropriate forms of financing to different financing occasions. They are able to calculate the financing costs and make justified decisions regarding the suitability of the respective forms of financing.</p>								
3	<p>Contents:</p> <ul style="list-style-type: none"> • Basic concepts of investment and financing • Methods of static investment calculation • Methods of dynamic investment calculation • Forms of external financing • Forms of internal financing 								
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching</p>								
5	Participation requirements:								
	Formal:								
	Content:	Knowledge of the contents of the module General Business Administration (1002 or 1024)							
6	<p>Forms of assessment:</p> <p>Written examination, combination examination, performance examination or oral examination</p>								
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>								
8	<p>Application of the module (in the following study programmes)</p> <p>Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Engineering and Management B.Sc.</p>								
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>								
10	<p>Module coordinator:</p> <p>Prof. Dr. rer. pol. Hildegard Manz-Schumacher</p>								
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course. Renewable Energies study programme: Elective module</p>								

12	Language: German
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Colloquium						KOL						
Identification number:	Workload:	Credits:	Study semester:		Frequency of the offer	Duration:						
1290	90 h	3	6th or 7th semester		each semester							
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study					
	Lecture	60 students	0	SCH	0	h	90	h				
	Tuition in seminars	30 students	0	SCH	0	h	0	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	0	SCH	0	h	0	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>The colloquium is to be assessed as an independent examination. It serves to determine whether the candidate is capable of orally presenting and independently justifying the scientific topic of the bachelor thesis, its subject-related foundations, its interdisciplinary connections and its non-subject-related references, as well as its significance for practical applications.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - Content of the thesis according to the topic - Disputation on the procedure in the preparation of the thesis and the questions that arose in the context of the thesis 											
4	<p>Forms of teaching:</p> <p>Oral examination for the bachelor thesis</p>											
5	<p>Participation requirements:</p> <table border="1" style="width: 100%;"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>Treatment of the bachelor thesis</td> </tr> </table>								Formal:	None	Content:	Treatment of the bachelor thesis
Formal:	None											
Content:	Treatment of the bachelor thesis											
6	<p>Forms of assessment:</p> <p>Oral examination</p>											
7	<p>Prerequisite for the award of credit points:</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Applied Mathematics B.Sc., Apparative Biotechnology B.Sc., Electrical Engineering B.Eng., Engineering Computer Sciences B.Eng., Mechanical Engineering B.Eng., Mechatronics B.Sc., Renewable Energies B.Eng. and Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											
10	<p>Module coordinator:</p> <p>Prof. Dr.-Ing. Anton Klar</p>											
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>											
12	<p>Language:</p> <p>German</p>											

Construction						KON						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1124	150 h	5	2nd semester	Annual (Summer)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	1	SCH	15	h	22.5	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>The students know the basic rules of drafting, dimensional and surface tolerances and have mastered the ability to interpret drawings taking into account the machine elements shown and to implement the information contained in accordance with the principles of engineering.</p> <p>They have mastered the skill of drawing constructions as individual part drawings in a manner suitable for completion. They are able to integrate several components in a construction and to present them appropriately as an assembly drawing.</p> <p>Through insights into current design examples, you will be able to grasp the practical significance of the way designs are presented and communicated and independently work on new designs using the methodologies gained.</p> <p>The course enables students to independently develop engineering-orientated ways of thinking and working in the design environment.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - Standardisation and geometric basics - Technical drawing, dimensioning and surfaces - Tolerances and fits - Shape and position tolerances - Representation of complete constructions in assembly drawings - Representation of workpieces in individual part and overall drawings - Elastic springs and screws - Construction types 											
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching, practical course</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>None</td> </tr> </table>								Formal:	None	Content:	None
Formal:	None											
Content:	None											
6	<p>Forms of assessment:</p> <p>Term paper, performance examination, project work, oral examination or examination during the course</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass and course assessment</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											
10	<p>Module coordinator:</p> <p>Prof. Dr.-Ing. Jürgen Sauser</p>											

11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Cost and Performance Accounting						KUL		
Identification number:	Workload:	Credits:	Study semester:		Frequency of the offer	Duration:		
1130	150 h	5	3rd or 5th semester		Annual (Winter)	1 semester		
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	2	SCH	30	h	45	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	<p>Learning outcomes/competences:</p> <p>Students will be able to show the aims and tasks of cost and performance accounting and explain the traditional basic structure of cost accounting systems, cost type accounting, cost centre accounting and cost unit accounting. They know that the recording and processing of all costs of an enterprise is an indispensable prerequisite for a functioning cost and activity accounting system and master the sub-steps of cost distribution, cost allocation, cost allocation and cost control required within the framework of cost unit accounting. The students can carry out both a unit-related and a time-related cost and performance assessment and weigh up the advantages and disadvantages of different cost accounting systems against each other. Through the targeted promotion of analytical and networked thinking, they have a pronounced cost awareness. They are able to develop and present their own solutions for selected decision-making situations.</p>							
3	<p>Contents:</p> <ul style="list-style-type: none"> - Basics of cost and performance accounting - Cost-type accounting - Cost unit accounting - Unit costing - Cost unit time accounting - Cost accounting systems - Decision-oriented cost accounting 							
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching</p>							
5	Participation requirements:							
	Formal:	None						
	Content:	The module General Business Administration (1002) should have been completed						
6	<p>Forms of assessment:</p> <p>Written examination, combination examination, performance examination or oral examination</p>							
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>							
8	<p>Application of the module (in the following study programmes)</p> <p>Engineering Computer Sciences B.Eng. and Industrial Engineering and Management B.Sc.</p>							
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>							
10	<p>Module coordinator:</p> <p>Prof. Dr. rer. pol. Hubertus Wameling</p>							

11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Logistics						LOG						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1142	150 h	5	4th semester	Annual (Summer)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	2	SCH	30	h	45	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	0	SCH	0	h	0	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>Students are familiarised with the logistics function in companies and externally. They are familiar with the application-orientated design options in the logistics subsystems as well as the corresponding design methods. The students are able to use operative and strategic logistics instruments in a target-orientated manner and thus efficiently direct and control operational and inter-company logistics processes. Logistical problems can be modelled, calculated and optimised using suitable methods.</p>											
3	<p>Contents:</p> <p>Goals, tasks and functions of logistics management</p> <ul style="list-style-type: none"> - Logistics planning and organisation - Supply chain management - Multimodal transport systems - Operational logistics - Procurement logistics - Warehouse logistics - Order picking - Production logistics - Distribution logistics - Analysis and calculation methods in logistics - Key figure systems 											
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with exercises</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>None</td> </tr> </table>								Formal:	None	Content:	None
Formal:	None											
Content:	None											
6	<p>Forms of assessment:</p> <p>Written examination, combination examination, performance examination or oral examination</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											
10	<p>Module coordinator:</p> <p>Prof. Dr.-Ing. Hans-Peter Barbey</p>											
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>											

12	Language: German
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Marketing						MK1						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1143	150 h	5	3rd semester	Annual (Winter)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study					
	Lecture	60 students	3	SCH	45	h	67.5	h				
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	0	SCH	0	h	0	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>Students develop an understanding of the importance of strategic planning for the market success of a company and understand strategic marketing as a holistic management function. They know the methods and processes of strategic marketing and are able to apply them and assess their effectiveness. They are able to develop strategic marketing concepts and react to market changes with alternative concepts. They have well-founded analytical and planning skills that enable them to reflect critically on current market events and market developments and to develop target-orientated concepts.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> • Market analysis and forecasting techniques • Marketing objectives, formation of strategic business areas, market segmentation of business-area-strategic options • Market participant-orientated marketing strategies • Basics of marketing budgeting and marketing controlling 											
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with exercises</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td></td> </tr> <tr> <td>Content:</td> <td>Knowledge of the contents of the module General Business Administration (1002 or 1024)</td> </tr> </table>								Formal:		Content:	Knowledge of the contents of the module General Business Administration (1002 or 1024)
Formal:												
Content:	Knowledge of the contents of the module General Business Administration (1002 or 1024)											
6	<p>Forms of assessment:</p> <p>Written examination, combination examination, performance examination or oral examination</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											
10	<p>Module coordinator:</p> <p>Prof. Dr. rer. pol. Hildegard Manz-Schumacher</p>											
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>											
12	<p>Language:</p> <p>German</p>											

Mechanical Machine Components						ME		
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:			
1127	150 h	5	3rd semester	Annual (Winter)	1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	22.5	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	Learning outcomes/competences: Students: <ul style="list-style-type: none"> are able to describe the basic mechanical machine components and explain the main stress types have mastered the analysis and calculation methods for strength calculation. can use these appropriately and calculate and design the machine components using engineering methods. are able to grasp the practical significance of machine components and evaluate design alternatives in engineering terms using the methodologies gained are capable of independent engineering thinking and work in mechanical engineering fields of application. 							
3	Contents: <ul style="list-style-type: none"> Loads, stresses Strength calculations Bolt and pin connections Bolted connections Locking elements Axles and shafts Shaft-hub connections Bearings, bearing arrangements and seals 							
4	Forms of teaching: Lecture, seminar-based teaching with exercises, practical course							
5	Participation requirements:							
	Formal:	None						
	Content:	None						
6	Forms of assessment: Written examination, combination examination, performance examination, project work or oral examination							
7	Prerequisite for the award of credit points: Module examination pass and course assessment							
8	Application of the module (in the following study programmes) Industrial Engineering and Management B.Sc.							
9	Importance of the grade for the final grade: according to BRPO							
10	Module coordinator: Prof. Dr.-Ing. Michael Fahrig							
11	Other information: Literature will be announced at the beginning of the course.							

12	Language: German
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Mathematics 1						MA1						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1151	150 h	5	1st semester	Annual (Winter)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	2	SCH	30	h	45	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	0	SCH	0	h	0	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences: Students are familiar with the most important function classes. They can apply methods of differential and integral calculus confidently. They can model simple engineering and economic problems and derive solutions from them.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - Sets and numeral systems - Functions and inverse functions - Important function classes - Complex numbers - Limit value and continuity - Derivation and curve discussion - Integration - Taylor polynomials 											
4	<p>Forms of teaching: Lecture, seminar-based teaching with exercises</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>Knowledge of school mathematics</td> </tr> </table>								Formal:	None	Content:	Knowledge of school mathematics
Formal:	None											
Content:	Knowledge of school mathematics											
6	<p>Forms of assessment: Written examination</p>											
7	<p>Prerequisite for the award of credit points: Module examination pass</p>											
8	<p>Application of the module (in the following study programmes) Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade: according to BRPO</p>											
10	<p>Module coordinator: Prof. Dr. rer. nat. Georgios Lajios</p>											
11	<p>Other information: Literature will be announced at the beginning of the course.</p>											
12	<p>Language: German</p>											

Mathematics 2						MA2						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1157	150 h	5	2nd semester	Annual (Summer)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	2	SCH	30	h	45	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	0	SCH	0	h	0	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>The students apply methods of linear algebra and multidimensional differential calculus as well as simple differential equations confidently. They can model engineering and economic problems with these mathematical methods and derive solutions from them.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - Linear algebra: Arithmetic operations with vectors and matrices - Systems of linear equations - Eigenvalues and eigenvectors - Multivariable calculus with applications - Introduction to Differential Equations 											
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>Knowledge of the module Mathematics 1 (1151)</td> </tr> </table>								Formal:	None	Content:	Knowledge of the module Mathematics 1 (1151)
Formal:	None											
Content:	Knowledge of the module Mathematics 1 (1151)											
6	<p>Forms of assessment:</p> <p>Written examination</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											
10	<p>Module coordinator:</p> <p>Prof. Dr. rer. nat. Georgios Lajios</p>											
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>											
12	<p>Language:</p> <p>German</p>											

Metrology						MT						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1168	150 h	5	3rd semester	Annual (Winter)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	1	SCH	15	h	22.5	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences: Describe the basic structure of measuring equipment and frequently used measuring methods or sensors; select the measuring methods suitable for the respective conditions of use; determine measuring uncertainties; determine possible disturbance variables and select precautions to reduce them; basic principles of the development of a computer-assisted system for processing measured values.</p>											
3	<p>Contents: Principle of measurement, SI units, structure of technical measuring equipment, measurement errors, measurement uncertainties, disturbance variables and their reduction, analogue and digital signals, general aspects for the selection and use of measuring transducers, time and frequency measurement, current, voltage and power measurement, length, angle and strain measurement, force, torque, temperature and pressure measurement methods, computer-assisted system for processing measured values.</p>											
4	<p>Forms of teaching: Lecture, seminar-based teaching with exercises and project tasks, practical course</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>None</td> </tr> </table>								Formal:	None	Content:	None
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6	<p>Forms of assessment: Written examination, combination examination, performance examination or oral examination</p>											
7	<p>Prerequisite for the award of credit points: Module examination pass and course assessment</p>											
8	<p>Application of the module (in the following study programmes) Apparative Biotechnology B.Sc., Mechatronics B.Sc. and Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade: according to BRPO</p>											
10	<p>Module coordinator: Prof. Dr. Dr. Andrea Ehrmann</p>											
11	<p>Other information: Literature will be announced at the beginning of the course.</p>											
12	<p>Language: German</p>											

Optical Systems Engineering						OST						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1300	150 h	5	6th semester	Annual (Summer)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	1	SCH	15	h	22.5	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>Students will be able to analyse typical applications for the use of optical sensor systems and evaluate them for economic application under production conditions. The focus here is on efficient implementation in automated production. Furthermore, the handling of different optical systems is taught both theoretically and practically, so that simple test systems can be designed independently.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - Difference between image processing and machine vision - Fundamentals of optical systems engineering - Physical properties of light / areas of application of optical system technology - Smart sensors and cameras - Lighting and optics - Machine vision software - Selected filters and special software tools - Colour image processing and spectroscopy - Interfaces for communication with machine controls - Selected real-life application examples of the various sensor classes - Two-dimensional coding, recording and communication with ERP systems. Distinction between reading and verification 											
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching, practical course</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>None</td> </tr> </table>								Formal:	None	Content:	None
Formal:	None											
Content:	None											
6	<p>Forms of assessment:</p> <p>Combination examination, performance examination or oral examination</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass and course assessment</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Engineering Computer Sciences B.Eng. and Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											
10	<p>Module coordinator:</p> <p>Prof. Dr. rer. nat. Marc-Oliver Schierenberg</p>											
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>											

12	Language: German
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Personnel and Organisation						PUO		
Identification number:	Workload:	Credits:	Study semester:		Frequency of the offer	Duration:		
1192	150 h	5	4th or 6th semester		Annual (Summer)	1 semester		
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	3	SCH	45	h	67.5	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	<p>Learning outcomes/competences:</p> <p>The students have a basic overview of the tasks of human resource management. They know the essential methods of personnel recruitment, personnel development and personnel evaluation and can evaluate them with regard to their suitability and applicability.</p> <p>They are familiar with essential theoretical concepts on communication; they understand the problems that can occur during the communication process and have practised possible solutions.</p> <p>They understand the importance of learning for change processes and can design the conditions for successful learning.</p> <p>They can explain the principles of organisational theory and have checked their significance using practical examples. They can use primary and secondary organisational forms with regard to their applicability.</p> <p>They are familiar with important topics of organisational change and can assess their significance for entrepreneurial activity.</p> <p>They have basic knowledge about the characteristics and significance of key qualifications and have demonstrated this with examples, e.g. regarding the conflict resolution and motivational skills.</p>							
3	<p>Contents:</p> <p>Significance, goals and tasks of human resources management</p> <p>Fundamentals of labour law</p> <p>Fundamentals of Communication</p> <p>Fundamentals of Learning Theory</p> <p>Environmental conditions, learning control, strategies for lifelong learning</p> <p>Organisational structure and process organisation, forms of primary and secondary organisation</p> <p>Organisational change</p> <p>Personnel management and conflict resolution</p>							
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with exercises and case studies</p>							
5	Participation requirements:							
	Formal:	None						
	Content:	None						
6	<p>Forms of assessment:</p> <p>Written examination, combination examination, performance examination or oral examination</p>							

7	Prerequisite for the award of credit points: Module examination pass
8	Application of the module (in the following study programmes) Engineering Computer Sciences B.Eng., Renewable Energies B.Eng. and Industrial Engineering and Management B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr. rer. oec. Thomas Süße
11	Other information: Literature will be announced at the beginning of the course. Renewable Energies study programme: Possible elective subject
12	Language: German

Physics						PHY		
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:			
1194	150 h	5	1st semester	Annual (Winter)	1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	22.5	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	Learning outcomes/competences: The students know the importance of physics as the basis of engineering work. They are able to analyse physical processes and relate them to basic physical laws. The students have the ability to use formulas, devices and measurement results in solving physics problems. Furthermore, they possess the competence for the scientific implementation, evaluation and documentation of experiments for the verification of theoretical facts, a competence that is required e.g. within the framework of research and development projects. The knowledge acquired forms the basis for a variety of advanced courses, as physics is the basis for a variety of technologies.							
3	Contents: Mechanics Kinematics: one and three-dimensional translation, rotation, relation, relative movements Dynamics: Newton's axioms, types of forces, work-energy-power, momentum, rotation, angular momentum Optics Light and photons, refraction and dispersion, geometrical optics, optical instruments, lasers Thermodynamics Temperature, thermal expansion, behaviour of gases - Gas laws, kinetic theory of gases, heat, first and second law of thermodynamics							
4	Forms of teaching: Lecture, seminar-based teaching with exercises and project tasks, practical course							
5	Participation requirements:							
	Formal:	None						
	Content:	None						
6	Forms of assessment: Written examination, course assessment, performance examination or oral examination							
7	Prerequisite for the award of credit points: Module examination pass and course assessment							
8	Application of the module (in the following study programmes) Industrial Engineering and Management B.Sc.							
9	Importance of the grade for the final grade: according to BRPO							

10	Module coordinator: Prof. Dr. rer. nat. Marc-Oliver Schierenberg
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Practical Project / Internship						PRA						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1292	450 h	15	7th semester	each semester	12 weeks							
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study					
	Lecture	60 students	0	SCH	0	h	450	h				
	Tuition in seminars	30 students	0	SCH	0	h	0	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	0	SCH	0	h	0	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>In the work term, the activities and learning outcomes imparted in the course of study are to be applied in a practice-oriented manner. To this end, students should work independently on engineering projects and develop suitable solution strategies. The main aim is to develop and expand integration, analysis and problem solving, presentation and communication skills.</p>											
3	<p>Contents:</p> <p>The contents result from the field of activity of the respective chosen company or enterprise and should include an engineering task. At the end of the work term, the supervising company is to prepare an activity report and the students a final report. During the practical phase, the students should receive individual and professional advising from the supervising university lecturers.</p>											
4	<p>Forms of teaching:</p> <p>Seminar-based teaching with exercises as accompanying guidance</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>None</td> </tr> </table>								Formal:	None	Content:	None
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Content:	None											
6	<p>Forms of assessment:</p> <p>Term paper</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Electrical Engineering B.Eng., Engineering Computer Sciences B.Eng., Mechanical Engineering B.Eng., Mechatronics B.Sc., Renewable Energies B.Eng. and Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											
10	<p>Module coordinator:</p> <p>Prof. Dr.-Ing. Anton Klar</p>											
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>											
12	<p>Language:</p> <p>German</p>											

Product and Price Management						PPM		
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:			
1209	150 h	5	5th semester	Annual (Winter)	1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	3	SCH	45	h	67.5	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	<p>Learning outcomes/competences:</p> <p>Students have basic knowledge of the tools of operational marketing and can classify them as practical implementation tools of strategic marketing. They gain knowledge of the methods and design tools of programme, product and pricing policy and can evaluate their possibilities and limits. The students understand the mode of action of the operative market control instruments and can apply them in a targeted manner. Students acquire the competence to develop concepts for the marketing of products throughout their entire life cycle and to evaluate their practicality.</p>							
3	<p>Contents:</p> <ul style="list-style-type: none"> • Overview of the instruments of operational marketing • Programme policy • Product policy • Contracting policy • Basic concepts of distribution policy 							
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching</p>							
5	Participation requirements:							
	Formal:	None						
6	Forms of assessment:							
	Written examination, combination examination, performance examination or oral examination							
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>							
8	<p>Application of the module (in the following study programmes)</p> <p>Mechatronics B.Sc., Renewable Energies B.Eng. and Industrial Engineering and Management B.Sc.</p>							
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>							
10	<p>Module coordinator:</p> <p>Prof. Dr. rer. pol. Hildegard Manz-Schumacher</p>							
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course. Renewable Energies study programme: possible elective subject to be chosen</p>							
12	<p>Language:</p> <p>German</p>							

Product Risk Management						PRM		
Identification number:	Workload:	Credits:	Study semester:		Frequency of the offer	Duration:		
1210	150 h	5	4th or 6th semester		Annual (Summer)	1 semester		
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	2	SCH	30	h	45	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	<p>Learning outcomes/competences:</p> <p>The students possess the technical and methodological competences with regard to risk identification, analysis and assessment for technical products. They can use the instruments required for this in relation to different technical products and develop instruments for risk minimisation for these products and evaluate the success of the measures introduced under technical and business management aspects.</p>							
3	<p>Contents:</p> <ul style="list-style-type: none"> - Product life cycle - Product development process - Innovation Management - Quality Management - Project management - Technical risk management - Risk types/ risk identificationMethods of risk analysis and risk rankingMethods of technical and economic risk assessmentRisk management instruments and processesIntegration of risk management into the product development cycleInstruments of evaluation and documentation - Supplier management 							
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with exercises/case studies.</p>							
5	Participation requirements:							
	Formal:	None						
	Content:	None						
6	<p>Forms of assessment:</p> <p>Term paper, written examination or oral examination</p>							
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>							
8	<p>Application of the module (in the following study programmes)</p> <p>Renewable Energies B.Eng. and Industrial Engineering and Management B.Sc.</p>							
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>							
10	<p>Module coordinator:</p> <p>Prof. Dr.-Ing. Eva Schwenzfeier-Hellkamp</p>							
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>							

12	Language: German
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Production Planning						PRP						
Identification number:	Workload:	Credits:	Study semester:		Frequency of the offer	Duration:						
1212	150 h	5	4th or 6th semester		Annual (Summer)	1 semester						
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	2	SCH	30	h	45	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	0	SCH	0	h	0	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>The students can apply tools and methods of production planning and control to practice-oriented examples.</p> <p>They are able to evaluate the planning results in terms of plausibility and efficiency and to assess their impact on holistic business processes between suppliers and customers.</p> <p>The students understand the procedures in the sub-processes of product planning and are able to evaluate the information exchanged between the sub-processes and to assess it with regard to its effects on other planning steps.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - Operational tasks in the area of production planning and control - Connection between development and the production processes to be planned: Product design suitable for production - Market requirements for production processes and their control - Typical EDP application areas to support production planning and control - Information flow and associated data structures in the IT systems (master data management: material master, parts lists, workplace master, routings) - Programme planning and primary needs assessment, - Material requirements planning with BOM explosion and net requirements planning - Scheduling and capacity balancing - Order processing and production order management, - Mapping a Kanban control system - Shipping preparation, delivery and invoicing - Computer-aided production planning and controlling 											
4	<p>Forms of teaching:</p> <p>Lecture and exercise</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>Basic knowledge of manufacturing processes and basic knowledge of information technology</td> </tr> </table>								Formal:	None	Content:	Basic knowledge of manufacturing processes and basic knowledge of information technology
Formal:	None											
Content:	Basic knowledge of manufacturing processes and basic knowledge of information technology											
6	<p>Forms of assessment:</p> <p>Written examination or oral examination</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Mechatronics B.Sc. and Industrial Engineering and Management B.Sc.</p>											

9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr. rer. oec. Pascal Reusch
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Project 1						PR1						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1222	150 h	5	4th semester	Annual (Summer)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study					
	Lecture	60 students	0	SCH	0	h	0	h				
	Tuition in seminars	30 students	0	SCH	0	h	0	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	2	SCH	30	h	120	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>The students master the methods and tools for the methodical handling of a technical or/and economic task from a wide variety of business processes. They acquire the competence to work in small organisational units in a target-orientated way and to present their project results with the help of suitable software tools (MS Project and MS PowerPoint). Students acquire key competences such as teamwork and communication skills.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - Basics of task descriptions - Structuring tasks - Project management techniques - Problem-solving processes - Presentation techniques - Development of problem solutions for simple technical and/or economic operational tasks from the professional fields of industrial engineers 											
4	<p>Forms of teaching:</p> <p>Project monitoring: Project work in a team with action-orientated processing of an engineering task</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>None</td> </tr> </table>								Formal:	None	Content:	None
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Content:	None											
6	<p>Forms of assessment:</p> <p>Project work</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											
10	<p>Module coordinator:</p> <p>Prof. Dr.-Ing. Franz Feyerabend</p>											
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>											
12	<p>Language:</p> <p>German</p>											

Project 2						PR2						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1223	150 h	5	5th semester	Annual (Winter)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study					
	Lecture	60 students	0	SCH	0	h	0	h				
	Tuition in seminars	30 students	0	SCH	0	h	0	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	2	SCH	30	h	120	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences: The students master the methods and tools for the methodical handling of a technical or/and economic task from a wide variety of business processes. They acquire the competence to work in small organisational units in a target-orientated way and to present their project results with the help of suitable software tools (MS Project and MS PowerPoint). Students acquire key competences such as teamwork and communication skills.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - Basics of task descriptions - Structuring tasks - Project management techniques - Problem-solving processes - Presentation techniques - Problem-solving procedure for simple technical and/or economic tasks from the professional fields of industrial engineering 											
4	<p>Forms of teaching: Project monitoring: Project work in a team with action-orientated processing of an engineering task</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>None</td> </tr> </table>								Formal:	None	Content:	None
Formal:	None											
Content:	None											
6	<p>Forms of assessment: Project work</p>											
7	<p>Prerequisite for the award of credit points: Module examination pass</p>											
8	<p>Application of the module (in the following study programmes) Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade: according to BRPO</p>											
10	<p>Module coordinator: Prof. Dr.-Ing. Franz Feyerabend</p>											
11	<p>Other information: Literature will be announced at the beginning of the course.</p>											
12	<p>Language: German</p>											

Process and Information Management						PIM		
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:			
1302	150 h	5	6th semester	Annual (Summer)	1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	2	SCH	30	h	45	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	Learning outcomes/competences: Students gain a basic understanding of operational IT systems and applications.							
3	Contents: After the basic concepts of computer science have been taught, procedures of information needs analysis and the classification of information systems are worked out. Furthermore, the following contents are taught: <ul style="list-style-type: none"> - Basics of IT systems in industrial application, - Basics of process and information management - Process definitions and IT systems to support industrial manufacturing (ERP, MES, PLM, PDM, SCM) - Integration of IT systems - The Digital Factory - Perspectives and outlooks of the factory of tomorrow 							
4	Forms of teaching: Lecture / Seminar							
5	Participation requirements:							
	Formal:	None						
	Content:	None						
6	Forms of assessment: Oral examination or examination accompanying the course							
7	Prerequisite for the award of credit points: Module examination pass							
8	Application of the module (in the following study programmes) Industrial Engineering and Management B.Sc.							
9	Importance of the grade for the final grade: according to BRPO							
10	Module coordinator: Prof. Dr.-Ing. Rolf Naumann							
11	Other information: Literature will be announced at the beginning of the course.							
12	Language: German							

Quality Management						QM						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1230	150 h	5	5th semester	Annual (Winter)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	2	SCH	30	h	45	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	0	SCH	0	h	0	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>The students are familiar with the basics of quality management (QM) and can select the instruments and tools for the design, maintenance, evaluation and improvement of quality management in a well-thought-out manner as well as recognise contexts in order to apply them along the entrepreneurial value chain.</p> <p>They are able to analyse and, if necessary, optimise business processes in terms of quality-orientated and cost-minimising corporate management and are able to independently perform management tasks in quality management. They use Total Quality Management as an integrative approach and/or as a fundamental corporate and leadership concept.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - History of the QM concept - Overview of current quality management standards - Evaluation of the eight principles of QM - Elaboration of the essential requirements from the ISO 9000 family, in particular for the areas of procurement, incoming goods, production and distribution - Process orientation - Project management, continuous improvement measures/programmes (CIP, Six Sigma, idea management) - Quality objectives and key figures (Balanced Scorecard) - Quality costs - Customer satisfaction analyses - Benchmarking - Customer and supplier relations - Legal aspects 											
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with exercises/case studies</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>None</td> </tr> </table>								Formal:	None	Content:	None
Formal:	None											
Content:	None											
6	<p>Forms of assessment:</p> <p>Term paper, written examination, combination examination, performance exam or oral exam</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Apparative Biotechnology B.Sc. and Industrial Engineering and Management B.Sc.</p>											

9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr. rer. pol. Hildegard Manz-Schumacher
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Robotics						ROB		
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:			
1240	150 h	5	5th semester	Annual (Winter)	1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	22.5	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	Learning outcomes/competences: The students know the elementary concepts and basics of standard manipulators. Students master the basic descriptive tools and methods for modelling and calculating the forward kinematics of a kinematic chain. Through the presentation and discussion of current robot systems (incl. mobile robot systems and multimodal sensor systems), the students can grasp both the practical significance of robotics and different approaches to robot development. They will thus become capable of independent engineering thinking and working in robotics and related areas of application.							
3	Contents: Teaching content: <ul style="list-style-type: none"> - Manipulators - Robot kinematics (incl. mathematical foundations) - Forward and inverse kinematics - Mobile robots - Sensors for mobile robots - Artificial intelligence and robotics - Behaviour-based robotics - Learning robots 							
4	Forms of teaching: Lecture, seminar-based teaching with exercises, practical course							
5	Participation requirements:							
	Formal:	None						
	Content:	Mathematics 1 and 2, Computer Science, Engineering Mechanics, Electrical Engineering 1 and 2, Physics						
6	Forms of assessment: Written examination, combination examination, performance examination or oral examination							
7	Prerequisite for the award of credit points: module examination pass and course assessment							
8	Application of the module (in the following study programmes) Apparative Biotechnology B.Sc., Electrical Engineering B.Eng., Engineering Informatics B.Eng., Mechatronics B.Sc. and Industrial Engineering and Management B.Sc.							
9	Importance of the grade for the final grade: according to BRPO							
10	Module coordinator: Prof. Dr. rer. nat. Martin Hülse							
11	Other information: Literature and other sources will be announced at the beginning of the course							

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12	Language: German

Software Engineering						SWE						
Identification number:	Workload:	Credits:	Study semester:		Frequency of the offer	Duration:						
1245	150 h	5	3rd or 5th semester		Annual (Winter)	1 semester						
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	1	SCH	15	h	22.5	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>Students know the basic principles of software engineering and can apply standard methods for the successful planning and implementation of software development projects. They are familiar with common UML diagram types. Students can use collaborative tools for version management in a team. They are able to plan and carry out software tests. They can explain the benefits and problems of using software products in technology and business and develop plans for their implementation.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - Requirements analysis and specification - Software design - Use of UML as a modelling language - Configuration management - Testing techniques - Process models 											
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with exercises, practical course</p>											
5	<p>Participation requirements:</p> <table border="1" style="width: 100%;"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td> Knowledge of object-oriented programming Modules: 1105 Computer Science 1; 1109 Computer science 2; </td> </tr> </table>								Formal:	None	Content:	Knowledge of object-oriented programming Modules: 1105 Computer Science 1; 1109 Computer science 2;
Formal:	None											
Content:	Knowledge of object-oriented programming Modules: 1105 Computer Science 1; 1109 Computer science 2;											
6	<p>Forms of assessment:</p> <p>Written examination or oral examination</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass and course assessment</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Engineering Computer Sciences B.Eng. and Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											
10	<p>Module coordinator:</p> <p>Prof. Dr. rer. nat. Georgios Lajios</p>											
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>											
12	<p>Language:</p> <p>German</p>											

Statistics						STA		
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:			
1249	150 h	5	3rd semester	Annual (Winter)	1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	2	SCH	30	h	45	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	<p>Learning outcomes/competences:</p> <p>Students are able to apply statistical methods for the preparation, consolidation and presentation of empirical data material with regard to technical and economic problems. They know typical applications of combinatorial and probabilistic approaches and can transfer them to practical problems. Through the knowledge acquired, both the analytical skills and the methodological competences of the students are practised and promoted. On the basis of the acquired methodological knowledge, the students are able to make decisions in the sense of a success-optimised business.</p>							
3	<p>Contents:</p> <ul style="list-style-type: none"> • Frequency distributions, scale levels, position and dispersion parameters • Concentration measures • Correlation and regression • Elementary combinatorics • Concept of probability, events, conditional probability, stochastic independence, Bayes' theorem • Special probability distributions: Equal distribution, Bernoulli distribution, binomial distribution, hypergeometric distribution, Poisson distribution, geometric distribution, normal distribution, lognormal distribution • Samples and estimators, confidence intervals 							
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with exercises</p>							
5	Participation requirements:							
	Formal:	None						
	Content:	Knowledge of the module Mathematics 1 (1151)						
6	<p>Forms of assessment:</p> <p>Written examination or combination examination or oral examination</p>							
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>							
8	<p>Application of the module (in the following study programmes)</p> <p>Industrial Engineering and Management B.Sc.</p>							
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>							
10	<p>Module coordinator:</p> <p>Prof. Dr. rer. nat. Georgios Lajios</p>							
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>							

12	Language: German
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Engineering Mechanics						TM			
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:				
1259	150 h	5	1st semester	Annual (Winter)	1 semester				
1	Course:	Planned group sizes	Scope	Actual contact time / classroom teaching	Self-study				
	Lecture	60 students	2 SCH	30 h	45 h				
	Tuition in seminars	30 students	2 SCH	30 h	45 h				
	Exercise	20 students	0 SCH	0 h	0 h				
	Practical or seminar	15 students	0 SCH	0 h	0 h				
	Supervised self-study	60 students	0 SCH	0 h	0 h				
2	<p>Learning outcomes/competences:</p> <p>The students know the elementary correlations, basic concepts and laws of technical mechanics. They master the basic means of description and methods of analysis for determining the mechanical loads on technical systems.</p> <p>They are able to derive stresses from determined mechanical loads. Through insight into current application areas, they can grasp the practical significance of engineering mechanics.</p> <p>The course enables the students to think and work independently with engineering-related methods in mechanical engineering application areas.</p>								
3	<p>Contents:</p> <ul style="list-style-type: none"> - Introduction: Statics, effect and definition of a force, idealisations - System of forces: Addition of several forces, central system of forces, resulting force, mechanical equilibrium - Free body diagram: statically determinate, special cases, multi-body systems - Truss: external and internal statically determinate, bar forces according to the method of section and the method of joint. - Centre of mass, centre of volume, centre of area, centre of line, stability - Friction: Coulomb's law for friction, physical processes of friction, rope friction, friction on machine elements, energy conversion efficiency, - Dynamics: general theory of motion - Strength of materials: Types of basic stresses, internal loads, determination of stresses on components - 								
4	<p>Forms of teaching:</p> <p>Lecture, seminar-based teaching with exercises</p>								
5	<p>Participation requirements:</p> <table border="1" style="width: 100%;"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>None</td> </tr> </table>					Formal:	None	Content:	None
Formal:	None								
Content:	None								
6	<p>Forms of assessment:</p> <p>Written examination or oral examination</p>								
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>								
8	<p>Application of the module (in the following study programmes)</p> <p>Industrial Engineering and Management B.Sc.</p>								
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>								
10	<p>Module coordinator:</p>								

	Prof. Dr.-Ing. Peter Reinhold
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Technical English						TEN		
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:			
1264	150 h	5	5th semester	Annual (Winter)	1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	0	SCH	0	h	0	h
	Tuition in seminars	30 students	4	SCH	60	h	90	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	Learning outcomes/competences: <ul style="list-style-type: none"> - Expertise: The students acquire an extended active language competence at the upper B2 level. They have a sound specialist vocabulary of Technical English and can combine it with Business English terminology relevant to their profession. - Social competence: they develop sensitivity to differences in intercultural communication, especially in English-speaking business environment. - Methodological competence: They are able to skim specialist texts for essential information and present them shortly and concisely both in speaking and in writing. . They establish wider contexts and make a critical assessment. - Personal competence: They show English fluency and a pro-active approach to managing authentic English sources. 							
3	Contents: <ul style="list-style-type: none"> - Students can actively participate in international conferences. - They master engineering-relevant terminology (e.g. manufacturing processes; mathematical operations; dimensions and shapes; forces and mechanisms; properties of materials; automated systems and Industry 4.0). - They possess interdisciplinary skills (e.g. discussing readings and trends; pitching a technical product; managing projects; designing conference posters; academic writing). 							
4	Forms of teaching: Seminar-based teaching / individual and group work, etc. / semester project (Assignment)							
5	Participation requirements:							
	Formal:	Regular attendance (70%) and active participation						
	Content:	English language competence: B2.1 (according to the European Reference Framework for Languages)						
6	Forms of assessment: Combination examination							
7	Prerequisite for the award of credit points: Passed semester project and written exam							
8	Application of the module (in the following study programmes) Industrial Engineering and Management B.Sc.							

9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: OStR Cornelia Biegler-König
11	Other information: Literature will be announced at the beginning of the course. Textbook, additional materials, intranet self-study courses
12	Language: English

Textile Technologies						TEX		
Identification number:	Workload:	Credits:	Study semester:		Frequency of the offer	Duration:		
6004	150 h	5	4th or 6th semester		Annual (Summer)	1 semester		
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	2	SCH	30	h	45	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	Learning outcomes/competences: Describing the textile chain, comparing different textile fabrics and materials, indicating the most important textile testing procedures and recent research topics. Students describe, analyse and assess a topic from the textile chain independently.							
3	Contents: Textile chain: primary spinning, secondary spinning, weaving, warp and weft knitting, braiding, narrow textiles, finishing, manufacture; textile machines; sustainability in the textile chain; intelligent / functional textiles; physical and other properties of textiles; standards; textile testing instructions. Recent research topics along the textile chain.							
4	Forms of teaching: Lecture, hands-on seminar							
5	Participation requirements:							
	Formal:							
	Content:							
6	Forms of assessment: project work							
7	Prerequisite for the award of credit points: Module examination pass							
8	Application of the module (in the following study programmes) Apparative Biotechnology B.Sc., Mechatronics B.Sc., Renewable Energies B.Eng. and Industrial Engineering and Management B.Sc., Mechanical Engineering B.Eng.							
9	Importance of the grade for the final grade: according to BRPO							
10	Module coordinator: Prof. Dr. Dr. Andrea Ehrmann							
11	Other information:							
12	Language: English							

Business Simulation Logistics or General Management						ULG		
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:			
1269	150 h	5	6th semester	Annual (Summer)	1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	2	SCH	30	h	45	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	Learning outcomes/competences:							
	<ul style="list-style-type: none"> - Optimisation of procurement, production and sales logistics - Identify and understand the relationships between logistics decisions and the resulting costs and lead times of products - Dealing with complex decisions under conditions of uncertainty - Decision-making in a team - Practising interdisciplinary thinking and acting - Learning problem-structuring and problem-solving skills - Practising efficient communication and visualisation 							
3	Contents:							
	<ul style="list-style-type: none"> - Introduction to the Topsisim simulation game - Game rounds Topsisim-Logistics depending on the complexity in the study course - Analysis and presentation rounds 							
4	Forms of teaching:							
	Lecture, business simulation with compulsory attendance, possibly in a block seminar							
5	Participation requirements:							
	Formal:	None						
	Content:	None						
6	Forms of assessment:							
	Term paper, written examination, project work or oral examination							
7	Prerequisite for the award of credit points:							
	Module examination pass							
8	Application of the module (in the following study programmes)							
	Industrial Engineering and Management B.Sc.							
9	Importance of the grade for the final grade:							
	according to BRPO							
10	Module coordinator:							
	Dipl.-Volkswirt Holger Hartman							
11	Other information:							
	Literature will be announced at the beginning of the course.							
12	Language:							
	German							

Business Simulation Marketing or General Management						UMG						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1270	150 h	5	6th semester	Annual (Summer)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	0	SCH	0	h	0	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	2	SCH	30	h	45	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>Students can experience the complexity of the market and the interactions between changing market data and corporate planning, because they shape their own success through their corporate planning and decisions. This makes it possible to recognise the interrelationships between companies and their need for coordination, and the students in the industrial engineering degree programme are optimally prepared for their function as interface managers and value chain or process optimisers through the networked thinking and action required here. Through team-orientated work in these simulation games, not only are the technical competences integratively linked, but at the same time important key skills are acquired.</p>											
3	<p>Contents:</p> <p>Contents of the marketing simulation:</p> <ul style="list-style-type: none"> - Market analysis - Target-group-orientated product positioning - Fixing appropriate pricing strategies - Adaptation of product policy strategies - Design of communication and distribution policy components - Budgeting and performance analysis of the implemented marketing policy instruments <p>Contents Business game General Management:</p> <ul style="list-style-type: none"> - Company and market analysis - Fixing R&D strategies - Development of optimal procurement and warehousing strategies - Generation of optimal production and sales decisions - Value-based recording and evaluation of the company's activities via internal and external accounting 											
4	<p>Forms of teaching:</p> <p>Lecture, business simulation with compulsory attendance, possibly in a block seminar</p>											
5	<p>Participation requirements:</p> <table border="1"> <tr> <td>Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>Knowledge of the contents of the modules of the first four semesters. English skills.</td> </tr> </table>								Formal:	None	Content:	Knowledge of the contents of the modules of the first four semesters. English skills.
Formal:	None											
Content:	Knowledge of the contents of the modules of the first four semesters. English skills.											
6	<p>Forms of assessment:</p> <p>Term paper, written examination, combination examination, performance exam or oral exam</p>											
7	<p>Prerequisite for the award of credit points:</p>											

	Module examination pass
8	Application of the module (in the following study programmes) Industrial Engineering and Management B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr. rer. oec. Klaus Rüdiger
11	Other information: Literature will be announced at the beginning of the course. The module can be offered in German or English.
12	Language: German

Distribution and Sales Management						VM		
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:			
1276	150 h	5	6th semester	Annual (Summer)	1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	3	SCH	45	h	67.5	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h
2	Learning outcomes/competences:							
	<p>After attending the lecture, students will be able to</p> <ul style="list-style-type: none"> • name and explain the central contents of the lecture. • place the course content in the context of the knowledge of principles of marketing acquired in other courses and identify differences. • apply the central contents to selected practical examples and case studies and independently solve the associated tasks and present the results. • critically reflect on the special features and tasks of sales and distribution management. • recapitulate the course content independently and enhance their knowledge during self-study. Ideally, they will form learning groups that last throughout the entire study period. 							
3	Contents:							
	<ol style="list-style-type: none"> 1. Introduction – Distribution and sales in the context of marketing: from distribution management to sales management 2. Sales management as a component of the marketing strategic 3. Sales management as a component of the marketing mix: Basics of operational sales management 4. Sales management in consumer markets 5. Sales management in industrial markets 6. Business relationship management (CRM Customer Relationship Management) 7. Foundations of personal selling 							
4	Forms of teaching:							
	Lecture, seminar-based teaching with exercises, case studies/cases							
5	Participation requirements:							
	Formal:	None						
	Content:	ideally, knowledge of the contents of the module Marketing (1143)						
6	Forms of assessment:							
	Written examination							
7	Prerequisite for the award of credit points:							
	Module examination pass							
8	Application of the module (in the following study programmes)							
	Mechatronics B.Sc. and Industrial Engineering and Management B.Sc.							
9	Importance of the grade for the final grade:							
	according to BRPO							

10	Module coordinator: Prof. Dr. rer. oec. Klaus Rüdiger
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Elective Module Production Management						WPM		
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:			
9004	150 h	5	5th or 6th semester	each semester	1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students		SCH		h		h
	Tuition in seminars	30 students		SCH		h		h
	Exercise	20 students		SCH		h		h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students		SCH		h		h
2	Learning outcomes/competences:							
3	Contents:							
4	Forms of teaching:							
5	Participation requirements:							
	Formal:							
	Content:							
6	Forms of assessment:							
7	Prerequisite for the award of credit points:							
8	Application of the module (in the following study programmes) Industrial Engineering and Management B.Sc.							
9	Importance of the grade for the final grade:							
10	Module coordinator: Prof. Dr. rer. pol. Hubertus Wameling							
11	Other information:							
12	Language: German							

Elective Module Technical Sales						WPM		
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:			
9005	150 h	5	5th or 6th semester	each semester	1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students		SCH		h		h
	Tuition in seminars	30 students		SCH		h		h
	Exercise	20 students		SCH		h		h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students		SCH		h		h
2	Learning outcomes/competences:							
3	Contents:							
4	Forms of teaching:							
5	Participation requirements:							
	Formal:							
	Content:							
6	Forms of assessment:							
7	Prerequisite for the award of credit points:							
8	Application of the module (in the following study programmes) Industrial Engineering and Management B.Sc.							
9	Importance of the grade for the final grade:							
10	Module coordinator: Prof. Dr. rer. pol. Hubertus Wameling							
11	Other information:							
12	Language: German							

Elective Module Industrial Engineering and Management						WM		
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:			
9003	150 h	5	5th semester	each semester	1 semester			
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students		SCH		h		h
	Tuition in seminars	30 students		SCH		h		h
	Exercise	20 students		SCH		h		h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students		SCH		h		h
2	Learning outcomes/competences:							
3	Contents:							
4	Forms of teaching:							
5	Participation requirements:							
	Formal:							
	Content:							
6	Forms of assessment:							
7	Prerequisite for the award of credit points:							
8	Application of the module (in the following study programmes) Industrial Engineering and Management B.Sc.							
9	Importance of the grade for the final grade:							
10	Module coordinator: Prof. Dr. rer. pol. Hubertus Wameling							
11	Other information:							
12	Language: German							

Materials Engineering						WT						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1281	150 h	5	2nd semester	Annual (Summer)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study					
	Lecture	60 students	2	SCH	30	h	45	h				
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	1	SCH	15	h	22.5	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <p>Students understand the relationships between material structure and material properties. They know different possibilities for changing material properties and have the competence to evaluate materials comparatively using material parameters and to select them appropriately for the application. They can analyse the material behaviour taking into account external stresses. They can apply their knowledge in practical experiments.</p>											
3	<p>Contents:</p> <ul style="list-style-type: none"> - Material structure (metals/atomic, plastics/molecular) - Mechanical properties of metals and polymers - Material behaviour (static/dynamic loads) - Material changes (heat treatments, constitution) - Material designations - Environmental influences (corrosion, media resistance, ageing of plastics) - Composites and light metals (lightweight construction) - Materials testing 											
4	<p>Forms of teaching:</p> <p>Lecture, seminar, practical course</p>											
5	<p>Participation requirements:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Formal:</td> <td>None</td> </tr> <tr> <td>Content:</td> <td>None</td> </tr> </table>								Formal:	None	Content:	None
Formal:	None											
Content:	None											
6	<p>Forms of assessment:</p> <p>Written examination</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Module examination pass</p>											
8	<p>Application of the module (in the following study programmes)</p> <p>Industrial Engineering and Management B.Sc.</p>											
9	<p>Importance of the grade for the final grade:</p> <p>according to BRPO</p>											
10	<p>Module coordinator:</p> <p>Prof. Dr.-Ing. Bruno Hüsgen</p>											
11	<p>Other information:</p> <p>Literature will be announced at the beginning of the course.</p>											
12	<p>Language:</p> <p>German</p>											

Business English						WEN						
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:							
1285	150 h	5	4th semester	Annual (Summer)	1 semester							
1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study					
	Lecture	60 students	0	SCH	0	h	0	h				
	Tuition in seminars	30 students	4	SCH	60	h	90	h				
	Exercise	20 students	0	SCH	0	h	0	h				
	Practical or seminar	15 students	0	SCH	0	h	0	h				
	Supervised self-study	60 students	0	SCH	0	h	0	h				
2	<p>Learning outcomes/competences:</p> <ul style="list-style-type: none"> - Expertise: Students extend their active general language competence of B1 and reach a B2.1 level. They possess a sound specialist vocabulary of Business English and master contextually relevant grammar. They communicate spontaneously and fluently, about different business functions and can present these matters in English confidently, clearly and in detail both in speaking and in writing. - Social competence: They try out and consolidate communicative key skills in English presentations, teamwork and project work. - Methodological competence: They use targeted strategies for content acquisition and critical analysis of specialist texts. They solve contextual tasks. They can present economic issues in a manner appropriate to their target audience. - Personal competence: They assume responsibility for their learning process; they research and structure authentic material, organise workloads and meet deadlines. 											
3	<p>Contents:</p> <p>They master the specialist terminology used in various functional business areas (e.g. entrepreneurship, marketing, finance, sales, company formats).</p> <ul style="list-style-type: none"> - They possess the interdisciplinary skills to perform job-related task (emailing; presentation techniques; negotiating; leadership; problem solving). 											
4	<p>Forms of teaching:</p> <p>Seminar-based teaching / individual and, group work, etc. / semester project (Assignment)</p>											
5	<p>Participation requirements:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Formal:</td> <td>Regular attendance (70%) and active participation</td> </tr> <tr> <td>Content:</td> <td>English language competence: B1 + (according to the European Reference Framework for Languages)</td> </tr> </table>								Formal:	Regular attendance (70%) and active participation	Content:	English language competence: B1 + (according to the European Reference Framework for Languages)
Formal:	Regular attendance (70%) and active participation											
Content:	English language competence: B1 + (according to the European Reference Framework for Languages)											
6	<p>Forms of assessment:</p> <p>Combination examination</p>											
7	<p>Prerequisite for the award of credit points:</p> <p>Passed semester project and written exam</p>											
8	<p>Application of the module (in the following study programmes)</p>											

	Industrial Engineering and Management B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: OStR Cornelia Biegler-König
11	Other information: Literature will be announced at the beginning of the course. Textbook, additional materials, intranet self-study courses
12	Language: English