

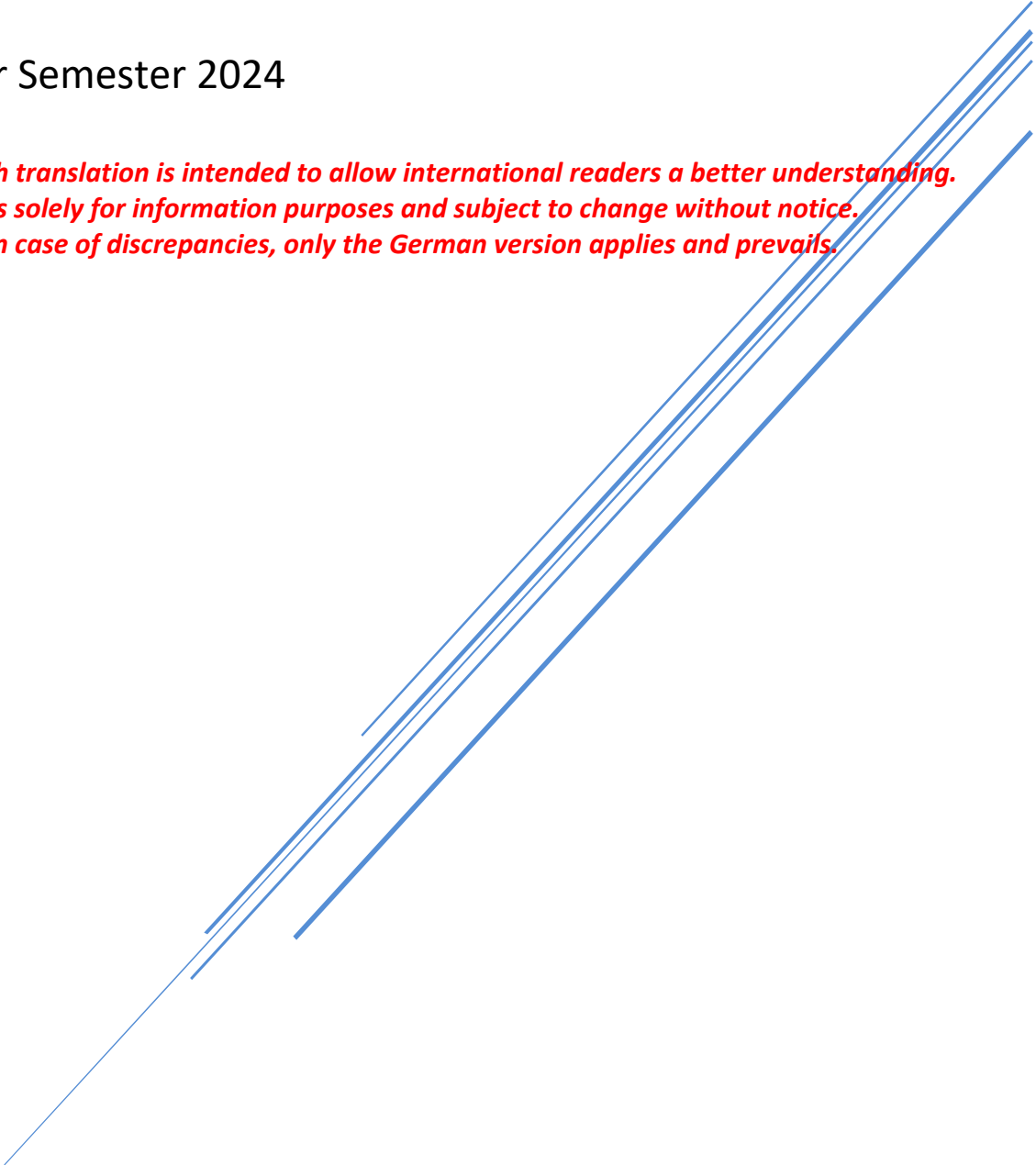
BENG INDUSTRIAL ENGINEERING – ELECTRICAL ENGINEERING BRANCH

Module Manual
of the Examination Regulations 2022

Faculty of Electrical Engineering and Information Technology

Summer Semester 2024

*This English translation is intended to allow international readers a better understanding.
It is solely for information purposes and subject to change without notice.
In case of discrepancies, only the German version applies and prevails.*

A decorative graphic consisting of several parallel blue lines of varying thicknesses, slanted diagonally from the bottom-left towards the top-right, extending across the lower half of the page.

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List of Abbreviations

WS	Winter semester
SS	Summer semester
L	Lecture
E	Exercise
P	Practical training
S	Seminar
CP	Credit points
C	Course
FME	Final module examination
ECTS	credits according to the European Credit Transfer System
BA	bachelor's programme
WIE	bachelor's programme Industrial Engineering – Electrical Engineering Branch

Explanation of Terms

Module allocated to other study programmes

In this category it will be noted if the module is allocated to other study programmes. 'Not allocated to other study programmes' means that this module is only offered in this study programme.

Formal prerequisites (FP)

In this category it will be noted if there are formal prerequisites for taking the module, such as the successful completion of a different module in the previous semester or a certain amount of credit points earned.

Subject-related prerequisites (SRP)

In this category it will be noted if there are subject-related prerequisites for taking the module, such as knowledge on and competences and skills in specific topics.

Prerequisites (FME)

In this category it will be noted if there are formal prerequisites for taking the final module examination, such as the successful completion of a different module in the previous semester or the successful completion of the corresponding internship/practical phase/practical training including confirmation thereof.

Requirements for award of credits

In this category it will be noted which prerequisites have to be met for the award of credit points for the module, such as the passing of the final module examination and the successful completion of the corresponding internship/practical phase/practical training including confirmation thereof.

Weighting for overall grade (§ xx Calculation of the overall grade and ECTS grade – Bachelor of Industrial Engineering – Electrical Engineering Branch Examination Regulations 2022)

Bachelor of Industrial Engineering

Modules in the 1st to 3rd semester → percentages are single weighted

A module worth **5 CP** is included in the calculation of the percentages of the overall grade with **5 CP**.

The modules in the 1st to 3rd semester correspond to **90 CP** in total.

Modules in the 4th/5th semester → percentages are twofold weighted

A module worth **5 CP** is included in the calculation of the percentages of the overall grade with **10 CP**.

The modules in the 4th/5th semester correspond to **120 CP** in total.

Bachelor Thesis → percentages are fivefold weighted.

The practical phase is not included in the calculation.

A module worth **12 CP** (Bachelor's Thesis) is included in the calculation of the percentages of the overall grade with **60 CP**.

This results in the following sample calculation for the percentages

$$5 \text{ CP} / 270 \text{ CP} * 100 = \mathbf{1.85\%}$$

$$10 \text{ CP} / 270 \text{ CP} * 100 = \mathbf{3.70\%}$$

$$60 \text{ CP} / 270 \text{ CP} * 100 = \mathbf{22.22\%}$$

Compulsory attendance during practical training ¹⁾

At the beginning of the course, the general conditions for attendance in the internship/practical phase/practical training are defined, e.g. regular attendance, possible absences and the repeatability of individual experiments.

Validity and Notes

BENG INDUSTRIAL ENGINEERING – ELECTRICAL ENGINEERING (EXAMINATION REGULATIONS 2022)

Valid for the summer semester 2024

Descriptions of the compulsory elective modules are documented in a separate module manual.

The regular semester determines in which semester the module is usually offered.

Overview of Versions

Version: BA_WIE_PO22_Modulhandbuch_v01 – July 2022

- First version for the examination regulations 2022

Version: BA_WIE_PO22_Modulhandbuch_v02 – March 2023

- Updates in the modules
 - Fundamentals of Electrical Engineering 2
 - Fundamentals of Computer Science 1
 - Fundamentals of Computer Science 2
 - Practical Phase

Version: BA_EI_PO22_Modulhandbuch_v03 – March 2023

- Examination numbers added

Version: BA_WIE_PO22_Modulhandbuch_v04 – August 2023

- Updates in the modules
 - Fundamentals of Electrical Engineering 1
 - Fundamentals of Computer Science 1
 - Fundamentals of Natural Sciences 2
 - Fundamentals of Microelectronics
 - Fundamentals of Business Administration
 - Accounting, Annual Accounts and Controlling
 - Cost Accounting, Results Accounts and Pricing
 - Investment Calculation

Version: BA_WIE_PO22_Modulhandbuch_v05 – September 2023

- Updates in the modules
 - Design Project
 - Market Analysis and Operations
 - Sales, Products and Services

Version: BA_WIE_PO22_Modulhandbuch_v06 – January 2024

- Updates in the modules
 - Project Management and Business Simulation
 - Design Project
 - Intercultural Management and Business Etiquette and Quotation
 - Industrial Marketing
 - Market Analysis and Operations
 - Sales, Products and Services

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Technical Modules

Fundamentals of Electrical Engineering 1

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Schoft
Course	Credit hours per week	Examination number(s)		11041 11042 (Practical Training)
Lecture (L)	2	Regular semester:		1
Exercise (E)	1	WS		Yes
Practical training (P)	1 ¹⁾	SS		–
Seminar (S)	–	Weighting for overall grade		1.85%
Total	4	Workload:	Attendance (h):	60 h
Credit points (CP)	5		Self-study (h):	90

Language of instruction	German		
Contents	Introduction: overview of the history of electrical engineering, phenomena of electromagnetism und their qualitative descriptions, historical technical applications Direct current (DC) circuit: Ohm's law, electrical power and energy, network theorems, analysis of DC circuits with linear resistance, node potential and mesh current calculation for the analysis of electrical networks, electrical measuring instruments to measure current, voltage and power, introduction of electrical and magnetic fields, capacitances and coils in a DC circuit		
Learning outcomes / Competences	Having successfully completed the module, students have an overview of the phenomena of electromagnetism and know the fundamentals of direct current (DC) modelling. They are also able to simplify and calculate more complex DC networks and to measure, process and analyse electrical parameters in DC circuits. Based on the fundamentals of electrical and magnetic fields, they have learned about capacitors and coils. During the practical activities in the electrical engineering laboratories, students learned to work in small groups in a team-oriented and responsible manner in order to complete the tasks together. They have the methodical skills to present their group's results in both writing and orally.		
Prerequisites (C)	Formal prerequisites:	Students may only participate in a practical experiment once they have completed a safety briefing for the respective laboratory at the beginning of the semester.	
	Subject-related prerequisites:	Fractional arithmetic, linear algebra such as term transformation and systems of linear equations, vector and matrix calculations, simple differential and integral calculus Theory of electricity	
Prerequisites (FME)	None		
Type and duration of examination	Written examination (90 min.)		
Requirements for award of credits	Passed practical training (confirmation of successful completion) and passed module examination		
Recommended literature and further information	Hagmann: Grundlagen der Elektrotechnik, AULA-Verlag Weißgerber: Elektrotechnik für Ingenieure 1-3, Vieweg Führer et al.: Grundgebiete der Elektrotechnik 1-3, Hanser Dzieia et al.: Elektrotechnische Grundlagen der Elektronik, HPI-Fachbuchreihe, Pflaum Böge: Handbuch Elektrotechnik, Vieweg		
	None		

Fundamentals of Electrical Engineering 2

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Schoft
Course	Credit hours per week	Examination number(s)		11051
Lecture (L)	2	Regular semester:		2
Exercise (E)	2	WS		–
Practical training (P)	–	SS		Yes
Seminar (S)	–	Weighting for overall grade		1.85%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German		
Contents	Quasi-stationary processes: alternating currents (AC), direct (DC) and mixed currents, transformation of sinusoidal currents and voltages into complex quantities, impedance, admittance, vector diagram, basic circuits, power in the alternating-current circuit, transformer. Grid feed-in of variable frequencies: locus, Bode diagram, linear representations, two-pole networks, four-pole networks, filter, resonant circuits, three-phase systems		
Learning outcomes / Competences	Having successfully completed the module, students can calculate simple AC networks using complex numbers. They know qualitative and quantitative procedures for system description in network analysis at variable frequencies. They can classify and apply frequency-dependent circuits as filters or resonant circuits in technical systems. They have basic knowledge of the topology and characterisation of three-phase systems.		
Prerequisites (C)	Formal prerequisites:	No prerequisites	
	Subject-related prerequisites:	Fractional arithmetic, linear algebra such as systems of linear equations, trigonometry, vector and matrix calculations, simple differential and integral calculus, complex numbers; theory of electricity Fundamentals of Electrical Engineering 1 for Industrial Engineering – Electrical Engineering Branch	
Prerequisites (FME)	None		
Type and duration of examination	Written examination (90 min.)		
Requirements for award of credits	Passed module examination		
Recommended literature and further information	Hagmann: Grundlagen der Elektrotechnik, AULA-Verlag Weißgerber: Elektrotechnik für Ingenieure 1-3, Vieweg Führer et. al.: Grundgebiete der Elektrotechnik 1-3, Hanser Böge: Handbuch Elektrotechnik, Vieweg		
	None		

Mathematics 1

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Kerkhoff
Course	Credit hours per week	Examination number(s)		12041
Lecture (L)	2	Regular semester:		1
Exercise (E)	2	WS		Yes
Practical training (P)	–	SS		–
Seminar (S)	–	Weighting for overall grade		1.85%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German		
Contents	Basic concepts of logic and set theory, mappings and functions. Number range extension: complex numbers, elementary functions of one complex variable. Fundamentals of linear algebra: coordinate spaces as standard vector spaces, linear mappings and matrices, systems of linear equations. Introduction to multilinear algebra: determinants. Elements of analytical geometry: scalar and vector product.		
Learning outcomes / Competences	Having successfully completed the module, students know the fundamentals of the practical use of mathematical notations and concepts as well as complex numbers and equations in a scientific context. Vectors and matrices in both a scientific and an economic applied context.		
Prerequisites (C)	Formal prerequisites:	Prerequisites (C)	
	Subject-related prerequisites:	Calculation skills with real numbers (without calculator) as well as confidence with term transformations (especially fraction and percentage calculation with real numbers), differentiation and integration as well as knowledge of the antiderivatives of elementary functions with real numbers	
Prerequisites (FME)	None		
Type and duration of examination	Written examination (90 min.)		
Requirements for award of credits	Passed module examination		
Recommended literature and further information	Will be announced during the lecture.		
	None		

Mathematics 2

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Kerkhoff
Course	Credit hours per week	Examination number(s)		12051
Lecture (L)	2	Regular semester:		2
Exercise (E)	2	WS		–
Practical training (P)	–	SS		Yes
Seminar (S)	–	Weighting for overall grade		1.85%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German
Contents	<p>The module first deals with the concepts of numerical sequence and convergence. Economic and technical applications are visualised, such as the assessment of constant cash flows as well as numerical methods (convergence of iteration methods). Based on this, continuity and differentiability of both real and complex functions follow. First, the elementary functions from Mathematics 1 are investigated with regard to these two properties. For example, the natural logarithm is not continuous in \mathbb{C}^*. The tangent line approximation has both technical and economic applications: Keywords are Taylor expansion of the first order and boundary functions. The mean value theorem of differential calculus is an important theoretical tool. On the one hand, it answers the question of how to find extrema (one-dimensional free nonlinear optimisation problems). On the other hand, it facilitates a qualitative analysis of functions.</p> <p>One of the main driving forces of the analysis – the area calculation – is solved by the introduction of the Riemann integral concept. Modern integral concepts such as the Lebesgue integral or the general μ-integral are not dealt with. The so-called fundamental theorems of differential and integral calculus allow a simple area calculation and answer the question of how to find antiderivatives. The combination of the fundamental theorems with the derivation rules leads to further integration techniques such as the substitution rule and partial integration. The integration is generalised to improper integrals and the integration of complex-valued functions, whereby the connection with integral transformations and continuous probability densities (for example the Gaussian bell curve) is established.</p> <p>This provides the fundamentals for introducing ordinary differential equations. Such equations can be used to formulate many laws of natural science and engineering as well as modelling approaches in business studies. Linear differential equations with constant coefficients are dealt with. As well as elementary solution approaches, the Laplace transformation method used in engineering is discussed.</p> <p>Finally, we generalise the tangent line approximation of Taylor expansions of any order.</p>
Learning outcomes / Competences	<p>Having successfully completed the module, students are able to deal with:</p> <ul style="list-style-type: none"> • the assessment of cash flows, the investigation of convergence-based iterative methods • basic techniques of differentiation in the application context: functional analysis with the help of first derivations, solving one-dimensional nonlinear optimisation problems, Taylor expansions • basic techniques of integration in the application context: area calculations, computation of probabilities with continuous density, calculation of Laplace transformations

	<ul style="list-style-type: none"> • solving linear differential equations with constant coefficients 	
Prerequisites (C)	Formal prerequisites:	No prerequisites
	Subject-related prerequisites:	Mathematics 1
Prerequisites (FME)	None	
Type and duration of examination	Written examination (90 min.)	
Requirements for award of credits	Passed module examination	
Recommended literature and further information	Will be announced during the lecture.	
	None	

Fundamentals of Computer Science 1

Module allocated to other study programmes		Bachelor of Electrical Engineering and Information Technology		Person responsible for the module Willemsen
Course	Credit hours per week	Examination number(s)		13011
Lecture (L)	2	Regular semester:		1
Exercise (E)	2	WS		Yes
Practical training (P)	–	SS		–
Seminar (S)	–	Weighting for overall grade		1.85%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German		
Contents	<ul style="list-style-type: none"> • Computer architectures and components • Numeral systems and conversions • A/D and D/A conversion • Boolean algebra, digital arithmetic • Fundamentals of VHDL • CPU architectures • Fundamentals of programming (compiler, linker, assembler, automata) • Fundamentals of operating systems • Processes and memory management • Dynamic memory allocation • Introduction to programming languages and programming paradigms (object-oriented, procedural, declarative, reactive, functional) 		
Learning outcomes / Competences	<p>Students understand the structure and architecture of computer systems and the interaction of their components. In addition, they master various number systems, Boolean algebra and the basic concepts of an operating system in order to execute and manage programs. They also have basic knowledge of programming languages, their compilation into machine code and their paradigms. In addition, they are able to analyse and create simple VHDL digital circuits.</p> <p>Thanks to the intensive practical exploration of the assignments, students are able to delegate tasks and develop solutions in a collaborative manner. They are able to communicate the results of their work methodically and in a manner appropriate to the target group.</p>		
Prerequisites (C)	Formal prerequisites:	No prerequisites	
	Subject-related prerequisites:	No prerequisites	
Prerequisites (FME)	Participation in and passing of the weekly tasks		
Type and duration of examination	Written examination (90 min.)		
Requirements for award of credits	Passed module examination		
Recommended literature and further information	Will be announced during the course		
	None		

Fundamentals of Computer Science 2

Module allocated to other study programmes		Fundamentals of Computer Science 3 (Bachelor of Electrical and Information Technology)	Person responsible for the module Rieß
Course	Credit hours per week	Examination number(s)	13021 13022 (Practical Training)
Lecture (L)	2	Regular semester:	2
Exercise (E)	1	WS	–
Practical training (P)	1 ¹⁾	SS	Yes
Seminar (S)	–	Weighting for overall grade	1.85%
Total	4	Workload:	Attendance (h): 60 h
Credit points	5		Self-study (h): 90

Language of instruction	German	
Contents	Students learn programming using C programming language. The module covers the following topics: data and data types, expressions, assignments and operators, algorithms and structured programming, functions, storage-class memory, pointers, input/output, files, dynamic memory and structured data types.	
Learning outcomes / Competences	<p>Having successfully completed the module and the practical training, students are able to synthesise, compile and evaluate a suitable C program for a given task. Students can apply the basic elements of C programming language in a suitable manner.</p> <p>During the practical training, students have learned how to practically apply the theoretical topics covered in the lectures and exercises. In addition, they have consolidated their knowledge acquired in theory. These additional considerations and the application of the fundamentals covered in the exercises have improved students' understanding.</p>	
Prerequisites (C)	Formal prerequisites:	No prerequisites
	Subject-related prerequisites:	No prerequisites
Prerequisites (FME)	Passed practical training (confirmation of successful completion)	
Type and duration of examination	Written examination (90 min.)	
Requirements for award of credits	Passed practical training (confirmation of successful completion) and passed module examination	
Recommended literature and further information	Kernighan, Richie: Programmieren in C, Hanser Hanser, Dausmann, Bröckl, Schoop, Goll: C als erste Programmiersprache, Vieweg und Teubner	
	None	

Fundamentals of Natural Sciences 1

Module allocated to other study programmes		Bachelor of Electrical Engineering and Information Technology		Person responsible for the module Prochotta
Course	Credit hours per week	Examination number(s)		14011
Lecture (L)	4	Regular semester:		2
Exercise (E)	–	WS		–
Practical training (P)	–	SS		Yes
Seminar (S)	–	Weighting for overall grade		1.85%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German		
Contents	<p>Physics part: Mechanics: kinematics, dynamics, interactions, work and energy, particle systems, impulse, static and dynamic processes, rotary movements, mechanics of deformable bodies, fluid dynamics</p> <p>Materials part: Structure and properties of matter, atomic structure of solids, Miller's indices, perturbations of atomic structure, diffusion, electrical, magnetic and mechanical properties of materials</p>		
Learning outcomes / Competences	Having successfully completed the module, students understand fundamental scientific correlations and can derive laws from experiments. Students are able to select suitable material for given applications. They can also apply material testing methods.		
Prerequisites (C)	Formal prerequisites:	No prerequisites	
	Subject-related prerequisites:	No prerequisites	
Prerequisites (FME)	None		
Type and duration of examination	Written examination (120 min.)		
Requirements for award of credits	Passed module examination		
Recommended literature and further information	Tipler: Physik, Springer Berber, Kacher, Langer: Physik in Formeln und Tabellen, Springer Fischer: Werkstoffe in der Elektrotechnik: Grundlagen - Aufbau - Eigenschaften - Prüfung - Anwendung - Technologie, Hanser		
	None		

Fundamentals of Natural Sciences 2

Module allocated to other study programmes		Bachelor of Electrical Engineering and Information Technology	Person responsible for the module Prochotta
Course	Credit hours per week	Examination number(s)	14021 14022 (Practical Training)
Lecture (L)	2	Regular semester:	3
Exercise (E)	1	WS	Yes
Practical training (P)	1 ¹⁾	SS	–
Seminar (S)	–	Weighting for overall grade	1.85%
Total	4	Workload:	Attendance (h): 60 h
Credit points	5		Self-study (h): 90

Language of instruction	German		
Contents	<p>Oscillations: harmonic oscillations, pendulums, damped oscillations, forced oscillations, acoustics</p> <p>Waves: harmonic waves, energy transfer by waves, superposition and interference, standing waves, Doppler effect, reflection, refraction, diffraction, wave packets, group phase velocity, dispersion, interactions between electromagnetic waves and matter</p> <p>Optics: waves and particles, reflection and diffraction, optical imaging, polarisation, optical instruments, photometric quantities</p> <p>Thermodynamics: temperature, thermometers, degrees of freedom, gas state equations for ideal and real gases, laws of thermodynamics, heat transfer, heat capacity, state transitions, state diagrams, heat engines, Carnot cycle, entropy</p> <p>Formulation of equations from measured values, quantities of limited accuracy, Gaussian distribution, error propagation, rounding of measured values, and inaccuracies</p>		
Learning outcomes / Competences	<p>Having successfully completed the module, students understand fundamental scientific correlations in the fields of vibrations, waves, optics and thermodynamics and can derive laws from experiments.</p> <p>Thanks to the intensive practical exploration of the scientific assignments in the laboratories, students are able to reliably prepare results in a collaborative manner and contribute their own ideas to the study groups. They are able to communicate the results of their work methodically.</p>		
Prerequisites (C)	Formal prerequisites:	Students may only participate in the practical experiments if they have passed the 'Fundamentals of Natural Sciences 1' module examination. Students may only participate in a practical experiment if they have completed a safety briefing at the beginning of the semester.	
	Subject-related prerequisites:	Fundamentals of Natural Sciences 1, Mathematics 1 for Industrial Engineering – Electrical Engineering Branch	
Prerequisites (FME)	None		
Type and duration of examination	Written examination (90 min.)		
Requirements for award of credits	Passed practical training (confirmation of successful completion) and passed module examination		

Recommended literature and further information	Tipler, Mosca: Physik für Wissenschaftler und Ingenieure Berber, Kacher, Langer: Physik in Formeln und Tabellen
	None

Fundamentals of Electrical Power Engineering

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Echternacht
Course	Credit hours per week	Examination number(s)		18011 18012 (Practical Training)
Lecture (L)	2	Regular semester:		3
Exercise (E)	1	WS		Yes
Practical training (P)	1 ¹⁾	SS		–
Seminar (S)	–	Weighting for overall grade		1.85%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German		
Contents	<p>Energy economics, legal framework of electricity supply, energy transition, electrical power supply, structure of electrical networks</p> <p>Fundamentals: complex AC calculation, symmetrical three-phase systems</p> <p>Equipment and models: generators, decentralised generating plants, three-phase transformers, overhead lines and cables, high-voltage direct current transmission, electrical devices, switchgear and protection devices</p> <p>Power system analysis, short-circuit current calculation in accordance with VDE 0102, load frequency control</p>		
Learning outcomes / Competences	<p>Having successfully completed the module, students know the fundamentals of energy economics, energy conversion and the transmission and distribution of electrical power. They can assess interactions between technical and economic aspects in the field of electrical power engineering. They can apply their knowledge and skills in a job-oriented way in the context of practical experiments.</p>		
Prerequisites (C)	Formal prerequisites:	No prerequisites	
	Subject-related prerequisites:	Fundamentals of Electrical Engineering	
Prerequisites (FME)	None		
Type and duration of examination	Written examination (90 min.)		
Requirements for award of credits	Passed practical training (confirmation of successful completion) and passed module examination		
Recommended literature and further information	Heuck, Dettmann: Elektrische Energieversorgung, Vieweg		
	Oeding, Oswald: Elektrische Kraftwerke und Netze, Springer		
	None		

Fundamentals of Automation Technology

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Schwung
Course	Credit hours per week	Examination number(s)		18021 18022 (Practical Training)
Lecture (L)	2	Regular semester:		3
Exercise (E)	1	WS		Yes
Practical training (P)	1 ¹⁾	SS		–
Seminar (S)	–	Weighting for overall grade		1.85%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German		
Contents	<p>Students learn the fundamentals of automation technology solutions. They are introduced to the objectives, tasks, structures and characteristics of automation technology as well as to typical forms of description in automation technology such as P&I flow diagrams and block diagrams. Building on this, they are given an overview of sensors and actuators for recording and influencing typical process variables and an explanation of their connection to the process-related automation components. Students learn about the structure of programmable logic controllers and their programming in accordance with IEC 61131-3; this is limited to the FBD and ST languages and simple language constructs and functionalities. Moreover, they are familiarised with the basic concepts of control system description and the design of automation systems based on these. They learn methods for describing and analysing continuous LTI systems in the time and image domain. In addition, students learn about control design with the help of settings rules. They are introduced to description and analysis methods as well as procedures for systematic control design for the automation of discrete-event processes. Finally, students are familiarised with the fundamental principles of industrial communication and robotics.</p> <p>The imparted knowledge is deepened in the simple automation experiments completed during the accompanying practical training in the laboratories. Students also use programmable logic controllers to implement simple automation solutions.</p>		
Learning outcomes / Competences	Having successfully completed the module, students are able to understand and modify automation systems and structures as well as solve and implement simple control tasks.		
Prerequisites (C)	Formal prerequisites:	No prerequisites	
	Subject-related prerequisites:	Fundamentals of mathematics and electrical engineering	
Prerequisites (FME)	None		
Type and duration of examination	Written examination (90 min.)		
Requirements for award of credits	Passed practical training (confirmation of successful completion) and passed module examination		
Recommended literature and further information	<p>Langmann: Taschenbuch der Automatisierungstechnik, Hanser</p> <p>Litz: Grundlagen der Automatisierungstechnik, Oldenbourg</p> <p>Lunze: Automatisierungstechnik – Methoden für die Überwachung und Steuerung kontinuierlicher und ereignisdiskreter Systeme, De Gruyter Oldenbourg</p>		

	Walter: Grundkurs Regelungstechnik: Grundlagen für Bachelorstudiengänge aller technischen Fachrichtungen und Wirtschaftsingenieure, Springer Wellenreuther, Zastrow: Automatisieren mit SPS – Theorie und Praxis, Springer
	None

Fundamentals of Microelectronics

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Ćurčić
Course	Credit hours per week	Examination number(s)		18031 18032 (Practical Training)
Lecture (L)	2	Regular semester:		3
Exercise (E)	1	WS		Yes
Practical training (P)	1 ¹⁾	SS		–
Seminar (S)	–	Weighting for overall grade		1.85%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German		
Contents	Introduction to sensors, base technologies, actuators Temperature sensors, force and pressure sensors, inertial sensors, microphones, magnetic field sensors, capacitive sensors, optical sensors, humidity sensors, chemical sensors		
Learning outcomes / Competences	Having successfully completed the module, students are able to understand sensor technology. They are able to apply their knowledge of industrial metrology. During the practical training, they have learned to practically apply the knowledge acquired in the lecture. They have studied particularly the following topics in an application-oriented manner: ultrasonic sensors, circuit design and layout, soldering technique and practical measurement technology using an oscilloscope. Having passed the practical training (confirmation of successful completion), students can apply the fundamentals of ultrasonic sensors as well as design and test electrical circuits.		
Prerequisites (C)	Formal prerequisites:	No prerequisites	
	Subject-related prerequisites:	No prerequisites	
Prerequisites (FME)	Passed practical training (confirmation of successful completion)		
Type and duration of examination	Written examination (90 min.)		
Requirements for award of credits	Passed practical training (confirmation of successful completion) and passed module examination		
Recommended literature and further information	Schaumburg: Sensoren, Teubner Büttgenbach: Mikromechanik, Teubner Tietze, Schenk: Halbleiter-Schaltungstechnik, Springer		
	None		

Fundamentals of Information Technology

Module allocated to other study programmes		Fundamentals of Computer Science 2 (Bachelor of Electrical and Information Technology)	Person responsible for the module A. Braun
Course	Credit hours per week	Examination number(s)	18041
Lecture (L)	2	Regular semester:	1
Exercise (E)	2	WS	Yes
Practical training (P)	–	SS	–
Seminar (S)	–	Weighting for overall grade	1.85%
Total	4	Workload:	Attendance (h): 60 h
Credit points	5		Self-study (h): 90

Language of instruction	German	
Contents	<ul style="list-style-type: none"> • Numerical presentation of vectors and matrices • Fundamentals of statistical methods • Plotting and visualisation in 2D and 3D • Organising, analysing and preprocessing data • Introduction to programming (if-then, loops) • Structuring and automation using functions • Fitting and regression • Debugging 	
Learning outcomes / Competences	<p>Students are able to quickly gain practical programming experience with this low-threshold course. They learn basic programming skills: structures (if-then statements, loops, functions), use of existing libraries, use of a debugger. They know the basic elements of data handling (storage formats, import, preprocessing) and data visualisation (plotting, export, formats). Students are able to productively use Matlab's development environment. They learn the first approaches to numerical thinking and modelling.</p> <p>Students work cooperatively and considerately with one another on the given problems, thereby developing an understanding of their own role in the study group and taking responsibility for themselves and the entire group.</p>	
Prerequisites (C)	Formal prerequisites:	No prerequisites
	Subject-related prerequisites:	No prerequisites
Prerequisites (FME)	Participation in and passing of the weekly programming tasks	
Type and duration of examination	Written examination, oral examination (20–40 min.) or special type of examination Will be announced at the beginning of the course.	
Requirements for award of credits	Participation in and passing of the weekly programming tasks and passed module examination	
Recommended literature and further information	Will be announced during the course	
	None	

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Transferable Skills Modules

Technical and Business English

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module S. Meier
Course	Credit hours per week	Examination number(s)		16021
Lecture (L)	–	Regular semester:		4
Exercise (E)	–	WS		–
Practical training (P)	–	SS		Yes
Seminar (S)	4	Weighting for overall grade		3.7%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German		
Contents	<ul style="list-style-type: none"> • Promotion of language skills, i.e. reading, listening, speaking and writing • Editing stylistically difficult technical texts in the fields of economics and electrical engineering • Grammar and word building exercises • Conversation and comprehension exercises • Writing up definitions • Paraphrasing and translation techniques • Intercultural business communication • Methods: inputs, interactive exercises, role plays, case studies and simulations, group and individual work, keynote presentations, exchange of experiences, use of tools 		
Learning outcomes / Competences	Having successfully completed the module, students can read, understand, speak and write technical English. They can comment on and summarise technical correlations verbally and in writing. They can identify and use complex sentence, word building and grammatical structures in technical English texts from the field of electrical engineering. They are able to translate a text orally or in written form. They have the business English, communication and intercultural skills required in international contexts (e.g. on business trips, and in negotiations, meetings and presentations).		
Prerequisites (C)	Formal prerequisites:	No prerequisites	
	Subject-related prerequisites:	English language proficiency of A2 level (according to the Common European Framework of Reference for Languages)	
Prerequisites (FME)	None		
Type and duration of examination	Written examination or special type of examination Will be announced at the beginning of the respective course		
Requirements for award of credits	Passed module examination		
Recommended literature and further information	Magazin Business Spotlight Halliday, Resnick, Walker: Fundamentals of Physics, Wiley Rizzoni: Fundamentals of Electrical Engineering, McGraw-Hill		
	None		

Project Management and Business Simulation

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Lang
Course	Credit hours per week	Examination number(s)		80041
Lecture (L)	3	Regular semester:		4
Exercise (E)	1	WS		–
Practical training (P)	–	SS		Yes
Seminar (S)	–	Weighting for overall grade		3.7%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German		
Contents	<p>First, students learn to understand the essential need for project management. They then learn different approaches (waterfall and agile/SCRUM project management) and the corresponding methods and tools. Thanks to an individual business plan project in small groups, students experience challenges and possible solutions for practical problems.</p> <p>In addition, students familiarise themselves with the essential objectives, characteristics and contents of a business plan. They create their own business plan in small groups for an individual project of their own choice. During the semester, they work on this project in their student groups and in regular coaching sessions and consultations with the teaching staff. Hybrid teaching and learning units are correspondingly used to enhance students' media and communication skills. The media hybrid interaction is an integral part of simulation in operational project management and is hence included in this course.</p>		
Learning outcomes / Competences	<p>Having successfully completed the module, students can apply common methods and instruments of project management. They have developed an understanding of the approaches and instruments presented and have applied them. They can critically analyse a project plan or project. Students have experienced the interaction within a company and the impact of business decisions. They have run through business processes and learned how to create a business plan in theory. Based on the methodology of problem-oriented learning, students have also written their own business plan independently. The teaching staff have counselled them and provided feedback during the process. As a result of this teaching-learning process, students have learned to critically analyse business plans.</p>		
Prerequisites (C)	Formal prerequisites:	<p>Compulsory, punctual participation in the first meeting as indicated on the notice</p> <p>Compulsory attendance as announced in the first meeting</p>	
	Subject-related prerequisites:	Fundamentals of Business Administration	
Prerequisites (FME)	Will be announced at the beginning of the respective course		
Type and duration of examination	<p>Written examination, oral examination (20–40 min.) or special type of examination.</p> <p>Will be announced at the beginning of the respective course</p>		
Requirements for award of credits	Passed module examination		
	Will be announced during the course		

Recommended literature and further information	None
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Design Project

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Lang
Course	Credit hours per week	Examination number(s)		80031
Lecture (L)	–	Regular semester:		5
Exercise (E)	–	WS		Yes
Practical training (P)	4 ¹⁾	SS		–
Seminar (S)	–	Weighting for overall grade		3.7%
Total		Workload:	Attendance (h):	30
Credit points	5		Self-study (h):	120

Language of instruction	German		
Contents	Students can choose between different projects from practice (in cooperation with partner companies). They work independently on these projects in teams – specifying the task, planning the project, putting the plan into action and presenting results. Teaching staff and partner companies are the project owners and provide subject-related consultation. Hybrid teaching and learning units are used in this seminar-based module to accordingly enhance students' media and communication skills.		
Learning outcomes / Competences	Having successfully completed the module, students are able to implement an interdisciplinary project independently. They have learned to organise themselves within a group, to divide and work on the tasks as well as to prepare the results for the project owner. Regular status meetings as well as feedback from the teaching staff and companies involved have accompanied the process. This is the basis of the didactic concept promoting the independence of students in the context of practical tasks.		
Prerequisites (C)	Formal prerequisites:	Compulsory, punctual participation in the first meeting as indicated on the notice Compulsory attendance as announced in the first meeting	
	Subject-related prerequisites:	Intercultural Management and Business Etiquette and Quotation, Project Management and Business Simulation, Business Administration	
Prerequisites (FME)	The 'Intercultural Management and Business Etiquette and Quotation', 'Fundamentals of Business Administration' and 'Project Management and Business Simulation' modules must be successfully completed. The following also applies: <ul style="list-style-type: none"> • Compulsory in-person attendance in the first meeting • Compulsory in-person or online attendance in all other meetings (max. 3 absences allowed) • In-person attendance means being present in the lecture hall / seminar room • Online attendance means being present in TEAMS with the camera turned on 		
Type and duration of examination	Written examination, oral examination (20–40 min.) or special type of examination. Will be announced at the beginning of the respective course		
Requirements for award of credits	Passed module examination		
	Will be announced during the course		

Recommended literature and further information	None
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Economic Modules

Fundamentals of Business Administration

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Hermanns
Course	Credit hours per week	Examination number(s)		55011
Lecture (L)	3	Regular semester:		1
Exercise (E)	1	WS		Yes
Practical training (P)	–	SS		–
Seminar (S)	–	Weighting for overall grade		1.85%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German		
Contents	<p>The module introduces fundamental concepts of business administration. It deals with essential decisions and functions in business administration and their application. The module includes an introductory overview of the following topics:</p> <ul style="list-style-type: none"> • Location decisions • Legal form • Corporate structure • Strategy • Organisation • Procurement • Logistics • Production • Marketing • Human resources management • Financial accounting and management accounting • Controlling • Financing • Investments 		
Learning outcomes / Competences	Having successfully completed the module, students know the fundamentals and basic concepts of business administration. They understand the essential decisions and functions in business administration. They are able to put the contents of advanced courses on related topics into the context of business administration.		
Prerequisites (C)	Formal prerequisites:	No prerequisites	
	Subject-related prerequisites:	No prerequisites	
Prerequisites (FME)	None		
Type and duration of examination	Written examination (120 min.)		
Requirements for award of credits	Passed module examination		
Recommended literature and further information	Compulsory reading for the lecture: Vahs, Schäfer-Kunz (8. Auflage, 2021): Einführung in die Betriebswirtschaftslehre, Schäffer-Poeschel		

	Further recommended literature: Wöhe, Döring / Brösel (2016 oder neuere Auflage 2020): Einführung in die Allgemeine Betriebswirtschaftslehre, Vahlen
	None

Intercultural Management and Business Etiquette and Quotation

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Lang
Course	Credit hours per week	Examination number(s)		55101
Lecture (L)	3	Regular semester:		4
Exercise (E)	1	WS		–
Practical training (P)	–	SS		Yes
Seminar (S)	–	Weighting for overall grade		3.7%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German		
Contents	In a globalised professional environment, an understanding for different cultures and communication is critical to success. The module deals with both cultural specifics and professional conventions. The topic of quotation complements the module contents – i.e. closely looking at process-related and legal requirements of a quote which can be tailored to an intercultural context for successful marketing. Hybrid teaching and learning units are used to accordingly enhance students' media and communication skills.		
Learning outcomes / Competences	Having successfully completed the module, students know and understand the essential elements of culture and can adapt to cultural differences in professional practice. They are able to analyse why people behave the way they do in different intercultural contexts. They can influence people's behaviour to a certain degree to achieve their own goals. They are able to communicate appropriately and behave correctly in business contexts. They have learned how to avoid and settle conflicts of interest. In addition, they are able to provide a quote which meets local legal and economic requirements as well as the client's needs – to influence the purchase decision in favour of the offering company.		
Prerequisites (C)	Formal prerequisites:	Compulsory, punctual participation in the first meeting as indicated on the notice Compulsory attendance as announced in the first meeting	
	Subject-related prerequisites:	No prerequisites	
Prerequisites (FME)	None		
Type and duration of examination	Written examination, oral examination (20–40 min.) or special type of examination. Will be announced at the beginning of the respective course		
Requirements for award of credits	Passed module examination		
Recommended literature and further information	Will be announced during the course		
	None		

Accounting, Annual Accounts and Controlling

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Hermanns
Course	Credit hours per week	Examination number(s)		55021
Lecture (L)	3	Regular semester:		3
Exercise (E)	1	WS		Yes
Practical training (P)	–	SS		–
Seminar (S)	–	Weighting for overall grade		1.85%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German		
Contents	<p>The module deals with the fundamentals of financial accounting:</p> <ul style="list-style-type: none"> • Fundamentals of accounting • Fundamentals of financial reporting • Profit and loss account • Total cost and cost-of-sales method <p>The module deals with the fundamentals of controlling:</p> <ul style="list-style-type: none"> • Cost trends and determination of cost functions • Calculation • Tasks and procedures for profit and loss account • Break-even analyses • Cost and revenue information for operational decision-making • Absorption costing and marginal costing • 'Build or buy' decision • Standard costing and variance analysis • Standard direct costing • Processing costing • Fundamentals of key figures of controlling • Economic analysis using controlling key figures • Annual accounts analysis using controlling key figures 		
Learning outcomes / Competences	Having successfully completed the module, students understand and can apply the fundamentals of accounting and annual accounts as well as the most important content and methods of controlling. They understand that the instruments of controlling provide essential information for corporate planning, management and control and thus significantly support operational management decision-making.		
Prerequisites (C)	Formal prerequisites:	No prerequisites	
	Subject-related prerequisites:	Fundamentals of Business Administration and Cost Accounting, Results Accounts and Pricing	
Prerequisites (FME)	None		
Type and duration of examination	Written examination (120 min.)		
Requirements for award of credits	Passed module examination		
	Compulsory reading for the fields of annual accounts and accounting:		

Recommended literature and further information	Vahs, Schäfer-Kunz (8. Auflage, 2021): Einführung in die Betriebswirtschaftslehre, Schäffer-Poeschel Compulsory reading for the field of controlling: Friedl, Hofmann, Pedell (2017): Kostenrechnung – Eine entscheidungsorientierte Einführung, Vahlen
	None

Industrial Marketing

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Lang
Course	Credit hours per week	Examination number(s)		55031
Lecture (L)	3	Regular semester:		2
Exercise (E)	1	WS		–
Practical training (P)	–	SS		Yes
Seminar (S)	–	Weighting for overall grade		1.85%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German		
Contents	The module teaches fundamental concepts of industrial marketing and creates a common understanding. Based on marketing goals and strategies, students start creating their own marketing concepts. For this purpose, they prepare and discuss theoretical contents digitally. During the exercise, they work in groups and apply the acquired knowledge to a product to be marketed. A special focus is on the choice and use of marketing instruments. Technical implementation and current developments are gradually integrated into considerations and applications. Work might touch other business-related disciplines. Hybrid teaching and learning units are used to accordingly enhance students' media and communication skills.		
Learning outcomes / Competences	Students are able to develop, implement and control marketing concepts.		
Prerequisites (C)	Formal prerequisites:	Compulsory, punctual participation in the first meeting as indicated on the notice Compulsory attendance as announced in the first meeting	
	Subject-related prerequisites:	Fundamentals of Business Administration	
Prerequisites (FME)	None		
Type and duration of examination	Written examination, oral examination (20–40 min.) or special type of examination. Will be announced at the beginning of the respective course		
Requirements for award of credits	Passed module examination		
Recommended literature and further information	Topic-specific literature will be recommended or provided during the respective course or via the online learning platform.		
	The exercise consists of group work.		

Cost Accounting, Results Accounts and Pricing

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Hermanns
Course	Credit hours per week	Examination number(s)		55041
Lecture (L)	3	Regular semester:		2
Exercise (E)	1	WS		–
Practical training (P)	–	SS		Yes
Seminar (S)	–	Weighting for overall grade		1.85%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German		
Contents	<p>The module deals with essential aspects of cost accounting, results accounts and pricing:</p> <ul style="list-style-type: none"> • Cost accounting and results accounts as part of management accounting • Fundamentals of cost accounting and results accounts • Calculation and cost allocation • Cost element, cost centre and cost unit accounting • Determination of actual costs and manufacturing costs • Calculation of the sales price • Procedure for internal cost allocation • Structure of a cost distribution sheet • Cost trends and determination of cost functions • Tasks and procedures for profit and loss account • Break-even analysis for a product • Cost and revenue information for operational decision-making • Absorption costing and marginal costing • Single-stage and multi-stage contribution margin • Total cost and cost-of-sales method 		
Learning outcomes / Competences	Having successfully completed the module, students are able to understand goals, structures and procedures of cost accounting, results accounts and pricing. Students know that cost accounting and results accounts provide essential information for corporate planning, management and control – thus supporting operational management decisions significantly.		
Prerequisites (C)	Formal prerequisites:	No prerequisites	
	Subject-related prerequisites:	Fundamentals of Business Administration	
Prerequisites (FME)	None		
Type and duration of examination	Written examination (120 min.)		
Requirements for award of credits	Passed module examination		
Recommended literature and further information	<p>Compulsory reading for the lecture: Friedl, Hofmann, Pedell (2017): Kostenrechnung – Eine entscheidungsorientierte Einführung, Vahlen</p> <p>Further recommendations:</p>		

	Vahs, Schäfer-Kunz (8. Auflage, 2021): Einführung in die Betriebswirtschaftslehre, Schäffer-Poeschel Brühl (2016): Controlling – Grundlagen einer erfolgsorientierten Unternehmenssteuerung, Vahlen
	None

Market Research and Statistics

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Lambeck
Course	Credit hours per week	Examination number(s)		55051
Lecture (L)	3	Regular semester:		3
Exercise (E)	1	WS		Yes
Practical training (P)	–	SS		–
Seminar (S)	–	Weighting for overall grade		1.85%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German		
Contents	<p>Students learn the fundamentals of market research, particularly the relevant methodology: planning and organisation of market research projects. In the process, they apply essential methods of data acquisition, such as surveys, observation or experiments. At the end, they analyse, interpret and illustrate the results of their market research.</p> <p>Descriptive statistics provide methods to collect and present research data of mass phenomena: statistical variables, distributions, linear correlation, linear regression, mean (position measures), dispersion, probability calculation, distribution functions, density functions, corporate quality management: statistical process control, acceptance sampling</p>		
Learning outcomes / Competences	<p>Having successfully completed the module, students are able to successfully select and apply a suitable method for a given market research question. They know how to present the results appropriately and to critically reflect on them.</p> <p>Students can deal with statistical data and apply the methods of descriptive statistics. They also master procedures of quality management relevant for industrial engineers.</p>		
Prerequisites (C)	Formal prerequisites:	No prerequisites	
	Subject-related prerequisites:	Mathematics 1	
Prerequisites (FME)	None		
Type and duration of examination	Written examination (90 min.)		
Requirements for award of credits	Passed module examination		
Recommended literature and further information	Will be announced during the course		
	None		

Investment Calculation

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Hermanns
Course	Credit hours per week	Examination number(s)		55091
Lecture (L)	3	Regular semester:		4
Exercise (E)	1	WS		–
Practical training (P)	–	SS		Yes
Seminar (S)	–	Weighting for overall grade		3.7%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German		
Contents	<p>The module deals with the fundamentals of investment calculation and thematically related topics.</p> <ul style="list-style-type: none"> • Introduction to investment calculation • Fundamentals of investment decisions • Investment decision-making process • Risks in investment decisions • Overview and classification of types of investment • Static methods of investment calculation: cost comparison, earnings comparison, profitability comparison, payback method • Dynamic methods of investment calculation: net present value method, internal rate of return method, annuity method, dynamic payback method • Uncertainty in investment calculation • Investment controlling and key figures analysis • Investment/deinvestment portfolio analysis • Financial fundamentals of investment decisions • Fundamentals of financing methods • Fundamentals of investment mathematics • Financial business analysis 		
Learning outcomes / Competences	Having successfully completed the module, students know the basic concepts in the field of investment calculation. They understand the different aspects and risks of investment decisions. They are able to explain common investment calculation methods, understand the differences between the procedures and calculate and assess the advantages of simple investments. They know the fundamental types of financing methods and understand financial business analysis.		
Prerequisites (C)	Formal prerequisites:	No prerequisites	
	Subject-related prerequisites:	Fundamentals of Business Administration; Cost Accounting, Results Accounts and Pricing; Accounting; Annual Accounts and Controlling	
Prerequisites (FME)	None		
Type and duration of examination	Written examination (120 min.)		
Requirements for award of credits	Passed module examination		
Recommended literature and further information	Textbook: Pape, Ulrich (2015): Grundlagen der Finanzierung und Investition, mit Fallbeispielen und Übungen, De Gruyter Oldenbourg		

	Further recommendations: Vahs, Schäfer-Kunz (8. Auflage, 2021): Einführung in die Betriebswirtschaftslehre, Schäffer-Poeschel Wöhe, Döring, Brösel (2016 oder neuere Auflage 2020): Einführung in die Allgemeine Betriebswirtschaftslehre, Vahlen
	None

Market Analysis and Operations

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Lang
Course	Credit hours per week	Examination number(s)		55013
Lecture (L)	3	Regular semester:		1
Exercise (E)	1	WS		Yes
Practical training (P)	–	SS		–
Seminar (S)	–	Weighting for overall grade		1.85%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German		
Contents	<p>Students have to analyse a defined market. Following the problem-based learning approach, they learn about the relevant methods and instruments. They apply them immediately and determine their advantages and disadvantages. Once they have completed the market analysis, they use the results to determine a suitable strategy for further market development. Finally, they document and present their market analysis. Students choose the samples for the market analysis themselves. Hybrid teaching and learning units are used in this seminar-based course to accordingly enhance students' media and communication skills.</p>		
Learning outcomes / Competences	<p>Having successfully completed the module, students master various techniques for market and competition analysis. They can assess the company's competitive position within the market and apply suitable techniques to concrete practical cases. They know how to analyse, define and segment a market, identify relevant competitors and determine success factors and trends within the market. Students master techniques to determine the competitive position of a company or part of a company (e.g. a selected product) within the market environment (e.g. product lifecycle, SWOT analysis). Students can assess the results in the context of the overall process of corporate strategy development. Students are able to document analysis results in writing following academic standards and to present them in an understandable way.</p>		
Prerequisites (C)	Formal prerequisites:	<p>Compulsory, punctual participation in the first meeting as indicated on the notice Compulsory attendance as announced in the first meeting</p>	
	Subject-related prerequisites:	No prerequisites	
Prerequisites (FME)	<ul style="list-style-type: none"> • Compulsory in-person attendance in the first meeting • Compulsory in-person or online attendance in all other meetings (max. 3 absences allowed) • In-person attendance means being present in the lecture hall / seminar room • Online attendance means being present in TEAMS with the camera turned on 		
Type and duration of examination	<p>Written examination, oral examination (20–40 min.) or special type of examination. Will be announced at the beginning of the respective course.</p>		
Requirements for award of credits	Passed module examination		
	Will be announced during the course		

Recommended literature and further information	None
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Sales, Products and Services

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Lang
Course	Credit hours per week	Examination number(s)		55081
Lecture (L)	3	Regular semester:		5
Exercise (E)	1	WS		Yes
Practical training (P)	–	SS		–
Seminar (S)	–	Weighting for overall grade		3.7%
Total	4	Workload:	Attendance (h):	60 h
Credit points	5		Self-study (h):	90

Language of instruction	German		
Contents	<p>The module investigates which concepts, organisational form, controlling system and controlling approach are theoretically possible and which ones are applied in practice. Current practical cases illustrate different approaches used in the industries.</p> <p>Students learn the methodological fundamentals of 'design thinking' in order to subsequently apply them. Thus, they develop an understanding of relevant factors of products and services from the clients' perspective – and how these are coordinated within the company. The individual sales aspects are then precisely presented and analysed using case studies. The case studies are provided by the students. Hybrid teaching and learning units are used in this seminar-based course to accordingly enhance students' media and communication skills.</p>		
Learning outcomes / Competences	<p>Having successfully completed the module, students know various sales concepts. They can apply them to existing organisations and critically reflect on them. They have developed an in-depth understanding of the different concepts and critically discussed them. In addition, students understand the basic idea of a customer relationship management (CRM) system. They have a general understanding of how to determine goals and possible functions of a CRM system. They know how important it is to successfully integrate organisational and controlling aspects into the CRM system – and have discussed solution approaches. Thanks to this fundamental knowledge, students are able to implement such a concept systematically in professional practice. Students know the fundamentals of innovation management, product and service management as well as their fields of application. They are able to apply their knowledge to given practical problems in a given situation. They can analyse complex cases from the fields of service and product development as well as innovation management – and use the results to develop and implement solutions in a targeted manner.</p>		
Prerequisites (C)	Formal prerequisites:	<p>Compulsory, punctual participation in the first meeting as indicated on the notice</p> <p>Compulsory attendance as announced in the first meeting</p>	
	Subject-related prerequisites:	<p>Fundamentals of Business Administration, Intercultural Management and Business Etiquette and Quotation</p>	
Prerequisites (FME)	<ul style="list-style-type: none"> • Compulsory in-person attendance in the first meeting • Compulsory in-person or online attendance in all other meetings (max. 3 absences allowed) • In-person attendance means being present in the lecture hall / seminar room • Online attendance means being present in TEAMS with the camera turned on 		

Type and duration of examination	Written examination, oral examination (20–40 min.) or special type of examination. Will be announced at the beginning of the respective course
Requirements for award of credits	Passed module examination
Recommended literature and further information	Will be announced during the course
	None

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Practical Phase and Bachelor's Thesis

Practical Phase

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Any member of the teaching staff
Course	Credit hours per week	Examination number(s)		80021
Lecture (L)	–	Regular semester:		6
Exercise (E)	–	WS		Yes
Practical training (P)	–	SS		Yes
Seminar (S)	–	Weighting for overall grade		0%
Total	–	Workload:	Attendance (h):	–
Credit points	18		Self-study (h):	–

Language of instruction	German		
Contents	<p>Application of the knowledge acquired in other modules and advanced study in a practical project</p> <p>The practical phase usually takes place in cooperation with a partner from industry. In exceptional cases, the practical phase can be completed in a laboratory at the university. The topics worked on are highly relevant in practice.</p> <p>During the practical phase, students are required to develop a solution to a given problem, starting with setting a goal and a time frame.</p> <p>Once they have developed the solution approach, they need to implement it and verify it applying instruments of quality assurance.</p>		
Learning outcomes / Competences	<p>Students are able to plan and implement a practical project independently on a scientific basis. They are able to apply their theoretical skills in practice.</p> <p>During the practical phase, students have extended the social skills and empowerment acquired during the course of their studies, especially in the following areas:</p> <ul style="list-style-type: none"> • Time management • Self-Reflection • Goal orientation • Project management • Ability to work in a team • Communication skills 		
Prerequisites (C)	Formal prerequisites:	130 CP	
	Subject-related prerequisites:	No prerequisites	
Prerequisites (FME)	130 CP		
Type and duration of examination	Presentation and written assignment / minimum 8 weeks		
Requirements for award of credits	Passed module examination		
	None		

Recommended literature and further information	None
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Bachelor's Thesis

Module allocated to other study programmes		Not allocated to other study programmes		Person responsible for the module Any member of the teaching staff
Course	Credit hours per week	Examination number(s)		80001
Lecture (L)	–	Regular semester:		6
Exercise (E)	–	WS		Yes
Practical training (P)	–	SS		Yes
Seminar (S)	–	Weighting for overall grade		22.2%
Total	–	Workload:	Attendance (h):	–
Credit points	12		Self-study (h):	–

Language of instruction	German		
Contents	<p>The bachelor's thesis is a written academic assignment, which completes the programme.</p> <p>In this module, students have to solve a practical problem applying academic methodology.</p>		
Learning outcomes / Competences	<p>With the bachelor's thesis, students prove their ability</p> <ul style="list-style-type: none"> – to work independently on an assignment from their specialism within a prescribed period of time, – to elaborate on subject-specific details as well as the relevant cross-disciplinary overview, – to apply technical, academic and practical methodology. <p>This includes, amongst other things, assessment of relevant literature, development and assessment of new solution approaches and solution implementation.</p>		
Prerequisites (C)	Formal prerequisites:	Before the student can register for the final thesis, all examinations with the exception of one must be passed. The practical phase is an exception to this; it needs to be completed before admission to the thesis.	
	Subject-related prerequisites:	No prerequisites	
Prerequisites (FME)	None		
Type and duration of examination	<p>The thesis consists of the mandatory written paper and an optional final presentation (after individual consultation with the examiner), whereby this final presentation does not correspond to a separate examination with grade.</p> <p>Submission of the thesis in digital format.</p> <p>The examiner can also request the submission in printed/bound format.</p> <p>Time allowed for the completion of the thesis: 8–12 weeks</p>		
Requirements for award of credits	Passed module examination		
Recommended literature and further information	None		
	None		