HOCHSCHULE HEILBRONN

Course catalogue

Department Engineering and Business

Study Programme Energy Systems Engineering and Management

Degree awarded Bachelor of Engineering (B.Eng.)

Effective as of:	
Course leader:	
Issued in printed form:	**08.09.2025**
Workload:	
Academic regulations:	**1**

Modules and course units

Module	Module coordinator
G1 Mathematics and Mechanics	Prof. Dr.-Ing. Anke Ostertag
G2 Physics	Prof. Dr. rer. nat. Markus Scholle
G3 Electrical Engineering 1	Dr. Alexander Pfannenstiel
G4 Renewable Energy Technology	Prof. Dr.-Ing. Mohamed Ibrahim Prof. Dr.-Ing. Ekkehard Laqua
G5 Languages 1	Prof. Dr.-Ing. Ekkehard Laqua
G6 Mathematics	Prof. Dr.-Ing. Anke Ostertag
G7 Material Science and Mechanics	Prof. Dr.-Ing. Ekkehard Laqua
G8 Electrical Engineering 2	Prof. Dr.-Ing. Mohamed Ibrahim
G9 Fundamentals of Information technology	Prof. Dr. Gertraud Peinel
G10 Fundamentals of Energy Supply	Prof. Dr.-Ing. Anke Ostertag
G11 Languages 2	
H1 Automation and Communication Technology	Prof. Dr.-Ing. Anke Ostertag
H2 Electronics and Measurement Technology	Prof. Dr.-Ing. Ekkehard Laqua
H3 Sustainable Energy Technology	Prof. Dr.-Ing. Ekkehard Laqua
H4 Technical thermodynamics	Prof. Dr.-Ing. Anke Ostertag
H5 Energy Systems and Smart Grids	Prof. Dr.-Ing. Mohamed Ibrahim
H6 Decentralized Energy Systems and Smart Grid Laboratory	Prof. Dr.-Ing. Mohamed Ibrahim
H7 Control Engineering	Prof. Dr.-Ing. Mohamed Ibrahim
H8 Control and Automation Laboratory	Prof. Dr.-Ing. Mohamed Ibrahim Prof. Dr.-Ing. Anke Ostertag
H9 Business Administration 1	Prof. Dr. Markus Speidel
H10 Business Administration 2	Prof. Dr. Markus Speidel
H11 Heating, Ventilation and Air Conditioning (HVAC)	Prof. Dr.-Ing. Ekkehard Laqua
H12 Heating, Ventilation and Air Conditioning Laboratory	Prof. Dr.-Ing. Ekkehard Laqua
P Internship and Colloquium	Prof. Dr.-Ing. Ekkehard Laqua
H13 Sustainability	Prof. Dr.-Ing. Anke Ostertag
H14 Modeling and Simulation of Energy Systems	Prof. Dr.-Ing. Mohamed Ibrahim
H15 Electric Power Systems	Prof. Dr.-Ing. Mohamed Ibrahim
H16 Business Administration 3	Prof. Dr. Markus Speidel
H17 Specialisation / Elective Courses	Prof. Dr.-Ing. Ekkehard Laqua
H18 Interdisciplinary Project Laboratory	Prof. Dr.-Ing. Ekkehard Laqua
H19 Special topics of Energy Management	Prof. Dr.-Ing. Mohamed Ibrahim
BT Bachelor Thesis and Colloquium	Prof. Dr.-Ing. Ekkehard Laqua

General learning outcomes Energy Systems Engineering and Management

First-year programme

Module G1 364010 Mathematics and Mechanics

Duration	Semester
Contact hours per week (45 mins each)	
Type of assessment	Module examination is made up of weighted individual performances
Number of ECTS credits awarded	10.0
Preconditions for obtaining ECTS credits	
Module coordinator	Prof. Dr.-Ing. Anke Ostertag
Professional competence: In-depth knowledge and comprehension	-
Lerninhalte	-
Professional competence: In-depth knowledge and comprehension	Students are familiar with vector algebra, functions, differential calculus, integral calculus, sequences and limits power series expansion and complex numbers. They can reproduce linear algebra, and differential and integral calculus for functions of one variable.
Professional competence: conative skills, analysis and synthesis of knowledge	Students can apply the mathematical basics from vector algebra to linear differential equations. They can apply their knowledge to technical and economic problems. In particular, the connection with mechanics shows the relevance of mathematical basics for technical problems. In the field of mechanics, students have broad and integrated knowledge in selected areas. In particular, they can calculate the bearing reactions of flat systems and determine the stress values.
Personal competence: Social abilities and skills	Students solve mathematical problems in small groups. The students support each other. They discuss different mathematical solutions openly and critically.
Personal competence: Independence / autonomy)	Students manage their own academic and professional development in mathematics and mechanics efficiently. They assess their own abilities correctly and are able to acquire additional content, e.g. from books and video tutorials on the Internet.
Competence levels according to GQF	6
Prerequisites (see below)	-
Module specifics	Accompanying tutorials are offered for both courses
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Course unit title G1.1 364011 Mathematics 1

This course unit forms part of module G1, it is Compulsory.

Name of lecturer(s)	Prof. Dr. Manfred Laumen
Semester	1
Available in	winter semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Mathematics 1
Number of ECTS credits awarded	8.0
Contact hours per week (45 mins each)	6.0
Workload: Contact hours	90
Workload: Independent studies	110
Workload details	
Type of assessment	
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	Basic math test
Planned learning activities and teaching methods	• Lecture with self-study exercise • Lecture follow-up • Exercises- Attendance • Exam preparation
Professional competence: In-depth knowledge and comprehension (Bloom)	Students train mathematical ways of thinking and working. They acquire knowledge of mathematical theorems and their possible applications.
Professional competence : conative skills, analysis and synthesis of knowledge	Students master mathematical skills in order to efficiently solve problems in scientific and technical fields. This applies in particular to • the application of complex numbers,in alternating current application • the use of vectors, e.g. in technical mechanics, • the calculation of matrices and determinats , e.g. in control systems, vector analysis • the solution of linear systems of equations, e.g. in the modeling and solution of resistance networks, • the determination of sequences, series and limits for numerical sequences and series as the basis of analysis (see Mathematics 2).
Personal competence: Social abilities and skills	Students learn to work in groups and solve mathematical problems as a team.
Personal competence: Independence / autonomy	The students - deepen the questions of the lecture independently. - organize their own work processes effectively.
Competence levels according to GQF	6

Course unit contents	• Vector Algebra • Complex Numbers • Matrices and Derterminants • Systems of Linear Equations • Sequences, Series and Limits • Functions • Differential Calculus • Integral Calculus
Recommended optional programme components	Accompanying tutorials is offered.
Additional specifics	
Recommended or required reading	Westermann, Th..: Mathematics for Engineers: Volume I, 1. edition, Imath, 2021 Westermann, Th. : Mathematics for Engineers : Volume II, 2. edition, Imath, 2022 Weltern, K.: Weber, S.; Schuster, P.; Grosjean,J. : Mathematics for Physicists and Engineers, 2. edition, Springer, 2014
Scheduled	https://splan.hs-heilbronn.de/splan/
Combined assessments	Will be published in the first three weeks of lectures

Course unit title G1.2 364012 Mechanics 1

This course unit forms part of module G1, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Ekkehard Laqua
Semester	1
Available in	winter semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Mechanics 1
Number of ECTS credits awarded	2.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	20
Workload details	
Type of assessment	
Duration of assessment	60
Type of course unit	Compulsory
Prerequisites (see below)	None
Planned learning activities and teaching methods	• Lecture with integrated exercises • Self-study • Lecture preparation and follow-up • Working on exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	Students have a broad and integrated specialist knowledge in selected areas of engineering mechanics, in particular they can • calculate bearing reactions of plane systems (statically determined), • determine centers of gravity and • determine section and stress values of plane beam structures. They can compare the calculations and interpret them accordingly.
Professional competence : conative skills, analysis and synthesis of knowledge	The analytical methods for determining the bearing and internal forces of rigid bodies are taught. Students solve complex problems of rigid bodies using mathematical methods and analyze their mechanical behavior. They assess the suitability of mechanical constructs for their static load.
Personal competence: Social abilities and skills	See module description
Personal competence: Independence / autonomy	See module description
Competence levels according to GQF	6

Course unit contents	• Axioms of statics • Equilibrium conditions • Supports and intermediate supports • Calculations of plane systems • Plane trusses (bar structures) • Center of gravity • section and stress values of plane beam structures.
Recommended optional programme components	Students are recommended to attend the tutorial offered to support them.
Additional specifics	The course Mathematics 1 (364011) should also be attended.
Recommended or required reading	• Kessel S.; Fröhling, D:; Technische Mechanik - Engineering Mechanics, Bilingual Textbook on the Fundamentals of Solid Mechanics, Springer-Vieweg, Wiesbaden, 2012 • Gross, D.; Hauger, W.; et al.: Engineering Mechanics 1 - Statics, 2nd Edition, Springer Science+Business Media Dordrecht, Heidelberg, New York, London 2013 • Meriam, J. L. (James L.) Engineering mechanics, statics / J.L. Meriam, L.G. Kraige.—9th ed.,, Hoboken, Wiley, 2020 • lecture notes: E. Laqua • collection of formulas: E. Laqua
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Module G2 364020 Physics

Duration	Semester
Contact hours per week (45 mins each)	
Type of assessment	
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	
Module coordinator	Prof. Dr. rer. nat. Markus Scholle
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	The students know the basic terms, definitions, concepts and phenomena of classical physics and know their meaning for modern engineering. They understand the scientific way of thinking and implementation concept, they are able to transfer the method to a complex context and they can identify the important issues of physical-technical problems.
Professional competence: conative skills, analysis and synthesis of knowledge	The students have skills in simple physical modelling and are able to define mathematical-physical approaches for solutions. They can structure and analyse physical-technical tasks and are able to use scientific way of thinking and methods to solve the problems. They have the ability to evaluate different approaches of solving a problem and can define their validity.
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy)	The students learn the technical issues in a way of "leaded" autonomy by reworking the lessons in own speed, by independent solving of given tasks as well as by own practical investigations und verification of technical issues in the lab. With their knowledge they can independently classify, distinguish, express and solve physical-technical problems. They are able to gather relevant informations, to value them and to interpret them in an independent manner.
Competence levels according to GQF	
Prerequisites (see below)	No compulsory requirements. Although it is expected, that students have sufficent knowledge in basic (school-)mathematics.Depening on knowledge, the participation on "Brückenkurs Mathematik" before starting the studies is higly recommended.
Module specifics	The module is part of the basic study.
Scheduled	
Combined assessments	

Course unit title G2.1 364021 Physics

This course unit forms part of module G2, it is Compulsory.

Name of lecturer(s)	Prof. Dr. rer. nat. Markus Scholle
Semester	1
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Physics
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	60
Workload: Independent studies	65
Workload details	-
Type of assessment	
Duration of assessment	90
Type of course unit	Compulsory
Prerequisites (see below)	School Mathematics
Planned learning activities and teaching methods	Lecture
Professional competence: In-depth knowledge and comprehension (Bloom)	The students know the basic terms, definitions, concepts and phenomena of classical physics and know their meaning for modern engineering. They understand the scientific way of thinking and implementation concept, they are able to transfer the method to a complex context and they can identify the important issues of physical-technical problems.
Professional competence : conative skills, analysis and synthesis of knowledge	The students have skills in simple physical modelling and are able to define mathematical-physical approaches for solutions. They can structure and analyse physical-technical tasks and are able to use scientific way of thinking and methods to solve the problems. They have the ability to evaluate different approaches of solving a problem and can define their validity.
Personal competence: Social abilities and skills	In small groups the students work on tasks and physical problems and by that way the learn to perform as a team. They have the ability, using the technical terms of the course, to discuss technical and/or scientific issues with lectures as well as with fellow students and by that they are able to gain a more deeply unterstanding of the subject.
Personal competence: Independence / autonomy	The students learn the technical issues in a way of "leaded" autonomy by reworking the lessons in own speed and by independent solving of given tasks. With their knowledge they can independently classify, distinguish, express and solve physical-technical problems. They are able to gather relevant informations, to value them and to interpret them in an independent manner.
Competence levels according to GQF	6

Course unit contents	• Physical quantities and units • Newtonian mechanics • Thermodynamics • Fluid mechanics • Variational calculus: Fermat's and Hamilton's principle • Oscillations
Recommended optional programme components	Students are recommended to attend the tutorial offered to support them.
Additional specifics	None
Recommended or required reading	• Tipler, P. A.: Physics for Scientists and Engineers, Springer Spektrum, Heidelberg, 2015. • Schmidt, A.: Technical Thermodynamics for Engineers, Springer, 2019. • Alrasheed, S.: Principles of Mechanics, Fundamental University Physics, 2019. • Spurk, H-J and Aksel, N., S.: Fluid Mechanics, Springer, 2019. • Scholle M.: lecture notes, HS Heilbronn
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Module G3 364030 Electrical Engineering 1

Duration	Semester
Contact hours per week (45 mins each)	
Type of assessment	
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Dr. Alexander Pfannenstiel
Professional competence: In-depth knowledge and comprehension	-
Lerninhalte	-
Professional competence: In-depth knowledge and comprehension	The "Electrical Engineering" module provides students with a basic theoretical and practical understanding and analysis of electrical networks in direct and alternating current technology.Students learn about the calculation and analysis of electric and magnetic fields as well as complicated AC circuits with resonance and filtering properties through to three-phase systems.filtering properties through to three-phase systems. They will be able to recognize and deepen their theoretical knowledge by means of laboratory experiments.
Professional competence: conative skills, analysis and synthesis of knowledge	Students are proficient in dealing with the physical elements of the electrical circuit as well as the multimeter and oscilloscope measuring equipment.They also have a very broad spectrum and practical skills in electrical engineering. They compare and analyze findings in the fields ofengineering sciences and have the ability to apply the knowledge they have acquired.
Personal competence: Social abilities and skills	They are able to lead and guide groups in a targeted manner. They will be able to present the results of their work in an appropriate form and defend them professionally.Students are able to solve their own results from technical scientific tasks and can discuss these with lecturers and other fellow students.
Personal competence: Independence / autonomy)	They can independently describe engineering topics and calculate their values. They are able to work on technical problems in a solution-oriented manner and acquire the necessary knowledge independently.
Competence levels according to GQF	6
Prerequisites (see below)	None
Module specifics	-
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Course unit title G3.1 364031 Electrical Engineering 1

This course unit forms part of module G3, it is Compulsory.

Name of lecturer(s)	Dr. Alexander Pfannenstiel
Semester	1
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Electrical Engineering 1
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	60
Workload: Independent studies	65
Workload details	-
Type of assessment	
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	-
Planned learning activities and teaching methods	• Lecture with integrated exercises • Self-study: Lecture preparation and follow-up • Working on exercises • Literature study
Professional competence: In-depth knowledge and comprehension (Bloom)	Students have mastered the basics of passive and active circuit components, e.g. resistance, voltage sources and current sources. They have also learned the methods for analyzing electrical circuits with various wiring options. In addition, they know the basic forms for describing and analyzing electric and magnetic fields.
Professional competence : conative skills, analysis and synthesis of knowledge	Students can transfer what they have learned to related scientific disciplines. They are able to extend the methods they have learned and modify and apply them according to the problem.
Personal competence: Social abilities and skills	See module description
Personal competence: Independence / autonomy	See module description
Competence levels according to GQF	6
Course unit contents	• Basic concepts of electrical engineering • Two poles and sources • Direct current networks (parallel and series circuits) • Methods of network analysis • Electric potential field (structure and properties of the capacitor) • Introduction to the theory of the magnetic field structure • Properties of the coil and the transformer

Recommended optional programme components	-
Additional specifics	-
Recommended or required reading	• RAMANA PILLA. and M SURYA KALAVATHI: Basic Electrical Engineering, S Chand & Company Limited 2022. • Viktor Hacker and Christof Sumereder: Electrical Engineering Fundamentals, Verlag: De Gruyter, 2020. • Sergey N. Makarov, Reinhold Ludwig, and Stephen J. Bitar: Practical Electrical Engineering, Springer International Publishing, 2019 • JC. Olivier: Electrical Circuits: A Primer, Artech House, 2018.
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	-

Module G4 364040 Renewable Energy Technology

Duration	Semester
Contact hours per week (45 mins each)	
Type of assessment	Module examination consists of an individual examination covering all courses.
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Mohamed Ibrahim Prof. Dr.-Ing. Ekkehard Laqua
Professional competence: In-depth knowledge and comprehension	-
Lerninhalte	-
Professional competence: In-depth knowledge and comprehension	Students acquire knowledge about the special features of energy as a civilization and economic good. They gain an understanding of the relationships between renewable energy resources and energy conversion technologies. They acquire knowledge about the characteristics of various energy converters such as solar thermal energy, geothermal energy, photovoltaicsand wind power plants. They gain an insight into the evaluation of energy conversion processes. This will enable them to assess the further development and use of renewable energy resources. In particular, they are able tobe able to assess the performance of various renewable energy systems and combined heat and power generation on the basis of characteristic values.
Professional competence: conative skills, analysis and synthesis of knowledge	Students master the basic knowledge of energy technology and regenerative energy converters. Students have a very broad spectrum and practical skills in energy technology. They compare and analyze findingsin the field of engineering. Students have the ability to apply the knowledge they have acquired.
Personal competence: Social abilities and skills	Students are able to lead and guide group work in a targeted manner. They are able to present the results of team work in an appropriate form and represent them professionally.
Personal competence: Independence / autonomy)	Students can independently describe engineering topics and calculate their values. They are also able to work on technical problems in a solution-oriented manner and acquire the necessary knowledge independently.
Competence levels according to GQF	6
Prerequisites (see below)	None
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Course unit title G4.1 364041 Bioenergy, Geothermal Energy and Solar Thermal Energy

This course unit forms part of module G4, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Ekkehard Laqua
Semester	1
Available in	winter semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Bioenergy, Geothermal Energy and Solar Thermal Energy
Number of ECTS credits awarded	2.5
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	20
Workload details	-
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	None
Planned learning activities and teaching methods	• Lecture with integrated exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	After completing the module, students will have basic knowledge of individual application areas of renewable energy systems (solar thermal energy, bioenergy and geothermal energy). Students learn the most important tools for planning, designing and evaluating these energy systems.
Professional competence : conative skills, analysis and synthesis of knowledge	Students are proficient in dealing with the conversion processes of solar thermal energy, bioenergy and geothermal energy. Students have a very broad spectrum and practical skills in energy technology. They compare and analyze findings from the field of engineering sciences. Students have the ability to apply the knowledge they have acquired.
Personal competence: Social abilities and skills	See module description
Personal competence: Independence / autonomy	See module description
Competence levels according to GQF	6
Course unit contents	- Classification of renewable energies - Solar thermal energy - Solar thermal power generation - Geothermal energy - Biomass - Biogas

Recommended optional programme components	The course Photovoltaics, wind power (364042) should also be attended.
Additional specifics	None
Recommended or required reading	• Yang Peter: Renewable Energy,Springer Cham, 2024 • Hossain E., Petrovic S.: Renewable Energy Crash Course,Springer Cham, 2021 • Livescu S., Dindoruk B.: Geothermal Energy Engineering, Elsevier 2024 • Quaschning, V.: Regenerative Energiesysteme, , Hanser Verlag, 2024 • FNR (ed.): Guide to biogas, 6th edition, 2013 • Laqua, E.: lecture notes, HS-Heilbronn
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	-

Course unit title G4.2 364042 Photovoltaics and Wind Energy

This course unit forms part of module G4, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Mohamed Ibrahim
Semester	1
Available in	winter semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Photovoltaics and Wind Energy
Number of ECTS credits awarded	2.5
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	45
Workload details	-
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	None
Planned learning activities and teaching methods	• Lecture with integrated exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	After completing the course, students will have mastered the basic functions of photovoltaic and wind power systems. They acquire knowledge of the various system components. The students learn to implement aspects planning and installation of the systems. After this course, students will be able to evaluate such systems and calculate their energy yields. Students will acquire the most important basic knowledge of the regulation and control of photovoltaic and wind power systems.
Professional competence : conative skills, analysis and synthesis of knowledge	Students acquire basic knowledge of solar and wind energy conversion. They have a very broad spectrum and practical skills of energy conversion. They compare and analyze findings in the field of engineering. Students have the ability to apply the knowledge they have acquired.
Personal competence: Social abilities and skills	See module description
Personal competence: Independence / autonomy	See module description
Competence levels according to GQF	6

Course unit contents	• Basic knowledge of photovoltaic systems and wind power plants • Radiation supply and radiation calculation • Operating principle and technologies of photovoltaic cells • Electrical properties and equivalent circuit diagram of solar cells • Operating conditions, maintenance and planning of PV systems • Utilization of wind energy • Function of the wind turbine for power generation • Control, regulation and operational management of wind turbines
Recommended optional programme components	The course Bioenergy, geothermal and solar thermal energy (364041) should also be attended.
Additional specifics	None
Recommended or required reading	• Farhad Ilahi Bakhsh. et al: Photovoltaic Systems Technology, USA, Wiley, 2024. • Arya, Sandeep, and Mahajan, Prerna: Solar Cells; Types and Applications, Germany, Springer Nature Singapore, 2023. • Mertens, Konrad. Photovoltaics; Fundamentals, Technology, and Practice, UK, Wiley, 2018. • M. Kaltschmitt et al. (Hrsg.): Renewable Energy: Technology, Economics and Environmnt, Germany, Springer Berlin Heidelberg, 2010. • Manwell, James F., et al.: Wind Energy Explained; Theory, Design and Application, Germany, Wiley, 2010. • Heier, Siegfried: Grid Integration of Wind Energy; Onshore and Offshore Conversion Systems, UK, Wiley, 2014.
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	-

Module G5 364050 Languages 1

Duration	Semester
Contact hours per week (45 mins each)	
Type of assessment	Module grade (without examination) is made up of weighted individual performances
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Ekkehard Laqua
Professional competence: In-depth knowledge and comprehension	-
Lerninhalte	-
Professional competence: In-depth knowledge and comprehension	For participants without DSH-1: • German language skills with level B1 For participants with DSH-1 • additional language skills in any language • A course must be taken that builds on an existing entry level, which must be proven in a placement test at the beginning of the course.
Professional competence: conative skills, analysis and synthesis of knowledge	They can use the language flexibly and effectively in social life as well as in an academic and professional environment.
Personal competence: Social abilities and skills	They can: • understand a wide range of longer texts and recognize meanings. • express ideas without having to search too long for right expressions. • write clear, detailed texts on selected topics and use structures and means of structuring and linking texts appropriately.
Personal competence: Independence / autonomy)	They can work completely independently in an English or German-speaking environment.
Competence levels according to GQF	6
Prerequisites (see below)	For participants without DSH-1: • German language skills at level A2-1 For participants with DSH-1: • Placement test to determine the entry level for the selected language course
Module specifics	-
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Course unit title G5.1 364051 Languages 1

This course unit forms part of module G5, it is Compulsory.

Name of lecturer(s)	
Semester	1
Available in	winter semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Language 1
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	60
Workload: Independent studies	65
Workload details	-
Type of assessment	Preliminary examination based on a time-constraint written assignment
Duration of assessment	180
Type of course unit	Compulsory
Prerequisites (see below)	For participants without DSH-1: • German language skills at level A2-1 For participants with DSH-1: • Placement test to determine the entry level for the selected language course
Planned learning activities and teaching methods	Language didactics colloquium
Professional competence: In-depth knowledge and comprehension (Bloom)	For participants without DSH-1: • Written and oral knowledge of the German language at level B1, proven by a written examination (possibly with oral part), e.g. telc B1, Goethe Zertifikat B1, DSD I or equivalent For participants with DSH-1 • additional language skills in any language • A course must be taken that builds on an existing entry level, which must be proven in a placement test at the beginning of the course.
Professional competence : conative skills, analysis and synthesis of knowledge	see module description
Personal competence: Social abilities and skills	see module description
Personal competence: Independence / autonomy	see module description
Competence levels according to GQF	6

Course unit contents	For participants without DSH-1: - German language skills with level B1-1 For participants with DSH-1 - additional language skills in any language
Recommended optional programme components	Accompanying language courses outside the curriculum may be necessary.
Additional specifics	-
Recommended or required reading	-
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	-

Module G6 364060 Mathematics

Duration	Semester
Contact hours per week (45 mins each)	
Type of assessment	Module examination consists of an individual performance.
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Anke Ostertag
Professional competence: In-depth knowledge and comprehension	-
Lerninhalte	-
Professional competence: In-depth knowledge and comprehension	Students are familiar with vector algebra, functions, differential calculus, integral calculus, power series expansion and complex numbers. They can reproduce linear algebra, Fourier series and differential and integral calculus for functions of several variables as well as linear differential equations.
Professional competence: conative skills, analysis and synthesis of knowledge	Students can apply the mathematical basics from vector algebra to linear differential equations. They can apply their knowledge to technical and economic problems.
Personal competence: Social abilities and skills	Students solve mathematical problems in small groups. The students support each other. They discuss different mathematical solutions openly and critically.
Personal competence: Independence / autonomy)	Students manage their own academic and professional development in mathematics efficiently. They assess their own abilities correctly and are able to acquire additional content, e.g. from books and video tutorials on the Internet.
Competence levels according to GQF	6
Prerequisites (see below)	-
Module specifics	Accompanying tutorial is offered.
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Course unit title G6.1 364061 Mathematics 2

This course unit forms part of module G6, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Anke Ostertag
Semester	2
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Mathematics 2
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	60
Workload: Independent studies	65
Workload details	-
Type of assessment	
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	None
Planned learning activities and teaching methods	• Lecture with integrated exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	Students know Taylor series and Fourier series. They can describe functions of several variables and theirintegration and differentiation. They can reproduce linear differential equations.
Professional competence : conative skills, analysis and synthesis of knowledge	Students can solve technically relevant problems with the help of Taylor and Fourier series. They applythe differentiation and integration of functions with several variables. They can solve linear differential equations.
Personal competence: Social abilities and skills	Students solve mathematical tasks independently in learning teams within the exercise units of the lecture and outside the lecture. Students support each other. They provide technical guidance to other students. Theyopenly and critically discuss different approaches, solutions and sources of error.
Personal competence: Independence / autonomy	Students can reflect on and evaluate their own learning and work objectives and pursue them in a self-directed manner. They see the consequences for the work processes in their learning teams and implement them efficiently accordingly.
Competence levels according to GQF	6
Course unit contents	• Taylor series, Fourier series • Functions of several variables • Partial differentiation • Multiple integrals • Differential equations

Recommended optional programme components	Students are recommended to attend the tutorial offered to support them.
Additional specifics	None
Recommended or required reading	Westermann, Th..: Mathematics for Engineers: Volume I, 1. edition, Imath, 2021 Westermann, Th. : Mathematics for Engineers : Volume II, 2. edition, Imath, 2022 Weltern, K.: Weber, S.; Schuster, P.; Grosjean,J. : Mathematics for Physicists and Engineers, 2. edition, Springer, 2014
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Module G7 364070 Material Science and Mechanics

Duration	Semester
Contact hours per week (45 mins each)	
Type of assessment	Module examination consists of an individual examination covering all courses.
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Ekkehard Laqua
Professional competence: In-depth knowledge and comprehension	-
Lerninhalte	-
Professional competence: In-depth knowledge and comprehension	The module Materials Science and Mechanics is designed to provide students with a broad and integrated knowledge of the engineering fundamentalsfor the fields of technical mechanics and materials science. Students acquire in-depth theoretical knowledge of technically relevant materials and can describe their suitability for defined areas of application. In the field of technical mechanics, students can derive the equations for the behavior of mechanical systems using the principles of technical mechanics and apply the methods for solving the systems of equations. They understand the relationships between different mechanical structures and are able to assess these in an interdisciplinary manner.
Professional competence: conative skills, analysis and synthesis of knowledge	Students have a very broad spectrum of specialized cognitive and practical skills in engineering mechanics and materials science. They transfer knowledge to other areas of engineering.
Personal competence: Social abilities and skills	Students work on technical tasks in small groups and participate interactively in the lecture. They discuss their findings with other students and are thus enabled to communicate engineering issues with their peers.
Personal competence: Independence / autonomy)	The lecture content is to be deepened and consolidated through self-study exercises. Students are able to solve tasks from the course independently.
Competence levels according to GQF	6
Prerequisites (see below)	None
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	-

Course unit title G7.1 364071 Material Science

This course unit forms part of module G7, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Ekkehard Laqua
Semester	2
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Material Science
Number of ECTS credits awarded	2.5
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	20
Workload details	-
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	-
Planned learning activities and teaching methods	• Lecture with integrated exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	Students have a broad and integrated specialist knowledge in selected areas of materials science.In particular, they are able to place the mechanical and electrical properties of materials in an overall context.place them in an overall context. By knowing the properties of materials, they are able to assess their suitability for different applications.
Professional competence : conative skills, analysis and synthesis of knowledge	They are able to plan areas of application for materials across the board and assess them, taking into account alternative courses of action and interactions with neighboring areas.
Personal competence: Social abilities and skills	See module description
Personal competence: Independence / autonomy	See module description
Competence levels according to GQF	6
Course unit contents	• Fundamentals of the mechanical behavior of materials • Fundamentals of the electrical behavior of materials • Conductive materials • Resistive materials • Semiconductors • Insulating and dielectric materials
Recommended optional programme components	The course Mechanics 2 (364072) should also be attended.

Additional specifics	None
Recommended or required reading	• Callister W., Rethwisch, D.; Materials science and engineering : an introduction , 10th edition, Hoboken, NJ , Wiley, 2018 • Perez, N.; Materials Science: Theory and Engineering, Springer, Cham, Switzerland, 2024 • Laqua Ekkehard, Lecture notes for the Materials Science lecture, HS Heilbronn
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Course unit title G7.2 364072 Mechanics 2

This course unit forms part of module G7, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Anke Ostertag
Semester	2
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Mechanics 2
Number of ECTS credits awarded	2.5
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	45
Workload details	-
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	-
Planned learning activities and teaching methods	• Lecture with integrated exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	Students have a broad and integrated specialist knowledge in selected areas of technical mechanics. In particular, they know how to calculate stresses in simple elastostatics problems, they have knowledge of the calculation of stresses and equivalent stresses and of plane kinematics.
Professional competence : conative skills, analysis and synthesis of knowledge	Students will be able to apply stress calculation to complex practical problems in the field of elastostatics. They can calculate the stresses and comparative stresses of technical problems and thus assess the system and design it for given requirements.
Personal competence: Social abilities and skills	See module description
Personal competence: Independence / autonomy	See module description
Competence levels according to GQF	6
Course unit contents	Elasto-Statics/ Strength of materials - Tension and compression bars - Stresses in straight bending of homogeneous beams - Torsion of bars- Dimensioning / strength verification of components Kinematics - One-dimensional movement - Movement of a point in space
Recommended optional programme components	The course Material Science (364071) should also be attended. Accompanying tutorials for mechanics 2 is offered.

Additional specifics	None
Recommended or required reading	• K. Bhaskar, T. K. Varadan; Strength of Materials, Springer Cham, 2023 • Molotnikov V, Molotnikova A.; Theory of Elasticity and Plasticity, Springer Cham, 2021 • Kessel S.; Fröhling, D:; Technische Mechanik - Engineering Mechanics, Bilingual Textbook on the Fundamentals of Solid Mechanics, Springer-Vieweg, Wiesbaden, 2012 • Gross, D.; Hauger, W.; et al.: Engineering Mechanics 2 - Mechanics of Materials, Berlin, Heidelberg : Springer, 2018
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	-

Module G8 364080 Electrical Engineering 2

Duration	Semester
Contact hours per week (45 mins each)	
Type of assessment	Module examination consists of an individual performance with laboratory work as preliminary work.
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Mohamed Ibrahim
Professional competence: In-depth knowledge and comprehension	-
Lerninhalte	-
Professional competence: In-depth knowledge and comprehension	The "Electrical Engineering" module provides students with a basic theoretical and practical understanding and analysis of electrical networks in direct and alternating current technology.Students learn about the calculation and analysis of electric and magnetic fields as well as complicated AC circuits with resonance and filtering properties through to three-phase systems.filtering properties through to three-phase systems. They will be able to recognize and deepen their theoretical knowledge by means of laboratory experiments.
Professional competence: conative skills, analysis and synthesis of knowledge	Students are proficient in dealing with the physical elements of the electrical circuit as well as the multimeter and oscilloscope measuring equipment.They also have a very broad spectrum and practical skills in electrical engineering. They compare and analyze findings in the fields ofengineering sciences and have the ability to apply the knowledge they have acquired.
Personal competence: Social abilities and skills	They are able to lead and guide groups in a targeted manner. They will be able to present the results of their work in an appropriate form and defend them professionally.Students are able to solve their own results from technical scientific tasks and can discuss these with lecturers and other fellow students.
Personal competence: Independence / autonomy)	They can independently describe engineering topics and calculate their values. They are able to work on technical problems in a solution-oriented manner and acquire the necessary knowledge independently.
Competence levels according to GQF	6
Prerequisites (see below)	None
Module specifics	-
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Course unit title G8.1 364081 Electrical Engineering 2

This course unit forms part of module G8, it is Compulsory.

Name of lecturer(s)	Dr. Alexander Pfannenstiel
Semester	2
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Electrical Engineering 2
Number of ECTS credits awarded	2.5
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	45
Workload details	
Type of assessment	
Duration of assessment	90
Type of course unit	Compulsory
Prerequisites (see below)	Electrical engineering 1 recommended
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	Students can transfer what they have learned to related scientific disciplines. They are able to extend the methods they have learned and modify and apply them according to the problem.
Personal competence: Social abilities and skills	See module description
Personal competence: Independence / autonomy	See module description
Competence levels according to GQF	6
Course unit contents	
Recommended optional programme components	Participation in the Electrical Engineering 2 laboratory is strongly recommended.
Additional specifics	

Recommended or required reading	• RAMANA PILLA. and M SURYA KALAVATHI: Basic Electrical Engineering, S Chand & Company Limited 2022. • Viktor Hacker and Christof Sumereder: Electrical Engineering Fundamentals, Verlag: De Gruyter, 2020. • Sergey N. Makarov, Reinhold Ludwig, and Stephen J. Bitar: Practical Electrical Engineering, Springer International Publishing, 2019 • JC. Olivier: Electrical Circuits: A Primer, Artech House, 2018.
Scheduled	
Combined assessments	

Course unit title G8.2 364082 Electrical Engineering Laboratory

This course unit forms part of module G8, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Mohamed Ibrahim
Semester	2
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Electrical Engineering Laboratory
Number of ECTS credits awarded	2.5
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	15
Workload: Independent studies	35
Workload details	-
Type of assessment	Preliminary examination based on a laboratory report
Duration of assessment	
Type of course unit	Compulsory
Prerequisites (see below)	Electrical engineering 1 and 2 recommended
Planned learning activities and teaching methods	Laboratory experiments with exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	Students master the use of measuring devices/instruments and the basic skills required for setting up experiments. In addition, they can interpret the measurement results and check their accuracy. Students will be able to independently set up, commission and measure DC and AC circuits proparties. They will be able to analyze and explain the results.
Professional competence : conative skills, analysis and synthesis of knowledge	Laboratory practicals are used to consolidate lectures and exercises and to teach the subject matter in electrical engineering.Students are able to analyze and evaluate the measurement results generated.
Personal competence: Social abilities and skills	Students are proficient in working in small groups. They work cooperatively and communicate theirresults in a comprehensible manner for a specialist audience. They are able to act quickly and keep themselves and their partners safe in the event of electronic current hazards and in a laboratory. Students will be able to independently set up, commission and measure AC circuits. They will be able to analyze and explain the results.
Personal competence: Independence / autonomy	Students plan and complete their experiments based on independent time and self-management.
Competence levels according to GQF	6

Course unit contents	• Handling measuring devices and electrical engineering instruments • Setting up circuits with parallel and series resistors • Use of voltage sources in the circuit • Recording typical circuit properties • Evaluation of measured variables from multimeters and oscilloscopes. • Passive components on alternating current • Oscilloscope in analog and digital storage mode • Switching processes on inductors and capacitance elements • Measurement of the time constant of LC and RC elements • Measurements on basic diode and OP circuits; recording characteristic values
Recommended optional programme components	-
Additional specifics	-
Recommended or required reading	• Test description
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	-

Module G9 364090 Fundamentals of Information technology

Duration	Semester
Contact hours per week (45 mins each)	
Type of assessment	Module examination consists of an individual performance.
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The number of credits specified for the sub-modules is only awarded if the specified examination has been successfully completed.
Module coordinator	Prof. Dr. Gertraud Peinel
Professional competence: In-depth knowledge and comprehension	-
Lerninhalte	-
Professional competence: In-depth knowledge and comprehension	
Professional competence: conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	Students learn the ability to work in teams by forming small groups to solve programming tasks.
Personal competence: Independence / autonomy)	
Competence levels according to GQF	6
Prerequisites (see below)	
Module specifics	
Scheduled	Timetable: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Course unit title G9.1 364091 Applied Computer Science

This course unit forms part of module G9, it is Compulsory.

Name of lecturer(s)	Prof. Dr. Gertraud Peinel
Semester	2
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Applied Computer Science
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	60
Workload: Independent studies	65
Workload details	-
Type of assessment	
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	-
Planned learning activities and teaching methods	Teaching method: Lecture with discussions; exercises in individual and group work; Learning methods: Preparation and follow-up work based on the lecture slides, independent solving of additional tasks, literature study
Professional competence: In-depth knowledge and comprehension (Bloom)	Students have learned the basics of software & software development, algorithms and programming languages.They know what programs consist of and have learned how algorithms are formulated and implemented using the example of sorting algorithms. Students know the basic concepts of object-oriented programming using a common programming language. They learn how to use a software development environment for programming.They have learned how to design and implement small programs and its user interfaces and can both explain the concept of debugging as well as use themselves its methods.Students know how algorithms are implemented in a program.Students recognize the need to develop software products in an engineering manner using project management methods and software processes. They can name important tasks of the software development process. Students learn the terms and methods of software engineering.
Professional competence : conative skills, analysis and synthesis of knowledge	You can work independently with a software development environment and develop and test programs in a common programming language.You can independently design and implement user interfaces.
Personal competence: Social abilities and skills	Students learn the ability to work in teams by forming small groups to solve programming tasks.

Personal competence: Independence / autonomy	Students learn to solve given tasks (programming tasks) independently and to discuss different results (algorithms and user interfaces) critically.
Competence levels according to GQF	6
Course unit contents	Learning objectives: Understanding the basics of software development: • Fundamentals of software, algorithms, programming languages • Terminology of software development and the software development process • Fundamentals of object-oriented programming • Use of a software development environment • Design and implementation of user interfaces • Usability of software • Debugging • Implementation of special algorithms (backtracking, recursion) • Understanding the necessity of software engineering
Recommended optional programme components	-
Additional specifics	-
Recommended or required reading	• Ken Carney: Visual Basic .NET: for Complete Beginners (English Edition), https://www.homeandlearn.co.uk/NET/vbNet.html, https://dokumen.pub/visual-basic-net-for-complete-beginners.html • freeCodeCamp.org: Visual Basic (VB.NET) – Full Course for Beginners, https://www.youtube.com/watch?v=HFWQdGn5DaU • Virginia Cooper, Ray Yao: Visual Basic Programming, Real World Code & Explanations, For Beginners, Visual Basic Reference, Visual Basic for Application, Independently published (27. Februar 2024), https://www.amazon.de/-/en/Flask-C-Netty/dp/B08FP9XH7H • Ian Sommerville: Software Engineering, Pearson, 2021 update
Scheduled	Timetable: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Module G10 364100 Fundamentals of Energy Supply

Duration	Semester
Contact hours per week (45 mins each)	
Type of assessment	Module examination consists of an individual examination covering all courses.
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Anke Ostertag
Professional competence: In-depth knowledge and comprehension	-
Lerninhalte	-
Professional competence: In-depth knowledge and comprehension	Students learn about various technical, economic and ecological aspects of energy supply and energy management. They are also familiar with the special features of supply networks and can combine this into an overall picture.
Professional competence: conative skills, analysis and synthesis of knowledge	Students will be able to examine problems and interrelationships in the energy industry and present the results clearly. They are able to assess energy systems, energy price concepts, business models and environmental impacts in a comparative manner and formulate requirements for an energy system of the present and future.
Personal competence: Social abilities and skills	Students solve challenging tasks from the specialist areas of liberalized energy and raw materials markets, environmental economicsand environmental management in learning groups and as part of self-study units. They support each other and discuss openly and critically.
Personal competence: Independence / autonomy)	Students can reflect on and evaluate their own learning and work objectives and pursue them in a self-directed manner. They see the consequences for the work processes in their learning teams and implement them efficiently accordingly. They correctly assess their own abilities and are able to acquire advanced content.
Competence levels according to GQF	6
Prerequisites (see below)	None
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	-

Course unit title G10.1 364101 Liberalized Energy and Raw Materials Market

This course unit forms part of module G10, it is Compulsory.

Name of lecturer(s)	Prof. Dr. rer. pol. Jürgen Antony
Semester	2
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Liberalized Energy and Raw Materials Market
Number of ECTS credits awarded	2.5
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	20
Workload details	-
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	None
Planned learning activities and teaching methods	• Lecture with integrated exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	Students acquire basic and in-depth knowledge of the various energy markets. They are familiar with the trading centers, the price-determining factors and the relevant players on the markets. Furthermore, students gain knowledge of the changes in business models due to the liberalization of grid-bound energy.
Professional competence : conative skills, analysis and synthesis of knowledge	Students are able to assess the requirements for an energy system of the future and can independently formulate approaches for successful business models of the future.
Personal competence: Social abilities and skills	Students solve challenging tasks in the field of liberalized energy and commodity markets in learning groups and as part of self-study units. They support each other and discuss openly and critically.
Personal competence: Independence / autonomy	Students can reflect on and evaluate their own learning and work objectives and pursue them in a self-directed manner. They see the consequences for the work processes in their learning teams and implement them efficiently accordingly. They correctly assess their own abilities and are able to acquire advanced content.
Competence levels according to GQF	6

Course unit contents	• General conditions for grid-bound energies • Pricing on the EEX (European Energy Exchange) • Energy transportation and distribution • Pricing at the end customer, taking into account special aspects • Models and parameters of price forecasting • Business models in the energy industry
Recommended optional programme components	None
Additional specifics	None
Recommended or required reading	• Welmer F. et al.; Raw Materials for Future Energy Supply, Springer Cham, 2018 • Ian Parry,Dirk Heine, Eliza Lis, and Shanjun Li; Getting energy priccs right : from principle to practice, Washington, D.C., International Monetary Fund, 2014
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Course unit title G10.2 364102 Public Supply Grids

This course unit forms part of module G10, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Ekkehard Laqua
Semester	2
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Public Supply Grids
Number of ECTS credits awarded	2.5
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	45
Workload details	-
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	None
Planned learning activities and teaching methods	• Lecture with integrated exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	Students know the origin of the different energy sources. They have a broad and integrated knowledge of the technical requirements and properties of supply networks. They are able to describe individual components of the distribution networks and combine what they have learned into an overall picture.
Professional competence : conative skills, analysis and synthesis of knowledge	Students have a very broad spectrum of methods for working on problems in the subject of supply networks. On this basis, they can investigate problems and relationships in the field of supply networks using scientific methods and present the results clearly. They can compare the technical requirements and properties of different networks and analyze problems independently.
Personal competence: Social abilities and skills	Students support each other and provide technical guidance to others in solving tasks in the supply networks. They openly and critically discuss different solution approaches in learning groups within the lecture and outside in self-study units.
Personal competence: Independence / autonomy	Students can reflect on and evaluate their own learning and work objectives and pursue them in a self-directed manner. They see the consequences for the work processes in their learning teams and implement them efficiently accordingly.
Competence levels according to GQF	6

Course unit contents	• Raw materials • Water management • Electricity grids • Natural gas grids • Oil grids
Recommended optional programme components	None
Additional specifics	None
Recommended or required reading	• Coffelt, Donald; Hendrickson, Chris: Fundamentals of Infrastructure Management. Carnegie Mellon University, 2018 • BGR: Energy Study 2023; Federal Institute for Geosciences and Natural Resources (BGR) Hannover, 2023 • Jose´ Luiz de Franc¸a Freire et. al.: Handbook of Pipeline Engineering, ABCM, Springer 2024, • Laqua, E. Hochschule Heilbronn, Lecture notes:
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Module G11 364000 Languages 2

Duration	Semester
Contact hours per week (45 mins each)	
Type of assessment	Module grade (without examination) is made up of weighted individual performances
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	
Professional competence: In-depth knowledge and comprehension	-
Lerninhalte	-
Professional competence: In-depth knowledge and comprehension	For participants without DSH-1: • German language skills with level B2-1 For participants with DSH-1 • additional language skills in any language • A course must be taken that builds on an existing entry level, which must be proven in a placement test at the beginning of the course.
Professional competence: conative skills, analysis and synthesis of knowledge	They can use the language flexibly and effectively in social life as well as in an academic and professional environment.
Personal competence: Social abilities and skills	They can: • understand a wide range of demanding, longer texts, and recognize implicit meaning. • express ideas fluently and spontaneously without much obvious searching for expressions • produce clear, well-structured, detailed text on complex subjects, showing controlled use of organizational patterns, connectors and cohesive devices.
Personal competence: Independence / autonomy)	They can work completely independently in an English and German-speaking environment.
Competence levels according to GQF	6
Prerequisites (see below)	For participants without DSH-1: • German language skills at level B1 For participants with DSH-1: • Placement test to determine the entry level for the selected language course
Module specifics	-
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Course unit title G11.1 364001 Languages 2

This course unit forms part of module G11, it is Compulsory.

Name of lecturer(s)	
Semester	2
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Language 2
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	60
Workload: Independent studies	65
Workload details	-
Type of assessment	Preliminary examination based on a combination of assessments; concluded by a time-constraint written assignment
Duration of assessment	180
Type of course unit	Compulsory
Prerequisites (see below)	For participants without DSH-1: • German language skills at level B1 For participants with DSH-1: • Placement test to determine the entry level for the selected language course
Planned learning activities and teaching methods	Language didactics colloquium
Professional competence: In-depth knowledge and comprehension (Bloom)	For participants without DSH-1: • Written and oral knowledge of the German language at level B2, proven by a written examination (possibly with oral part), e.g. telc B2, Goethe Zertifikat B2, DSD II, TestDaF 3, DSH 1 or equivalent For participants with DSH-1 • additional language skills in any language • A course must be taken that builds on an existing entry level, which must be proven in a placement test at the beginning of the course.
Professional competence : conative skills, analysis and synthesis of knowledge	see module description
Personal competence: Social abilities and skills	see module description
Personal competence: Independence / autonomy	see module description
Competence levels according to GQF	6

Course unit contents	For participants without DSH-1: - German language skills with level B2-1 F For participants with DSH-1 - additional language skills in any language
Recommended optional programme components	Accompanying language courses outside the curriculum may be necessary.
Additional specifics	-
Recommended or required reading	-
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Advanced studies

Module H1 364110 Automation and Communication Technology

Duration	Semester
Contact hours per week (45 mins each)	4
Type of assessment	Module examination consists of an individual examination covering all courses.
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Anke Ostertag
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	Students have a broad and integrated knowledge of the relevant areas of communication technology. They can reproduce the practical application in PLC programming and combine it with the knowledge of communication technology. They know analog and digital modulation methods and can classify them. Students know the basics ofof wired and wireless transmission technologies. Students know the requirements for different communication systems in automation technology. For thefield buses are frequently used today to connect sensors and actuators to control systems. Students are familiar with the applications of such bus systems for both industrial and building automation. This knowledge is consolidated in practical exercises in a laboratory.
Professional competence: conative skills, analysis and synthesis of knowledge	Students can apply their knowledge of relevant areas of automation and communication technology and implement simple PLC programs in practical technical examples.
Personal competence: Social abilities and skills	Students work responsibly in small groups. They discuss and solve challenging communication technology tasks together. Students can support each other in solving the tasks. They discuss different solutions openly and critically.
Personal competence: Independence / autonomy)	They can reflect on and evaluate their own learning and work goals and pursue them in a self-directed manner. They correctly assess their own abilities and are able to acquire advanced content.
Competence levels according to GQF	6
Prerequisites (see below)	Applied Computer Science (364091) recommended
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	-

Course unit title H1.1 364111 Automation Systems

This course unit forms part of module H1, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Ekkehard Laqua
Semester	3
Available in	winter semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Automation Systems
Number of ECTS credits awarded	2.5
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	45
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	Applied Computer Science (364091) recommended
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H1.2 364112 Communication Technology

This course unit forms part of module H1, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Anke Ostertag
Semester	3
Available in	winter semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Communication Technology
Number of ECTS credits awarded	2.5
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	20
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	Applied Computer Science (364091) recommended
Planned learning activities and teaching methods	• Lecture with integrated exercises • Self-study • Follow-up of the lecture • Exercises • Literature study • Accompanying exam preparation
Professional competence: In-depth knowledge and comprehension (Bloom)	Students have knowledge of standardization. They know different types of coding, compression and modulation processes. They will be able to reproduce data backup and encryption. They are familiar with bus access methods and wireless networks. They can combine the knowledge of the different areas into coherent communication systems.
Professional competence : conative skills, analysis and synthesis of knowledge	Students can reflect on their broad knowledge of communication technology in practical examples. They can analyze and assess the individual procedures in a complete communication technology system.
Personal competence: Social abilities and skills	Students work responsibly in small groups. They discuss and solve challenging tasks from the field of communication technology together. Students can support each other in solving the tasks. They discuss different solutions openly and critically.
Personal competence: Independence / autonomy	They can reflect on and evaluate their own learning and work goals and pursue them in a self-directed manner. They correctly assess their own abilities and are able to acquire advanced content.
Competence levels according to GQF	6

Course unit contents	• Standardization • Topology and data transmission • Synchronization and multiplexing • Modulation • Coding • Compression • Data backup • Encryption • Bus access methods • Wireless/ wireless networks
Recommended optional programme components	The course Automation Systems (364111) should also be attended.
Additional specifics	
Recommended or required reading	• Cowley,J.: Communications and Networking, Springer, 2.edition, 2012 • Hercog, D.: Communication Protocols: Principles, Methods and Specifications, Springer, 2021 • Gibson, J.D.: Analog Communications Springer, 1. edition, 2023 • Gibson, J.D.: Digital Communications , SPringer 1. edition, 2023
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Module H2 364120 Electronics and Measurement Technology

Duration	Semester
Contact hours per week (45 mins each)	4
Type of assessment	Module examination consists of an individual performance.
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Ekkehard Laqua
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	The measurement and control technology module is designed to impart a broad and integrated knowledge including the scientific fundamentals of measurement and control technology.Students learn how to use sensors and connect them to the measuring equipment. They develop a critical understanding of the theories and methods used, particularly with regard to suitability and error analysis.Students will be able to analyze and evaluate different controlled systems. They will be able to select and design suitable controllers for the application. Students acquire in-depth specialist knowledge of control engineering and can describe its suitability for specific areas of application. They understand the relationships between different control elements and can identify these across disciplines. Through the laboratory component, students use modern simulation tools to describe practical examples and can examine their behavior.
Professional competence: conative skills, analysis and synthesis of knowledge	Students learn the basics, terms, key figures and models of measurement and sensor technology. They can use the skills they have acquired to investigate problems and correlations from other areas using scientific methods and present the results clearly and comprehensibly. Students are able to compare different sensors and measuring systems and assess their suitability for the respective measuring task based on their characteristic features.Students have a very broad range of practical skills in control engineering. They can independently describe the mode of operation of the closed control loop and select and set a controller type. They compare findings from the field of engineering. They analyze inindependently analyze simple electrical and mechanical control systems in laboratory exercises. You will design and examine appropriate controller types.
Personal competence: Social abilities and skills	Students work on the tasks in small groups and participate interactively in the lecture. They discuss their findings with other students and are thus enabled to communicate engineering issues with their peers.
Personal competence: Independence / autonomy)	The students consolidate and deepen the questions of the lecture independently through self-study exercises.
Competence levels according to GQF	6
Prerequisites (see below)	Electrical Engineering 1 (364030) and Electrical Engineering 2 (364080) recommended

Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Course unit title H2.1 364121 Electronics and Measurement Technology

This course unit forms part of module H2, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Ekkehard Laqua
Semester	3
Available in	winter semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Electronics and Measurement Technology
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	60
Workload: Independent studies	65
Workload details	
Type of assessment	
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	Electrical Engineering 1 (364030) and Electrical Engineering 2 (364080) recommended
Planned learning activities and teaching methods	• Lecture with integrated exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	Students have a broad and integrated specialist knowledge in the field of electrical measurement and sensor technology, in particular they learn analog and digital measurement methods of electrical quantities and the various sensor principles for converting physical quantities into electrical quantities.Students acquire a general overview of sensor production and sensor principles and are able to assess the principles with regard to their suitability for the measurement task at hand.They develop a critical understanding of the assessment of measurement results with regard to measurement deviation and uncertainty.
Professional competence : conative skills, analysis and synthesis of knowledge	Students learn the basic building blocks of electrical measurement technology and can analyze and assess which measurement method to use depending on the task. They can examine and evaluate each measurement for measurement deviation and measurement uncertainty and make recommendations.Students can select a suitable sensor principle for a given measurement problem from a cross-section of industrially used sensor technologies, taking into account the boundary conditions.the boundary conditions. In particular, they are able to familiarize themselves independently with unfamiliar sensor technologies and apply them to their tasks.
Personal competence: Social abilities and skills	Students learn to critically scrutinize measurement results and thus acquire the ability to criticize and self-reflect.
Personal competence: Independence / autonomy	see module description

Competence levels according to GQF	6
Course unit contents	• Introduction • Characterization of measurement signals • Measurement methods and setup • Measurement deviation and measurement uncertainty • Measurement of current and voltage • Measurement of ohmic, reactance and impedance • Power and energy measurement • Temperature measurement • Displacement measurement • Rotational speed and velocity measurement • Strain measurement • Force-mass determination • Pressure measurement • Flow measurement • Vibration measurement • Moisture measurement
Recommended optional programme components	None
Additional specifics	None
Recommended or required reading	• Czichos, Horst: Measurement, Testing and Sensor Technology, Springer, Cham, 2018 • Bengtsson Lars; Electrical Measurement Techniques, Springer, Singapore, 2024 • Fraden,Jacob: Handbook of Modern Sensors, Springer, Cham, 2016 • Parthier, Rainer.: Messtechnik , 10. Auflage, Springer Vieweg, Wiesbaden 2020 • Schrüfer, E.: Elektrische Messtechnik, 13. Auflage, HanserVerlag, Leipzig, 2020 • Laqua E, lecture notes, HS-Heilbronn
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Module H3 364130 Sustainable Energy Technology

Duration	Semester
Contact hours per week (45 mins each)	4
Type of assessment	Module examination consists of an individual examination covering all courses.
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Ekkehard Laqua
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	The Energy Management module serves to impart a broad and integrated knowledge including the scientific fundamentals in the field of energy supply optimization,load management and automation systems. Students are able to familiarize themselves with specific energy management tasks and carry out technical and organizational energy management in the operation of buildings and industrial plants. They also acquire basic knowledge in the field of automation systems.
Professional competence: conative skills, analysis and synthesis of knowledge	Students apply their findings from this module to improve the energy consumption of buildings. They analyze the energy consumption of an object in a structured approach and develop measures to reduce energy consumption.energy consumption. They use automated load management systems and evaluate the success of their measures.
Personal competence: Social abilities and skills	Students have a very broad spectrum of specialized cognitive and practical skills. Students solve challenging tasks in the field of energy management and must represent their recommendations to decision-makers in a competent and argumentative manner.
Personal competence: Independence / autonomy)	The lecture content is to be deepened and consolidated through self-study exercises. The students are able to independently solve tasks from the course and acquire additional content.
Competence levels according to GQF	6
Prerequisites (see below)	None
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title H3.1 364131 Optimizing of Energy Supply

This course unit forms part of module H3, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Ekkehard Laqua
Semester	3
Available in	winter semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Optimizing of Energy Supply
Number of ECTS credits awarded	2.5
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	45
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	The course Demand Side Management (364132) should also be attended. The courses of the module Technical thermodynamics (3641140) should also be attended.
Additional specifics	

Recommended or required reading	• Durmus Kaya et al.: Energy Management and Energy Efficiency in Industry, Springer Nature Switzerland AG 2021 • Mathew V.K. et al.: Energy Storage Systems,Springer Singapore, 2022 • Lehner, Markus et al.: Power-to-Gas: Technology and Business Models, Springer Cham 2014 • Dabija ,Ana-Maria:Energy Efficient Building Design, Springer Cham, 2020 • Pehnt, M.: Energy efficiency, 1st edition, Springer Verlag, 2010 • Laqua E: Lecture notes, HS-Heilbronn
Scheduled	
Combined assessments	

Course unit title H3.2 364132 Demand Side Management

This course unit forms part of module H3, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Ekkehard Laqua
Semester	3
Available in	winter semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Demand Side Management
Number of ECTS credits awarded	2.5
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	20
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	Module Fundaments of Energy Supply (364100) recommended
Planned learning activities and teaching methods	• Lecture with integrated exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	Students have a broad and integrated specialist knowledge in the field of load management, in particular they learn to familiarize themselves with specific energy management tasks and to implement energy management in the operation of buildings and systems in technical and organizational terms. They know and master the application of basic organizational and technical methods of energy consumption recording, energy consumption evaluation and associated controlling instruments.
Professional competence : conative skills, analysis and synthesis of knowledge	Students determine the energy costs of a property and work out how to reduce them. They use the possibilities of load profile analysis using suitable data acquisition systems and can assess and propose measures to reduce loads. Students will be able to apply the procedure of the energy management standard DIN ISO 50001.
Personal competence: Social abilities and skills	see module description
Personal competence: Independence / autonomy	Students acquire methodological skills through the energy management approach in accordance with the standard, which can also be transferred to other areas.
Competence levels according to GQF	6

Course unit contents	• Energy costs and ways to reduce them • Guidelines for operational energy management • Selected examples • Tariff models • Load management in electrical grids • Energy management standard 50001 • Energy management and energy data acquistion
Recommended optional programme components	The course Optimization of energy supply (364131) should also be attended.
Additional specifics	None
Recommended or required reading	• Djaffar Ould Abdeslam: Smart Meters, Artificial Intelligence to Support Proactive Management of Energy Consumption, Springer Cham, 2023 • Sturm, Christine: Inside the Energiewende, Springer Cham, 2020 • Roosa, Stephan: • Energy Management Handbook, Taylor & Francis Ltd; 9th ed, 2018 • Hessel, V.: Energy Management, Siemens, 2008 • BMU brochure: DIN EN 50001, Energy management systems in practice - A guide for companies and organizations, 2013 • Laqua, E., lecture notes, HS Heilbronn
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Module H4 364140 Technical thermodynamics

Duration	Semester
Contact hours per week (45 mins each)	4
Type of assessment	Module examination consists of an individual examination covering all courses.
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Anke Ostertag
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	The students know the most important basics of thermodynamics, heat transfer and fluid mechanics.
Professional competence: conative skills, analysis and synthesis of knowledge	Students will be able to apply the fundamentals of thermodynamics, heat transfer and fluid mechanics in practical technical examples.
Personal competence: Social abilities and skills	Students work responsibly in small groups. They discuss and solve thermodynamic tasks and problems in heat transfer and fluid mechanics together.
Personal competence: Independence / autonomy)	Students manage their own scientific and professional development in thermodynamics, heat transfer and fluid mechanics efficiently. They assess their own skills correctly and are able to acquire additional content, e.g. from books and video tutorials on the Internet.
Competence levels according to GQF	6
Prerequisites (see below)	364020 Physics recommended
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title H4.1 364141 Thermodynamics

This course unit forms part of module H4, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Anke Ostertag
Semester	3
Available in	winter semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Thermodynamics
Number of ECTS credits awarded	2.5
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	20
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	364020 Physics recommended
Planned learning activities and teaching methods	• Lecture with integrated exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	Students know the most important fundamentals of thermodynamics. They can reproduce the 1st and 2nd law of thermodynamics. They know the thermodynamics of gases, vapors and cyclic processes.
Professional competence : conative skills, analysis and synthesis of knowledge	Students are able to calculate technically relevant thermodynamic problems. They are able to apply thermodynamics to the design and calculation of engines and power plants. This enables students to calculate, describe and analyze ideal and real cycle processes that frequently occur in engines, power plants and air conditioning technology.
Personal competence: Social abilities and skills	Students support each other and guide others in solving thermodynamic problems. They openly and critically discuss different solution approaches in learning groups within the lecture and outside in self-study units.
Personal competence: Independence / autonomy	Students can reflect on and evaluate their own learning and work objectives and pursue them in a self-directed manner. They see the consequences for the work processes in their learning teams and implement them efficiently accordingly.
Competence levels according to GQF	6

Course unit contents	• Thermodynamic systems • 1st and 2nd law of thermodynamics, • Thermodynamics of gases • Reversible and irreversible cyclic processes • Vapors • Humid air • applications in engines and power stations
Recommended optional programme components	None
Additional specifics	None
Recommended or required reading	• Schmidt, A.: Technical Thermodynamics for Engineers, Basic and Application, Springer, 2.edition,2022 • Dehli, M.: Task Collection Technical Thermodynamics, Springer, 1. edition, 2024 • Dehli, M.; Doering, E.; Schedwill, H.: Fundamentals of Technical Thermodynamics , Springer, 1 edition, 2023
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Course unit title H4.2 364142 Heat Transfer/ Fluid Dynamics

This course unit forms part of module H4, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Anke Ostertag
Semester	3
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Heat Transfer/ Fluid Dynamics
Number of ECTS credits awarded	2.5
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	45
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	
Type of course unit	Compulsory
Prerequisites (see below)	364020 Physics recommended
Planned learning activities and teaching methods	• Lecture with exercise
Professional competence: In-depth knowledge and comprehension (Bloom)	The students know the most important basics of heat transfer and fluid dynamics They are familiar with heat conduction,heat convection, heat transfer and radiation. They know different types of heat exchangers.They are familiar with calculation interpretation of hydrostatics and -dynamics as well as aerostatics and aerodynamics in technical applications. They are familiar with the limits of their calculation.
Professional competence : conative skills, analysis and synthesis of knowledge	Students can calculate the heat flow and temperature distribution in components and systems. Students acquire the competence to calculate heat transfer in the case of free and forced convection and to calculate heat transfer in the case of thermal radiation. They are able to analyze, compare and design technical applications such as insulation or heat exchanger types. Knowledge of the elementary basic laws enables students to apply various pressures and forces in hydro- aerostatics systems and in technical applications such as hydraulic systems. They will be able to analyze technical flow processes such as frictional pipe flow and calculate and design them using selected methods.
Personal competence: Social abilities and skills	Students support each other and provide technical guidance to others in solving heat transfer and fluid dynamics tasks. They openly and critically discuss different solution approaches in learning groups within the lecture and outside in self-study units.

Personal competence: Independence / autonomy	Students can reflect on and evaluate their own learning and work objectives and pursue them in a self-directed manner. They see the consequences for the work processes in their learning teams and implement them efficiently accordingly.
Competence levels according to GQF	6
Course unit contents	Fundamentals of Heat transfer Introduction, • Heat conduction • Convection • Heat exchangers • Thermal radiation Fundamentals of Fluid dynamics • Hydrostatics • Aerostatics • Hydrodynamics • Aerodynamics
Recommended optional programme components	
Additional specifics	
Recommended or required reading	• Dehli, M. Doering E., Schedwill, H.: Fundamentals of technical Thermodynamics, Springer, 1 edition, 2023 • Dehli, M.: Task Collection Technical Thermodynamics, Springer, 1. edition, 2024 • Mobedi M., Ilis G.G.,: Fundamentals of Heat transfer, An Interdisciplinary Analytical Approach, Springer, 1. edition, 2023 • Soldati A., Marchioli, C. Fluid Mechanics for Mechanical Engineers, springer, 1 edtion, 2024 • Munson, B. R., Young, D. F., Okiishi, T. H.: Fundamentals of Fluid Mechanics. New York: John Wiley & Sons, Inc., 1998
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Module H5 364150 Energy Systems and Smart Grids

Duration	Semester
Contact hours per week (45 mins each)	4
Type of assessment	Module examination is made up of weighted individual performances
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Mohamed Ibrahim
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	The students possess broad and integrated knowledge including the scientific fundamentals and practical application in the field of central and decentralized energy systems. They are familiar with the special features of energy systems and the various methods of energy storage.
Professional competence: conative skills, analysis and synthesis of knowledge	The students have methods for dealing with problems in the field of centralized and decentralized energy systems. The students have the ability to apply acquired knowledge. The students acquire the ability to assess the use of selected energy conversion and storage techniques in centralized and decentralized energy systems and, in doing so, master the application of the knowledge gained to the technical and economic design of the energy conversion systems.
Personal competence: Social abilities and skills	Students are able to lead and guide group work in a targeted manner. They are able to present and professionally represent results developed in a team in an appropriate form.
Personal competence: Independence / autonomy)	Students can reflect on their own set learning and work goals, evaluate them and pursue them in a self-directed manner. They see the consequences for the work process in their learning teams and implement them efficiently. Students can independently describe energy-related topics and are also able to work on assigned technical problems in a solution-oriented manner and independently acquire the necessary knowledge for them.
Competence levels according to GQF	6
Prerequisites (see below)	Recommendations, see course description
Module specifics	
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title H5.1 364151 Central Energy Systems

This course unit forms part of module H5, it is Compulsory.

Name of lecturer(s)	
Semester	3
Available in	winter semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Central Energy Systems
Number of ECTS credits awarded	2.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	20
Workload details	
Type of assessment	
Duration of assessment	60
Type of course unit	Compulsory
Prerequisites (see below)	None
Planned learning activities and teaching methods	• Lecture with integrated exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	Students know the structure and function of central energy systems with their individual parts and components. They can reproduce the operating behavior and describe characteristic curves.
Professional competence : conative skills, analysis and synthesis of knowledge	Students can determine energy and mass flows, which are the starting point for dimensioning components. They are able to assess the efficiency of energy systems. They can develop measures to increase technical efficiency and are able to evaluate the cost-effectiveness of these measures.
Personal competence: Social abilities and skills	Students support each other and guide others in solving tasks in the field of "Central Energy Systems". They openly and critically discuss different approaches to solutions in learning groups.
Personal competence: Independence / autonomy	Students can reflect on and evaluate their own learning and work goals and pursue them in a self-directed manner. They see the consequences for the work processes in their learning teams and implement them efficiently accordingly.
Competence levels according to GQF	6
Course unit contents	• Combustion calculation • Structure and function of large fossil power plants • Parts and components of large fossil power plants • In-depth study: Turbomachinery • Nuclear power plants • Energy plants with combined heat and power generation

Recommended optional programme components	The course Decentralized Energy Systems and Smart Grids (364152) should also be attended.
Additional specifics	None
Recommended or required reading	• Dipak Sarkar; Thermal Power Plant, 1st Edition Elsevier, 2016 • Demirel Yasar; Energy : Production, Conversion, Storage, Conservation, and Coupling, Springer Cham, 2021
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title H5.2 364152 Decentralized Energy Systems and Smart Grids

This course unit forms part of module H5, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Mohamed Ibrahim
Semester	3
Available in	winter semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Decentralized Energy Systems and Smart Grids
Number of ECTS credits awarded	3.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	45
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	60
Type of course unit	Compulsory
Prerequisites (see below)	Module Renewable Energy Technology (364040) recommended. The course Decentralized Energy Systems and Smart Grid Laboratory (364161) should be attended at the same time.
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	The students have mastered the basics of decentralized energy supply systems. They have a very broad spectrum and practical skills in the field of decentralized energy converters. They compare and analyze findings in the field of energy technology. The students have the ability to apply the knowledge they have acquired.
Personal competence: Social abilities and skills	Students are able to lead and guide group work in a targeted manner. They are able to present and professionally represent results developed in a team in an appropriate form.
Personal competence: Independence / autonomy	Students can independently describe engineering science topics and calculate their values. They are also able to work on technical problems in a solution-oriented manner and acquire the necessary knowledge independently.
Competence levels according to GQF	6
Course unit contents	
Recommended optional programme components	The course Centralized Energy Systems (364151) should also be attended.

Additional specifics	
Recommended or required reading	• Giorgio Graditi, Marialaura Di Somma: Distributed Energy Resources in Local Integrated Energy Systems; Optimal Operation and Planning, Niederlande, Elsevier Science, 2021. • Craig, Paul P., and Levine, Mark D.: Decentralized Energy, UK, Taylor & Francis Group, 2020. • Brauner, G., Energy systems: regenerative and decentralized: strategies for the energy transition Springer-Viewg-Verlag, 2016 • Grassi, Walter: Heat Pumps; Fundamentals and Applications, Germany, Springer International Publishing, 2017. • Nicolae Badea: Design for Micro-Combined Cooling, Heating and Power Systems; Stirling Engines and Renewable Power Systems. UK, Springer London, 2016. • Refaat, Shady S., et al: Smart Grid and Enabling Technologies, UK, Wiley, 2021.
Scheduled	
Combined assessments	

Module H6 364160 Decentralized Energy Systems and Smart Grid Laboratory

Duration	Semester
Contact hours per week (45 mins each)	4
Type of assessment	Module (without examination) consists of individual preliminary work through laboratory work.
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Mohamed Ibrahim
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	Students have a broad and integrated knowledge including the scientific principles and practical application in the field of decentralized energy systems. They know the special featuresof decentralized energy systems and know the various methods for storing energy.
Professional competence: conative skills, analysis and synthesis of knowledge	The students have methods for dealing with problems in the field of decentralized energy systems. The students have the ability to apply acquired knowledge in practice.
Personal competence: Social abilities and skills	Students are able to lead and guide group work in a targeted manner. They are able to present and professionally represent results developed in a team in an appropriate form.
Personal competence: Independence / autonomy)	Students are able to independently describe engineering aspects of decentralized energy technology and calculate their design parameters. They are also able to work on technical problems in a solution-oriented manner and to independently acquire the necessary knowledge for this.
Competence levels according to GQF	6
Prerequisites (see below)	Recommendations, see course description
Module specifics	
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title H6.1 364161 Decentralized Energy Systems and Smart Grid Laboratory

This course unit forms part of module H6, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Mohamed Ibrahim
Semester	3
Available in	winter semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Decentralized Energy Systems and Smart Grid Laboratory
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	60
Workload: Independent studies	65
Workload details	
Type of assessment	Preliminary examination based on a laboratory report
Duration of assessment	
Type of course unit	Compulsory
Prerequisites (see below)	Module Renewable Energy Technology (364040) recommended. The course Decentralized Energy Systems and Smart Grid (364152) should be attended at the same time.
Planned learning activities and teaching methods	Laboratory with exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	The aim of the laboratory experiments in energy technology is the practical illustration of basic knowledge as well as the presentation of selected practical aspects in connection with theoretically imparted specialist knowledge.Students are able to recognize and understand the theoretical knowledge required for the respective laboratory experiments from the lecture or self-study.They have relevant knowledge of measurement technology, in particular the various methods of error calculation, and know how results can be evaluated.
Professional competence : conative skills, analysis and synthesis of knowledge	Students are able to put their theoretical knowledge into practice in laboratory experiments. They have the ability to structure energy technology tasks,recognize the essentials and evaluate the results. Furthermore, students are able to critically assess and evaluate the measurement results of the laboratory experiments.
Personal competence: Social abilities and skills	The students prepare for the individual laboratory experiments independently in small groups and carry them out in teams. They support each other in carrying out the tasks and discuss the appropriate measurement results.Students are able to evaluate the measured data in a meaningful way, discuss and evaluate the results obtained together and summarize the entire laboratory experiment in a scientific report. They can also jointly present the results of their work to experts and defend their accuracy.

Personal competence: Independence / autonomy	Students plan and carry out their experiments based on independent time and self-management.
Competence levels according to GQF	6
Course unit contents	• Behavior of photovoltaic systems under different operating conditions • Charge-discharge characteristics of accumulators • Operating behavior of fuel cells • Wind turbine with double-fed asynchronous generators • Design of photovoltaic systems- Decentralized energy supply systems
Recommended optional programme components	The course Decentralized Energy Systems and Smart Grid (364152) should be attended at the same time.
Additional specifics	None
Recommended or required reading	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Module H7 364170 Control Engineering

Duration	Semester
Contact hours per week (45 mins each)	4
Type of assessment	Module examination consists of an individual performance.
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Mohamed Ibrahim
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	The control engineering module is designed to provide a broad and integrated knowledge, including the scientific fundamentals of control engineering. Students will be able to analyze and evaluate different control systems. They can select and design appropriate controllers for the application. Students acquire in-depth knowledge of control engineering and can describe its suitability for specific applications. They understand the interrelationships between different control elements and can determine these across disciplines. Through the laboratory component, students describe practical examples using modern simulation tools and can examine their behavior.
Professional competence: conative skills, analysis and synthesis of knowledge	The students have a very broad spectrum of theoretical and practical skills in control engineering. They can independently describe the mode of operation of the closed control loop and select a controller type and define the parameter sizes. They transfer knowledge to different areas of engineering. They design and analyze corresponding controller types.
Personal competence: Social abilities and skills	Students work on the tasks in small groups and participate interactively in the lecture. They discuss their findings with other students and are thus enabled to communicate engineering issues with their peers.
Personal competence: Independence / autonomy)	The students consolidate and deepen the questions of the lecture independently through self-study exercises.
Competence levels according to GQF	6
Prerequisites (see below)	Recommendations, see course description
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title H7.1 364171 Control Engineering

This course unit forms part of module H7, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Mohamed Ibrahim
Semester	4
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Control Engineering
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	60
Workload: Independent studies	65
Workload details	
Type of assessment	
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	Electronics and Measurement Technology (364121) recommended. The course Control Engineering and PLC Laboratory (364181) should be attended at the same time.
Planned learning activities and teaching methods	• Lecture with integrated exercises • Self-study: Lecture follow-up • Exercises in the form of homework • Working on case studies
Professional competence: In-depth knowledge and comprehension (Bloom)	After completing the module, students will have a broad and integrated knowledge of the fundamentals of control engineering. They will understand the structure and mode of operation of a control loop and have mastered the vocabulary and principles of control engineering. You will be able to analyze and understand different technical systems. You will be able to derive a mathematical model using technical examples. They can examine and understand the dynamic behavior of the system with the help of the mathematical tool "Laplace transformation".Students will be familiar with the dynamic behavior of different controlled systems and their response to standard test signals and will be able to calculate and analyze the steady-state error of a controlled system. They will be able to describe and investigate the mode of operation of the closed control loop in the time, frequency and Laplace ranges and will be able to carry out stability analyses and select a suitable controller type. Students are familiar with multi-loop control circuits such ase.g. cascade control or disturbance compensation.

Professional competence : conative skills, analysis and synthesis of knowledge	Students can describe the mode of operation of the closed control loop and analyze a dynamic system in a task-oriented manner. They can analyze the stability of the dynamic system in the S-plane and independently investigate and evaluate the behavior of the system in the time and frequency domain. You will be able to apply the knowledge you have acquired to specific problems.
Personal competence: Social abilities and skills	See module description
Personal competence: Independence / autonomy	See module description
Competence levels according to GQF	6
Course unit contents	• Introduction to systems theory • Basic concepts of control and control engineering • Structural description of the control loop • Analysis and synthesis of technical systems • Introduction to mathematical models of continuous systems • Introduction to the Laplace transformation for the investigation of control systems • transfer function and system behavior • Construction of controlled systems with operational amplifiers and passive components • Dynamic behavior of linear control systems • Stationary behavior of control systems • System stability and S-plan analysis • Root locus method for system analysis • Frequency analysis and Bode plo • Definition and design of controller types
Recommended optional programme components	The course Control Engineering and PLC Laboratory (364181) should be attended at the same time.
Additional specifics	None
Recommended or required reading	• Norman S. Nise: Control System Engineering, John Wiley & Sons. Inc. 2024. • Medioli, Adrian and Goodwin, Graham.: Practical Control System Design, Real World Designs Implemented on Emulated Industrial Systems, John Wiley & Sons, 2024 • Richard C. Dorf and Robert H. Bishop: Modern Control Systems (Fourteenth Edition, Global Edition). China, Dian zi gong ye chu ban she, 2023 • Katsuhiko Ogata: Modern Control Engineering, PEARSON, 2021.
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Module H8 364180 Control and Automation Laboratory

Duration	Semester
Contact hours per week (45 mins each)	4
Type of assessment	Module (without examination) consists of individual preliminary work through laboratory work.
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Mohamed Ibrahim Prof. Dr.-Ing. Anke Ostertag
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	The module “Laboratory Control and Automation Laboratory” is divided into two areas. In the area of control engineering, students are enabled to analyze and evaluate different control systems in practical experiments. Students acquire in-depth practical knowledge of control engineering and can describe its suitability for specific applications. They understand the interrelationships between different control elements and can use modern simulation tools to examine their behavior using practical examples. In the field of automation technology, students can reproduce the basic knowledge of PLC programming within the Codesys programming environment. They are familiar with the various automation devices and can combine the application of PLC programming with knowledge of the relevant areas of automation and communication technology.
Professional competence: conative skills, analysis and synthesis of knowledge	tudents develop a broad range of practical skills in control, automation and communication technology through practical experiments. They can independently describe the functioning of a closed control loop and select and adjust a controller type. They independently analyze simple electrical and mechanical control systems in laboratory exercises. Students can apply PLC programming in Codesys in practical examples. They can structure the relationships between communication systems and automation systems, thus reflecting on the knowledge they have acquired in automation and communication technology.
Personal competence: Social abilities and skills	Students work on the tasks in small groups and participate interactively in the lecture. They discuss their findings with other students and are thus enabled to communicate engineering issues with their peers.

Personal competence: Independence / autonomy)	The students consolidate and deepen the questions of the lecture independently through self-study exercises.
Competence levels according to GQF	6
Prerequisites (see below)	Recommendations, see course description
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Course unit title H8.1 364181 Control and Automation Laboratory

This course unit forms part of module H8, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Mohamed Ibrahim Prof. Dr.-Ing. Anke Ostertag
Semester	4
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Control and Automation Laboratory
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	60
Workload: Independent studies	65
Workload details	
Type of assessment	Preliminary examination based on a laboratory report
Duration of assessment	
Type of course unit	Compulsory
Prerequisites (see below)	The course Control Engineering (364171) should be attended at the same time.
Planned learning activities and teaching methods	Laboratory work with experiment
Professional competence: In-depth knowledge and comprehension (Bloom)	After completing the module, students have a basic knowledge of the application of simulation tools in the field of control engineering, for designing and analyzing technical control loops with different controller types (P, PI, and PID). Students can apply their basic knowledge of PLC programming within the Codesys programming environment. They are familiar with the Raspbery Pi and Pixtend devices. They can combine the application of PLC programming with knowledge of the relevant areas of communication technology.
Professional competence : conative skills, analysis and synthesis of knowledge	The students have a broad spectrum of practical modeling skills for dynamic systems and can construct models and assess their behavior. They are able to analyze and evaluate the generated simulation results. Students can apply PLC programming in Codesys in practical examples. They can structure the relationships between telecommunication systems and automation systems, thus reflecting on the knowledge they have learned in automation and communication technology.
Personal competence: Social abilities and skills	Students are able to discuss their own results from technical-scientific content with lecturers and also with other fellow students and thus jointly gain a deeper understanding of the subject matter.

Personal competence: Independence / autonomy	Students acquire the technical content independently by independently setting up and solving experimental tasks and verifying the facts. They are able to collect, evaluate and independently interpret relevant results.
Competence levels according to GQF	6
Course unit contents	• Introduction to 'MATLAB/SIMULINK, • Simulation of a control loop with SIMULINK • Structure and investigation of the dynamics of temperature control systems with SIMULINK • Structure and investigation of the dynamics of level and flow control with SIMULINK • P-PI-.PID controller dimensioning with control system toolbox, MATLAB • PLC programming with Codesys • Fundamentals and modules • Visualization • Simulation • Connecting Pixtend, Raspberry Pi via WiFi • Application based on various practical examples
Recommended optional programme components	The course Control Engineering (364171) should be attended at the same time.
Additional specifics	None
Recommended or required reading	• Test script • John, K.-H., Tiegelkamp, M. (2009/2010). IEC 61131-3: Programming Industrial Automation Systems. Springer Verlag • Adam, H.-J., Adam, M. (2012). PLC Programming In Instruction List According To IEC 61131-3. Springer Verlag • Lamb, F. (2019). Advanced PLC Hardware & Programming: Hardware and Software Basics, Advanced Techniques & Allen-Bradley and Siemens Platforms. Automation Consulting, LLC
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Module H9 364190 Business Administration 1

Duration	Semester
Contact hours per week (45 mins each)	4
Type of assessment	Module examination is made up of weighted individual performances
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr. Markus Speidel
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	Students can recognize fundamental business interrelationships and evaluate business problems in the area of general business administration. They have broad and integrated knowledge of the interrelationships of economic activity, of the tasks and the interaction of operational functions in a company and know the relevant legal bases (HGB, BGB).
Professional competence: conative skills, analysis and synthesis of knowledge	Students possess integrated specialized knowledge regarding the economic activities of companies. They can reproduce and interpret the basic concepts of general business administration.
Personal competence: Social abilities and skills	The students solve tasks in the field of business administration, they can support each other in solving tasks, they openly and critically discuss different questions and views.
Personal competence: Independence / autonomy)	Students correctly assess their own abilities and are able to acquire advanced business management content.
Competence levels according to GQF	6
Prerequisites (see below)	None
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title H9.1 364191 Introduction to Business Administration

This course unit forms part of module H9, it is Compulsory.

Name of lecturer(s)	Prof. Dr. Markus Speidel
Semester	4
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Introduction to Business Administration
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	60
Workload: Independent studies	65
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	90
Type of course unit	Compulsory
Prerequisites (see below)	None
Planned learning activities and teaching methods	- Allocation SWS: Lecture 2.8 SWS, Exercise 1.2 SWS - Lecture - tutorials - Independent study of literature
Professional competence: In-depth knowledge and comprehension (Bloom)	Students will be able to define basic business management terms. They become familiar with the functional areas of business administration and their interaction. They will be able to discuss business management problems and master basic business management terminology.
Professional competence : conative skills, analysis and synthesis of knowledge	Students have integrated specialist knowledge of the economic activities of companies. They can reproduce and interpret the basic concepts of general business administration.
Personal competence: Social abilities and skills	The students solve tasks in the field of business administration basics and can support each other in solving tasks, they openly and critically discuss different questions and views.
Personal competence: Independence / autonomy	Students correctly assess their own abilities and are able to acquire advanced business management content.
Competence levels according to GQF	6

Course unit contents	• Understanding Economic Systems and Business • Competing in the Global Marketplace • Forms of Business Ownership • Designing Organizational Structures • Managing Human Resources and Labor Relations • Creating Products and Pricing Strategies to Meet Customers' Needs • Distributing and Promoting Products and Services • Using Technology to Manage Information • Financial Information and Accounting
Recommended optional programme components	None
Additional specifics	None
Recommended or required reading	• OpenStax. (2018). Introduction to Business. OpenStax. Retrieved from https://openstax.org/books/introduction-business/pages/1-introduction • Pride, W. M., Hughes, R. J., & Kapoor, J. R. (2022). Foundations of Business (7th ed.). Cengage Learning.
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures. The final grade is made up of 50% case studies and 50% written examination during the examination period.

Module H10 364200 Business Administration 2

Duration	Semester
Contact hours per week (45 mins each)	4
Type of assessment	Module examination is made up of weighted individual performances
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr. Markus Speidel
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	Students acquire a basic insight into the fundamentals of accounting and the preparation of annual financial statements. Furthermore, students have relevant knowledge in the field of project management. They are familiar with essential business terms, concepts, approaches and methods in these areas.
Professional competence: conative skills, analysis and synthesis of knowledge	Students are able to recognize fundamental business interrelationships and evaluate business problems in the areas of accounting and financial statements. Students are able to analyze and evaluate business situations and develop alternative solutions. Students understand the interrelationships that lead to success in a joint project when working in a team.
Personal competence: Social abilities and skills	The students solve tasks in the field of business administration, they can support each other in solving tasks, they openly and critically discuss different questions and views.
Personal competence: Independence / autonomy)	Students correctly assess their own abilities and are able to acquire advanced business management content.
Competence levels according to GQF	6
Prerequisites (see below)	Recommendations, see course description
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title H10.1 364201 Introduction to Accounting

This course unit forms part of module H10, it is Compulsory.

Name of lecturer(s)	Prof. Dr. Markus Speidel
Semester	4
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Introduction to Accounting
Number of ECTS credits awarded	3.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	45
Workload details	
Type of assessment	
Duration of assessment	90
Type of course unit	Compulsory
Prerequisites (see below)	• Knowledge of business administration
Planned learning activities and teaching methods	• Lecture with exercise • Self-study (follow-up of the lecture, exercises, literature study, accompanying exam preparation)
Professional competence: In-depth knowledge and comprehension (Bloom)	Students have in-depth general knowledge and specialist theoretical knowledge in the following areas: • Fundamentals of accounting • Fundamentals of annual financial statements • Selected accounting and valuation rules
Professional competence : conative skills, analysis and synthesis of knowledge	Students have integrated and in-depth theoretical knowledge of the subject: • The recognition of business transactions • The application of selected accounting and valuation options depending on the respective accounting policy objectives of a company
Personal competence: Social abilities and skills	The students solve tasks in the field of accounting, they can support each other in solving tasks, they openly and critically discuss different questions and views.
Personal competence: Independence / autonomy	Students learn how to define, reflect on and evaluate professional work objectives
Competence levels according to GQF	6

Course unit contents	Learning objectives: • Financial accounting as part of the accounting system • Recording and retention obligations- Inventory, stocktaking, balance sheet • Structure of an accounting record • Chart of accounts and chart of accounts, posting to inventory and profit and loss accounts • Accounting regulations and principles of proper bookkeeping and accounting • Accounting for fixed and current assets, equity, provisions and liabilities • Accrual of expenses and income over time • Content and structure of the profit and loss account
Recommended optional programme components	The course Introduction to Business Administration (364191) should also be attended.
Additional specifics	
Recommended or required reading	• David Annand, Introduction to Financial Accounting, Athabasca University 2024 • Charles Horngren , Gary Sundem , et al., Introduction to Financial Accounting Pearson, 2013
Scheduled	Starplan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Course unit title H10.2 364202 Project Management

This course unit forms part of module H10, it is Compulsory.

Name of lecturer(s)	Prof. Dr. Markus Speidel
Semester	4
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Project Management
Number of ECTS credits awarded	2.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	20
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	60
Type of course unit	Compulsory
Prerequisites (see below)	Recommendations, see course description
Planned learning activities and teaching methods	• Lecture with integrated exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	Students understand the relationships that lead to the success of a joint project when working in a team and are familiar with the methods and tools of project management. They also know some important basics from related disciplines, which are often decisive for the success of a project.
Professional competence : conative skills, analysis and synthesis of knowledge	Students have a broad spectrum of methods and tools in the field of project management andthey can apply these to practical issues, including changing requirements and different content-related issues.
Personal competence: Social abilities and skills	Students can support each other in solving tasks and discuss different questions and views openly and critically.
Personal competence: Independence / autonomy	Students correctly assess their own skills and are able to acquire advanced knowledge in the field of project management.
Competence levels according to GQF	6
Course unit contents	• Problem-solving process, finding ideas and solutions • Project foundation and project organization • Team and team leadership in the project • Structural planning, scheduling and capacity planning • Risk management, project control and cost management • Project completion • Project contracts • Project management and quality
Recommended optional programme components	None

Additional specifics	None
Recommended or required reading	• Nicholas, J. M., Steyn, H. (2020). Project Management for Engineering, Business and Technology. UK: Taylor & Francis., 2020 • Maley, C. H. (2012). Project Management Concepts, Methods, and Techniques. USA: CRC Press., 2012
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures. The final grade is made up of 50% case studies and 50% written examination during the examination period.

Module H11 364210 Heating, Ventilation and Air Conditioning (HVAC)

Duration	Semester
Contact hours per week (45 mins each)	4
Type of assessment	Module examination consists of an individual examination covering all courses.
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Ekkehard Laqua
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	The Heating, Ventilation and Air Conditioning module is designed to provide students with broad and integrated knowledge, in particular, the scientific principles of Heating, Ventilation and Air Conditioning technology. Students will be able to use scientific methods to examine problems and interrelationships and design air conditioning systems.
Professional competence: conative skills, analysis and synthesis of knowledge	The students transfer knowledge to different types of energy in Heating, Ventilation and Air Conditioning technology and can optimize the applications with regard to the rational use of energy.
Personal competence: Social abilities and skills	The students have a very broad spectrum of specialized cognitive and practical skills in the field of Heating, Ventilation and Air Conditioning technology. The students solve challenging tasks in this field and have to present their approach in a professional and argumentative manner.
Personal competence: Independence / autonomy)	The lecture content is to be deepened and consolidated through self-study exercises. Students are able to independently solve tasks from the course and acquire additional content. Students reflect on, evaluate and take responsibility for their own and externally set learning and work objectives as well as the consequences of their practical implementation.
Competence levels according to GQF	6
Prerequisites (see below)	None
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Module examination consists of an individual examination covering all courses.

Course unit title H11.1 364211 Air Conditioning Techonology

This course unit forms part of module H11, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Ekkehard Laqua
Semester	4
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Air Conditioning Techonology
Number of ECTS credits awarded	2.5
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	20
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	None
Planned learning activities and teaching methods	• Lecture with integrated exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	The students have a broad and integrated knowledge in the field of air conditioning technology. In particular, they learn the basics of designing ventilation systems for air conditioning in buildings. The knowledge of air conditioning technology enables students to distinguish between partial and full air conditioning systems. This provides them with the prerequisite for the energy-efficient optimization of ventilation and air conditioning systems.
Professional competence : conative skills, analysis and synthesis of knowledge	With their knowledge of the interrelations between energy consumption and the design of ventilation systems, students can compare different concepts and recommend an optimized system. They are able to examine and energetically refurbish full or partial air conditioning systems according to the client's specifications.
Personal competence: Social abilities and skills	The students have a very broad spectrum of specialized cognitive and practical skills in the use of energy for air conditioning in buildings. The students solve challenging tasks in this area and must be able to competently and argumentatively explain their approach.
Personal competence: Independence / autonomy	The lecture content is to be deepened and consolidated through exercises in self-study. Students are able to independently solve tasks from the course and to acquire related content.
Competence levels according to GQF	6

Course unit contents	• Introduction • Physiology and comfort • Determination of room loads • Representation and calculation of ventilation processes • Flow phenomena in air-supported air conditioning systems • Potentials and limits of heat recovery in air conditioning systems • Room air hygiene
Recommended optional programme components	The course Heating and Refrigeration Technology (364212) should also be attended. The course Heating Ventilation and Air Conditioning Laboratory (364221) should be attended at the same time.
Additional specifics	None
Recommended or required reading	• Khazaii, Javad: Advanced Decision Making for HVAC Engineers; Springer Cham 2016 • Nuggenhalli S. Nandagopal: HVACR Principles and Applications ,Springer Cham, 2024 • Amende, Kevin et. al.: principles of Heating, Ventilating, and Air Conditioning, Ninth Edition,2021 ASHRAE Handbook—Fundamentals, 2021 • Laqua, E.: Lecture notes, HS-Heilbronn
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title H11.2 364212 Heating and Refrigeration Technology

This course unit forms part of module H11, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Ekkehard Laqua
Semester	4
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Heating and Refrigeration Technology
Number of ECTS credits awarded	2.5
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	45
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	None
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	Students can draw up performance and energy balances for entire buildings, defined units of building parts and system components. Students will be able to explain and evaluate the various methods of refrigeration and supply. In particular, they are able to carry out efficiency assessments of heating systems, chillers and heat pumps.
Personal competence: Social abilities and skills	Students have a very broad spectrum of specialized cognitive and practical skills in energy use. The students solve challenging tasks in the field of heating and refrigeration technology and have to defend their approach competently and argumentatively.
Personal competence: Independence / autonomy	The lecture content is to be deepened and consolidated through self-study exercises. The students are able to independently solve tasks from the course and acquire additional content.
Competence levels according to GQF	6
Course unit contents	
Recommended optional programme components	The course Air conditioning technology (364211) should also be attended. The course Heating Ventilation and Air Conditioning Laboratory (364221) should be attended at the same time.
Additional specifics	

Recommended or required reading	• Bollin, Elmar: Using Renewable Energies in Buildings, Springer Wiesbaden 2023 • Kirkpatrick, Allan T. : Introduction to Refrigeration and Air Conditioning Systems, Springer Cham 2022 • Laqua,E.: lecture notes, HS-Heilbronn
Scheduled	
Combined assessments	

Module H12 364220 Heating, Ventilation and Air Conditioning Laboratory

Duration	Semester
Contact hours per week (45 mins each)	4
Type of assessment	Module (without examination) consists of individual preliminary work through laboratory work.
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Ekkehard Laqua
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	The Heating, Ventilation and Air Conditioning Laboratory module is designed to provide a broad and integrated knowledge of the practical use of air conditioning systems. You will be able to use scientific methods to examine problems and interrelationships and design systems for the rational use of energy.
Professional competence: conative skills, analysis and synthesis of knowledge	The students possess a very broad spectrum of specialized cognitive and practical skills in the area of heating, ventilation and air conditioning. They transfer knowledge to all relevant types of energy and can optimize applications with regard to the rational use of energy. They deepen their knowledge about conducting practical experiments in the laboratory and recognize the relationships between various subfields of energy use.
Personal competence: Social abilities and skills	The students possess a very broad spectrum of specialized cognitive and practical skills in the area of heating, ventilation and air conditioning technology. The students solve challenging tasks in this area and must be able to competently and argumentatively explain their approach. The students form cooperative working groups in which they plan and design work processes. They can purposefully present the interdisciplinary complex facts by analyzing their experiments.
Personal competence: Independence / autonomy)	The contents of the laboratory experiments are to be deepened and consolidated in self-study. The students plan their experiments based on independent time and self-management and then carry them out in a small team. The students reflect on, evaluate and take responsibility for their own and externally set learning and work goals, as well as the consequences of their practical implementation.
Competence levels according to GQF	6
Prerequisites (see below)	Recommendations, see course description
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title H12.1 364221 Heating, Ventilation and Air Conditioning Laboratory

This course unit forms part of module H12, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Ekkehard Laqua
Semester	4
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Heating, Ventilation and Air Conditioning Laboratory
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	60
Workload: Independent studies	65
Workload details	
Type of assessment	Preliminary examination based on a laboratory report
Duration of assessment	
Type of course unit	Compulsory
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	Students learn how to handle and operate cooling, heating and ventilation systems such as air conditioning units, solar thermal systems, ventilation units and combined heat and power units using various test parameters. Students actively participate in the collection of measurement data and transfer their knowledge from various lectures. In particular, students analyze energy consumption and determine the efficiency of the respective application.
Personal competence: Social abilities and skills	The students form cooperative working groups in which they plan and design work processes. They can present the complex, interdisciplinary facts in a targeted manner by analyzing their experiments.
Personal competence: Independence / autonomy	Students reflect on, evaluate and take responsibility for their own and externally set learning and work goals, as well as the consequences of their practical implementation.
Competence levels according to GQF	6
Course unit contents	
Recommended optional programme components	The courses Heating and Refrigeration Technology (364212) and Air conditioning technology (364211) should also be attended.

Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Module P 364350 Internship and Colloquium

Duration	Semester
Contact hours per week (45 mins each)	2
Type of assessment	Module (without examination) consists of individual preliminary work through presentation.
Number of ECTS credits awarded	30.0
Preconditions for obtaining ECTS credits	Prerequisites for recognition of the practical semester: • completion of the colloquium on the practical semester and • timely submission of the practical semester report
Module coordinator	Prof. Dr.-Ing. Ekkehard Laqua
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	During their work experience, students work on engineering tasks appropriate to their level of training, applying the knowledge and skills acquired during their studies. The practical experience gained in the world of work deepens the knowledge acquired during their studies and links it to an application, which in turn strengthens their understanding of what they have learned.
Professional competence: conative skills, analysis and synthesis of knowledge	In relevant engineering activities, students gain an orientation for their future career choice and experience typical job profiles. In addition, the internship semester facilitates career entry and provides initial contacts with companies.
Personal competence: Social abilities and skills	In the colloquium, students share the experience they have gained with their fellow students and deepen it through interactive discussions. In practice, students learn how to integrate themselves into operational processes and teams.
Personal competence: Independence / autonomy)	Students learn: • how to independently research the jobs offered for the practical semester • how to create application documents and conduct job interviews • about the job profiles of engineering activities • personality development in a real work environment • how to independently create and present the internship report
Competence levels according to GQF	6
Prerequisites (see below)	Recommendations, see course description
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title P 364351 Internship and Colloquium

This course unit forms part of module P, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Ekkehard Laqua
Semester	5
Available in	winter semester
Mode of delivery	Seminar
Language of instruction	english
Course unit title (German)	Internship and Colloquium
Number of ECTS credits awarded	28.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	800
Workload: Independent studies	20
Workload details	The workload arises from completing the practical semester on 100 attendance days in the company as well as preparing the colloquium and the practical semester report.
Type of assessment	Module-specific
Duration of assessment	
Type of course unit	Compulsory
Prerequisites (see below)	Completion of the internship semester, submission of the internship semester report
Planned learning activities and teaching methods	Attendance event, scientific colloquium
Professional competence: In-depth knowledge and comprehension (Bloom)	Students work on practical engineering tasks appropriate to their level of training and apply the knowledge and skills acquired during their studies. The practical experience gained in the working world deepens the knowledge acquired during their studies and links it to an application, which in turn strengthens their understanding of what they have learned.
Professional competence : conative skills, analysis and synthesis of knowledge	In relevant engineering activities, students gain an orientation for their upcoming career choice and experience typical job profiles. In addition, the practical semester facilitates career entry and provides initial contacts with companies.
Personal competence: Social abilities and skills	In the colloquium, students share the experience they have gained with their fellow students and deepen it through interactive discussions. In practice, students learn how to integrate themselves into operational processes and teams.
Personal competence: Independence / autonomy	The students learn: - Independently research jobs offered for internship semesters - Preparing application documents and conducting job interviews - Job descriptions of engineering activities - Personality development in a real working environment - Independent preparation and presentation of the internship report
Competence levels according to GQF	6

Course unit contents	In this event, the students present and discuss their experiences in front of and with the plenum
Recommended optional programme components	Corporate life
Additional specifics	
Recommended or required reading	
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title P1.2 364352 Corporate Life

This course unit forms part of module P, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Anke Ostertag
Semester	5
Available in	winter semester
Mode of delivery	Seminar
Language of instruction	english
Course unit title (German)	Corporate Life
Number of ECTS credits awarded	2.0
Contact hours per week (45 mins each)	
Workload: Contact hours	30
Workload: Independent studies	20
Workload details	
Type of assessment	Preliminary examination based on a paper / a presentation
Duration of assessment	
Type of course unit	Compulsory
Prerequisites (see below)	Participation in the practical semester
Planned learning activities and teaching methods	Lecture with integrated exercise and case studies in workshop character.
Professional competence: In-depth knowledge and comprehension (Bloom)	Students deepen their knowledge of communication and leadership. Case studies are used, for example in the form of role plays. Students then discuss the theory and interpret it.
Professional competence : conative skills, analysis and synthesis of knowledge	Students can explain the connections between communication and leadership. They can distinguish between different leadership styles. Case studies are carried out in small groups in the form of role plays so that students learn to apply the theory.
Personal competence: Social abilities and skills	Students work responsibly in groups and lead groups. They solve challenging tasks in the field of communication and leadership in small groups and as self-study units. Students support each other and guide others professionally in solving group tasks. They argue openly and critically about their various approaches within the team.
Personal competence: Independence / autonomy	Students can reflect on, evaluate and pursue their own learning and work goals in a self-directed manner. They can correctly assess their own abilities and are able to acquire advanced content.
Competence levels according to GQF	6
Course unit contents	• Communication training (communication models) • Conflict management (types of conflict, solution models) • Behavioral models, soft skills (self-reflection) • Application / interview, (case study application interview) • Leadership models- Moderation (case study moderation)

Recommended optional programme components	
Additional specifics	
Recommended or required reading	• Geoffrey Beattie; The Psychology of Language And Communication, Routledge, 2017 • Career and Workforce Readiness, Trent University, Careerspace, Trent University, Ontario, 2022 • García-Pérez, Grisel María, and Constanza Rojas-Primus, editors. Promoting Intercultural Communication Competencies in Higher Education. IGI Global Scientific Publishing, 2017.
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Module H13 364230 Sustainability

Duration	Semester
Contact hours per week (45 mins each)	4
Type of assessment	Module examination is made up of weighted individual performances
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Anke Ostertag
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	Students will learn about various economic and ecological aspects of sustainable management as well as ethic topics. They will be familiar with the basics of environmental pollution and circulatory systems, and will know the principles of sustainability and the basics of environmental economics and environmental management.
Professional competence: conative skills, analysis and synthesis of knowledge	Students can apply and reflect on the environmental impacts of the energy and environmental sector. Students can analyze and structure chemical and physical environmental pollution and combine it in an environmental management system. They can also create life cycle assessments and compare them with those of other providers.
Personal competence: Social abilities and skills	Students work in groups to solve challenging tasks in the areas of environmental impact, environmental economics and environmental management. They complete life cycle assessments as self-study units and support each other. Students discuss environmental issues related to economics and sustainability openly and critically.
Personal competence: Independence / autonomy)	Students can reflect on and evaluate their own learning and work objectives and pursue them in a self-directed manner. They see the consequences for the work processes in their learning teams and implement them efficiently accordingly. They correctly assess their own abilities and are able to acquire advanced content.
Competence levels according to GQF	6
Prerequisites (see below)	Recommendations, see course description
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title H13.1 364231 Environmental Economics, Management and Ethics

This course unit forms part of module H13, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Anke Ostertag
Semester	6
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Environmental Economics, Management and Ethics
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	60
Workload: Independent studies	65
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	90
Type of course unit	Compulsory
Prerequisites (see below)	None
Planned learning activities and teaching methods	Lecture with integrated exercises Project work and research on a given topic with coaching appointments and a final presentation
Professional competence: In-depth knowledge and comprehension (Bloom)	Students are familiar with the basics of environmental pollution and circular systems.Students will be able to assess the interrelationships between environmental impacts, environmental pollution and the impact of mankind. They know the principles of sustainability combined with the basics of environmental economics and environmental management. They are familiar with ethical values in the area of sustainability. Students can applicate life cycle assessments using the LCA tools, like SimaPro. Students can interpret Life Cycle Analysis publications fin the context of various stakeholders and technical products and also know the limits of its application.
Professional competence : conative skills, analysis and synthesis of knowledge	Students can apply and reflect on the environmental impact of current energy and environmental issues.They can evaluate complex environmental impacts in monetary terms and reflect on their effects.Students can analyze and structure chemical and physical environmental impacts and combine them in an environmental management system. Students can apply, analyze and compare comprehensive life cycle assessments using LCA tools like SimaPro. Students understands to read and to know the limit of published life cycle assessments in the context of various stakeholders.

Personal competence: Social abilities and skills	Students solve challenging tasks in the field of environmental impact, environmental economics and environmental management in learning groups. As part of self-study units, students work in small groups on theri practical work und research study, supporting each other in the process. Students discuss environmentally relevant issues openly and critically with regard to economics and sustainability and ethics impacts.
Personal competence: Independence / autonomy	Students can reflect on and evaluate their own learning and work objectives and pursue them in a self-directed manner. They see the consequences for the work processes in their learning teams and implement them efficiently accordingly. They correctly assess their own abilities and are able to acquire advanced content.
Competence levels according to GQF	6
Course unit contents	Basics and theory of environmental economics and environmental management • Basics • Sustainability • Ethics • Environmental economics • Environmental management Application: Life Cycle Assessment • Basics Application of LCA Tool like SimaPro Project work with presentation
Recommended optional programme components	None
Additional specifics	None
Recommended or required reading	• Sambargi S., Shuba N.S.: Nudging Green: Behavioral Economics and Environmental Sustainability, Springer, 1 edition, 2024 • Srivastava R.; Singh S.: Environmental Risk over Indian Subcontinents: Consequenceces and Impacts, Springer, 1 editin, 2024 • Oblakovic G., Dogan I.D., Lajtman M.K.: Life-Cycle Analysis, Springer, 1 edition, 2023
Scheduled	
Combined assessments	Will be published in the first three weeks of lectures. The final grade is made up of 50% presentation and 50% written examination during the examination period.

Module H14 364240 Modeling and Simulation of Energy Systems

Duration	Semester
Contact hours per week (45 mins each)	4
Type of assessment	Module examination consists of an individual performance with laboratory work as preliminary work.
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Mohamed Ibrahim
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	After completing this module, students will have mastered the concepts, methods and procedures for mathematical modeling of technical systems, with a focus on modeling energy systems. Students will describe the necessary procedures for identifying system parameters and energy component models. To deepen their understanding of the theoretical content, laboratory experiments will be integrated with modeling software. Students will create models and simulate them with real data.
Professional competence: conative skills, analysis and synthesis of knowledge	Students are able to construct a mathematical model in a task-oriented way and to analyze simulation results, as well as to describe the results independently. They can apply the acquired knowledge to specific problems.
Personal competence: Social abilities and skills	Students work on the tasks in small groups and participate interactively in the lecture. They discuss their findings with other students and are thus enabled to communicate engineering issues with their peers.
Personal competence: Independence / autonomy)	The students consolidate and deepen the questions of the lecture through self-study exercises.
Competence levels according to GQF	6
Prerequisites (see below)	Recommendations, see course description
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title H14.1 364241 Modeling and Simulation of Energy Systems

This course unit forms part of module H14, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Mohamed Ibrahim
Semester	6
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Modeling and Simulation of Energy Systems
Number of ECTS credits awarded	2.5
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	45
Workload details	
Type of assessment	
Duration of assessment	90
Type of course unit	Compulsory
Prerequisites (see below)	Module Renewable Energy Technology (364040) recommended. Module Energy Systems and Smart Grids (364150) recommended.
Planned learning activities and teaching methods	• Lecture with integrated exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	After completing this module, students will have mastered the concepts, methods and procedures for mathematical modeling of technical systems, with a focus on the modeling of energy systems. Students will learn the necessary methods for identifying system parameters and for numerically integrating differential equations, interpolation, curve fitting and the mathematical description of complex management concepts. Subsequently, the models are created from measurements taken on the system.
Professional competence : conative skills, analysis and synthesis of knowledge	Students can create and analyze an energy system model in a task-oriented way and describe how theA model works.
Personal competence: Social abilities and skills	See module description
Personal competence: Independence / autonomy	See module description
Competence levels according to GQF	6

Course unit contents	• Introduction to modeling and simulation technology • Mathematical tools for the numerical solution of algebraic equations, numerical solution of differential equations (e.g. Newton, Rungekute methods), and optimization methods • Methods for modeling measurement data (curve fitting, interpolation and extrapolation methods) • Mathematical modelling of different components and energy systems (e.g. photovoltaics, wind turbines, combined heat and power plants, storage technologies, decentralized energy systems)
Recommended optional programme components	The course Modelling and Simulation of Energy Systems Laboratory (364242) should be attended at the same time.
Additional specifics	None
Recommended or required reading	• Sayyaadi, Hoseyn: Modeling, Assessment, and Optimization of Energy Systems, Niederlande, Elsevier Science, 2020. • Farzaneh, Hooman: Energy Systems Modeling; Principles and Applications, Germany, Springer Nature Singapore, 2019. • Thomas A. Adams: Modeling and Simulation of Energy Systems, Schweiz, Mdpi AG, 2019. • Epperson, James F.: An Introduction to Numerical Methods and Analysis, Germany, Wiley, 2013. • Gordon, Steven I. and Guilfoos, Brian.: Introduction to Modeling and Simulation with MATLAB (R) and Python, UK, CRC Press, 2020.
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title H14.2 364242 Modeling and Simulation of Energy Systems Laboratory

This course unit forms part of module H14, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Mohamed Ibrahim
Semester	6
Available in	summer semester
Mode of delivery	Lab
Language of instruction	english
Course unit title (German)	Modeling and Simulation of Energy Systems Laboratory
Number of ECTS credits awarded	2.5
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	20
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Compulsory
Prerequisites (see below)	Module Renewable Energy Technology (364040) recommended. Module Energy Systems and Smart Grids (364150) recommended.
Planned learning activities and teaching methods	Experiments/Simulations
Professional competence: In-depth knowledge and comprehension (Bloom)	Students will set up the main components of the energy systems and energy management processes in the laboratory and simulate them under various operating scenarios. In particular, the modeling and simulation tool MATLAB-Simulink is used. After completing the module, students will have mastered the basics of analyzing and documenting energy management scenarios.
Professional competence : conative skills, analysis and synthesis of knowledge	The students are able to analyze and evaluate the generated simulation results of the energy management system.
Personal competence: Social abilities and skills	Students are able to discuss their own simulation results from technical and scientific content with lecturers and also with other fellow students and thus jointly gain a deeper understanding of the subject matter.
Personal competence: Independence / autonomy	Students develop their knowledge of the subject matter independently by setting up and solving experimental tasks and verifying the facts. They are able to collect, evaluate and interpret relevant results independently.
Competence levels according to GQF	6

Course unit contents	• Familiarization with MATLAB-SIMULINK • Application of MATLAB in solving numerical models • Experiment on modeling and simulation of PV systems under real radiation and temperature data • Experiment on modeling and simulation of wind systems under real wind speed data • Experiment on modeling and simulation of accumulator storage systems • Experiment on modeling and simulation of energy management scenarios
Recommended optional programme components	None
Additional specifics	None
Recommended or required reading	• Gordon, Steven I. and Guilfoos, Brian.: Introduction to Modeling and Simulation with MATLAB (R) and Python, UK, CRC Press, 2020. • Khatib, Tamer, and Elmenreich, Wilfried: Modeling of Photovoltaic Systems Using MATLAB; Simplified Green Codes, UK, Wiley, 2016.
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Module H15 364250 Electric Power Systems

Duration	Semester
Contact hours per week (45 mins each)	4
Type of assessment	Module examination consists of an individual performance.
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Mohamed Ibrahim
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	The students have a broad and integrated knowledge including the scientific fundamentals and practical application in the field of electrical energy supply systems. They know the specifics of operating power supply networks and the necessary components of an electrical distribution network and can combine this into an overall view. They are able to apply the basic calculation methods to subject-specific problems.
Professional competence: conative skills, analysis and synthesis of knowledge	The module is designed to provide a basic knowledge of energy generation and distribution. Students acquire the ability to compare the use of selected supply technologies and to recommend an optimized electrical system. Students can identify issues and relationships using scientific methods and present the results clearly.
Personal competence: Social abilities and skills	The students support each other and guide others in solving tasks in the field of energy generation and distribution. They openly and critically discuss various approaches in learning groups during and outside of lectures in self-study units.
Personal competence: Independence / autonomy)	Students are able to reflect on, evaluate and pursue their own learning and work goals in a self-directed manner. They see the consequences for the work process in their learning teams and implement them efficiently.
Competence levels according to GQF	6
Prerequisites (see below)	Recommendations, see course description
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title H15.1 364251 Electric Power Systems

This course unit forms part of module H15, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Mohamed Ibrahim
Semester	6
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Electric Power Systems
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	60
Workload: Independent studies	65
Workload details	
Type of assessment	
Duration of assessment	120
Type of course unit	Compulsory
Prerequisites (see below)	Module Electrical Engineering 1 (364030) recommended. Module Electrical Engineering 2 (364080) recommended.
Planned learning activities and teaching methods	• Lecture with integrated exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	Students will learn about the essential components for transmission, transportation and distribution of electrical energy. They learn the fundamentals of operating power supply networks. They are able to apply the basic calculation methods for steady-state and transient processes (such as load flow calculation and short-circuit current calculation) in three-phase networks and can apply these to exercises. They can assess different supply structures in terms of reliability, security, controllability and economic efficiency.
Professional competence : conative skills, analysis and synthesis of knowledge	With their knowledge of the interrelations between energy generation, transmission and supply, students can compare different supply technologies and recommend an optimized electrical system. They are able to examine supply structures and evaluate and design electrical equipment.
Personal competence: Social abilities and skills	The students have a very broad spectrum of specialized cognitive skills in electrical power supply. The students solve challenging tasks in this area and can competently and argumentatively explain their approach.
Personal competence: Independence / autonomy	The lecture content is to be deepened and consolidated through exercises in self-study. Students are able to independently solve tasks from the course and to acquire related content.
Competence levels according to GQF	6

Course unit contents	• Development of electrical energy systems and integrated systems • Provision of electrical energy and different voltage levels • Structure and operation of electricity grids • Grid components and switchgear • Star point treatment and switchgear • Calculation methods in three-phase networks • Environmental and personal protection • Security of supply and economic efficiency
Recommended optional programme components	None
Additional specifics	Excursions to power supply facilities in the region are offered on a regular basis.
Recommended or required reading	• Meier, Alexandra. Electric Power Systems: A Conceptual Introduction, Wiley & Sons Ltd, 2024. • Mehdi Rahmani-Andebili. Power System Analysis: Comprehensive Lessons, Springer Cham, 2024 • Doleski, Oliver D. and Freunek, Monika: Handbook of Electrical Power Systems: Energy Technology and Management in Dialogue. Deutschland, De Gruyter, 2024.
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Module H16 364260 Business Administration 3

Duration	Semester
Contact hours per week (45 mins each)	4
Type of assessment	Module examination is made up of weighted individual performances
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr. Markus Speidel
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	Students gain a fundamental insight into selected business management functional areas. They learn the basics of international accounting and financing. Furthermore, they develop an understanding of the basics of start-up management and get to know the challenges of founding and managing companies.
Professional competence: conative skills, analysis and synthesis of knowledge	Students are able to recognize fundamental business relationships and gain knowledge about analyzing annual financial statements from financial reports. Furthermore, they develop the ability to develop and implement a business idea. In doing so, they acquire problem-solving skills and learn about entrepreneurial thinking.
Personal competence: Social abilities and skills	Students solve problems in the areas of accounting and company formation and can support each other in solving tasks. They discuss annual financial statements openly and critically and demonstrate the ability to work together effectively and communicate in teams when developing concepts for new companies. They are able to critically reflect on and discuss ethical and social issues related to entrepreneurship.
Personal competence: Independence / autonomy)	Students deepen their knowledge of balance sheet analysis using practical examples, which they work on independently, and learn to present the results in a way that is appropriate for the target group. Furthermore, they demonstrate independent action in the development and implementation of business ideas.
Competence levels according to GQF	6
Prerequisites (see below)	Recommendations, see course description
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title H16.1 364261 International Accounting Standards and Business Analysis

This course unit forms part of module H16, it is Compulsory.

Name of lecturer(s)	Prof. Dr. rer. pol. Martin Tettenborn
Semester	6
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	International Accounting Standards and Business Analysis
Number of ECTS credits awarded	3.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	45
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	60
Type of course unit	Compulsory
Prerequisites (see below)	Introduction to Accounting (364201) recommended
Planned learning activities and teaching methods	• Lecture with exercise • Self-study (follow-up of the lecture, exercises, literature study
Professional competence: In-depth knowledge and comprehension (Bloom)	Knowledge of the main IFRS, financial statement analysis and the relationship between financial accounting and management accounting.
Professional competence : conative skills, analysis and synthesis of knowledge	Knowledge of financial statement analysis of English-language financial reports
Personal competence: Social abilities and skills	In a practical example, the students discuss with the lecturer a system of key figures derived from the data of the annual financial statements.
Personal competence: Independence / autonomy	The students deepen their knowledge of balance sheet analysis by means of practical examples, which must be worked out independently, and learn to present the results in an appropriate manner for the target group.
Competence levels according to GQF	6

Course unit contents	Course description By the end of the course students will be able to: • Basic understanding of accounting of the firm, i. e. how the financial position of the firm is represented to different stakeholders depending on their various claims / objectives; • understand the growing importance of global financial markets and its relation to financial reporting; • understand the usefulness of a conceptual framework and the objective of financial reporting; • understand basic accounting assumptions and measurement principles. Each lecture will look at a different set of different accounting topics. An instructional unit involves lectures, class discussions, analyses of financial reports. The following are the main topics that will be dealt with: • Introduction to Accounting • Importance of global markets • objective of financial reporting. • Challenges facing financial reporting • Conceptual Framework • Measurement principles • Revenue recognition • Analyses of various financial reports
Recommended optional programme components	
Additional specifics	
Recommended or required reading	• IFRS current Edition • selected financial reports and journal articles • Kieso/weygandt/warfield; Intermediate Accounting, Wiley, Hoboken, 2017
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Course unit title H16.2 364262 Start-up Management

This course unit forms part of module H16, it is Compulsory.

Name of lecturer(s)	Prof. Dr. Markus Speidel
Semester	6
Available in	summer semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Start-up Management
Number of ECTS credits awarded	2.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	20
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	60
Type of course unit	Compulsory
Prerequisites (see below)	Introduction to Business Administration (364191) recommended
Planned learning activities and teaching methods	Lectures in seminars, implementation of a business simulation game with group work and exercises to impart professional and social skills
Professional competence: In-depth knowledge and comprehension (Bloom)	• Understanding of the fundamentals of start-up management • Understanding of the challenges and opportunities associated with founding and managing companies • Ability to apply theoretical concepts to practical situations
Professional competence : conative skills, analysis and synthesis of knowledge	• Ability to develop and implement a business idea, including the creation of a business plan and a convincing presentation. • Competence in using business tools and methods to analyze market opportunities and competitive strategies. • Development of problem-solving skills and entrepreneurial thinking by participating in the business game.
Personal competence: Social abilities and skills	• Ability to work effectively in teams and communicate with each other during the simulation game and when developing concepts for social enterprises. • Ability to critically reflect on and discuss ethical and societal issues related to entrepreneurship.
Personal competence: Independence / autonomy	Acting independently when developing and implementing business ideas in the context of the business game
Competence levels according to GQF	6

Course unit contents	• Introduction to Entrepreneurship • Business Simulation for the Establishment of a Startup: Includes business model development, creation of a business plan, and negotiations on financing and implementing the defined business strategy. • Transfer through the Creation and Presentation of a Business Plan for a Self-Developed Business Idea.
Recommended optional programme components	None
Additional specifics	None
Recommended or required reading	• Harris, T. (2019). Start-up: A Practical Guide to Starting and Running a New Business (2nd ed.). Cham: Springer International Publishing. • Evans, V. (2022). The Financial Times Essential Guide to Writing a Business Plan: How to win backing to start up or grow your business (3. Aufl.). Pearson Education Limited.
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures. The final grade is made up of 50% case studies and 50% written examination during the examination period.

Module H17 364270 Specialisation / Elective Courses

Duration	Semester
Contact hours per week (45 mins each)	8
Type of assessment	Module examination is made up of weighted individual performances
Number of ECTS credits awarded	10.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed. To obtain the required ECTS credits, a graded examination, as required for the selected course according to the catalog of elective subjects, must be passed.
Module coordinator	Prof. Dr.-Ing. Ekkehard Laqua
Professional competence: In-depth knowledge and comprehension	Teaching method: Lecture Learning method: Lecture with preparation and follow-up Exam type: Written exam or combined exam with written exam as final exam
Lerninhalte	Students choose courses worth a total of 10 ECTS credits. The range of elective subjects on offer is announced at the beginning of the winter semester. The catalog of elective subjects includes at least six elective subjects.
Professional competence: In-depth knowledge and comprehension	see Sub Modules in the catalog of elective subjects
Professional competence: conative skills, analysis and synthesis of knowledge	see Sub Modules in the catalog of elective subjects
Personal competence: Social abilities and skills	see Sub Modules in the catalog of elective subjects
Personal competence: Independence / autonomy)	see Sub Modules in the catalog of elective subjects
Competence levels according to GQF	6
Prerequisites (see below)	None
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title H17.1 364271 Special Topics 1

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 1
Number of ECTS credits awarded	3.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.2 364272 Special Topics 2

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 2
Number of ECTS credits awarded	3.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.3 364273 Special Topics 3

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 3
Number of ECTS credits awarded	2.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.4 364274 Special Topics 4

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 4
Number of ECTS credits awarded	4.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.5 364275 Special Topics 5

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 5
Number of ECTS credits awarded	3.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.6 364276 Special Topics 6

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 6
Number of ECTS credits awarded	3.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.7 364277 Special Topics 7

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 7
Number of ECTS credits awarded	2.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.8 364278 Special Topics 8

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 8
Number of ECTS credits awarded	2.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.9 364279 Special Topics 9

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 9
Number of ECTS credits awarded	3.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.11 364311 Special Topics 11

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 11
Number of ECTS credits awarded	2.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.12 364312 Special Topics 12

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 12
Number of ECTS credits awarded	2.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.13 364313 Special Topics 13

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 13
Number of ECTS credits awarded	3.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.14 364314 Special Topics 14

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 14
Number of ECTS credits awarded	3.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.15 364315 Special Topics 15

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 15
Number of ECTS credits awarded	2.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.16 364316 Special Topics 16

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 16
Number of ECTS credits awarded	2.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.17 364317 Special Topics 17

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 17
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.18 364318 Special Topics 18

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 18
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.19 364319 Special Topics 19

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 19
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.21 364321 Special Topics 21

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 21
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.22 364322 Special Topics 22

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 22
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.23 364323 Special Topics 23

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 23
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.24 364324 Special Topics 24

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 24
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.25 364325 Special Topics 25

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 25
Number of ECTS credits awarded	3.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.26 364326 Special Topics 26

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 26
Number of ECTS credits awarded	3.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.27 364327 Special Topics 27

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 27
Number of ECTS credits awarded	2.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.28 364328 Special Topics 28

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 28
Number of ECTS credits awarded	2.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.29 364329 Special Topics 29

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 29
Number of ECTS credits awarded	3.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.31 364331 Special Topics 31

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 31
Number of ECTS credits awarded	2.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.32 364332 Special Topics 32

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 32
Number of ECTS credits awarded	2.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.33 364333 Special Topics 33

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 33
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.34 364334 Special Topics 34

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 34
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.35 364335 Special Topics 35

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 35
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.36 364336 Special Topics 36

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 36
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.10 364337 Special Topics 10

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 10
Number of ECTS credits awarded	3.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.20 364338 Special Topics 20

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 20
Number of ECTS credits awarded	5.0
Contact hours per week (45 mins each)	4.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title H17.30 364339 Special Topics 30

This course unit forms part of module H17, it is Elective.

Name of lecturer(s)	
Semester	6
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special Topics 30
Number of ECTS credits awarded	3.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	
Workload: Independent studies	
Workload details	
Type of assessment	Bitte die korrekte Prüfungsart dem Prüfungsamt mitteilen
Duration of assessment	
Type of course unit	Elective
Prerequisites (see below)	
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	
Professional competence : conative skills, analysis and synthesis of knowledge	
Personal competence: Social abilities and skills	
Personal competence: Independence / autonomy	
Competence levels according to GQF	
Course unit contents	
Recommended optional programme components	
Additional specifics	
Recommended or required reading	
Scheduled	
Combined assessments	

Module H18 364280 Interdisciplinary Project Laboratory

Duration	Semester
Contact hours per week (45 mins each)	8
Type of assessment	Module examination consists of an individual performance.
Number of ECTS credits awarded	10.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Ekkehard Laqua
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	Students understand the interrelationships that lead to the success of a joint project when working in a team.
Professional competence: conative skills, analysis and synthesis of knowledge	You can apply the methods of project management. You will be able to describe an interdisciplinary task.They are able to plan and implement a project. Students will be able to accurately estimate the amount of work required to complete the task.
Personal competence: Social abilities and skills	Students practise working together responsibly in a team and learn to structure complex specialist tasks together. They support each other and discuss different solutions and approaches openly and critically. They work together constructively to find appropriate solutions.
Personal competence: Independence / autonomy)	Students can reflect on and evaluate their own learning and work goals and pursue them in a self-directed manner.
Competence levels according to GQF	6
Prerequisites (see below)	None
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title H18.1 364281 Project Lab

This course unit forms part of module H18, it is Compulsory.

Name of lecturer(s)	Prof. Dr. Markus Speidel Prof. Dr.-Ing. Mohamed Ibrahim Prof. Dr.-Ing. Ekkehard Laqua Prof. Dr.-Ing. Anke Ostertag
Semester	6
Available in	winter semester
Mode of delivery	Lab
Language of instruction	english
Course unit title (German)	Project Lab
Number of ECTS credits awarded	10.0
Contact hours per week (45 mins each)	8.0
Workload: Contact hours	75
Workload: Independent studies	175
Workload details	
Type of assessment	
Duration of assessment	
Type of course unit	Compulsory
Prerequisites (see below)	None
Planned learning activities and teaching methods	
Professional competence: In-depth knowledge and comprehension (Bloom)	Students understand the interrelationships that lead to the success of a joint project when working in a team.
Professional competence : conative skills, analysis and synthesis of knowledge	You can apply the methods of project management. You will be able to describe an interdisciplinary task.They are able to plan and implement a project. Students will be able to accurately estimate the amount of work required to complete the task.
Personal competence: Social abilities and skills	Students practise working together responsibly in a team and learn to structure complex specialist tasks together. They support each other and discuss different solutions and approaches openly and critically. They work together constructively to find appropriate solutions.
Personal competence: Independence / autonomy	Both the work goals set by others as well as their own work goals and solutions are reflected upon and pursued in a self-directed manner.
Competence levels according to GQF	8
Course unit contents	Specified content from technology and business with practical application relevance.
Recommended optional programme components	
Additional specifics	The course is held as a block course.

Recommended or required reading	
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Module H19 364290 Special topics of Energy Management

Duration	Semester
Contact hours per week (45 mins each)	4
Type of assessment	Module examination is made up of weighted individual performances
Number of ECTS credits awarded	5.0
Preconditions for obtaining ECTS credits	The specified number of credits will only be awarded if the corresponding examination has been successfully completed.
Module coordinator	Prof. Dr.-Ing. Mohamed Ibrahim
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	The module Special Topics in Energy Management is designed to impart broad and integrated knowledge, including basic knowledge, in the design and operation of hybrid energy supply systems, and to create energy balances for buildings. The module provides in-depth knowledge about the operation of energy mix structures with different energy generation and storage technologies. Furthermore, it imparts basic knowledge in the use of design and energy consulting software.
Professional competence: conative skills, analysis and synthesis of knowledge	The students have a very broad spectrum of specialized cognitive and practical skills in energy supply and energy storage. They transfer knowledge to different energy supply systems and concepts. The students take into account thermal and electrical energy converters as well as energy storage systems and design these as an overall system. The students can use design and balancing software to evaluate and analyze generation plants.
Personal competence: Social abilities and skills	Students are able to lead and guide group work in a targeted manner. They can present the results of team work in an appropriate form and defend them professionally.
Personal competence: Independence / autonomy)	Students can reflect on, evaluate and pursue their own learning and work goals in a self-directed manner. They can correctly assess their own abilities and are able to acquire advanced content.
Competence levels according to GQF	6
Prerequisites (see below)	Recommendations, see course description
Module specifics	None
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	

Course unit title H19.1 364291 Special topics of Energy Management 1

This course unit forms part of module H19, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Mohamed Ibrahim
Semester	7
Available in	winter semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special topics of Energy Management 1
Number of ECTS credits awarded	2.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	20
Workload details	
Type of assessment	
Duration of assessment	90
Type of course unit	Compulsory
Prerequisites (see below)	Module Renewable Energy Technology (364040) recommended. The course Decentralized Energy Systems and Smart Grids (364152) recommended.
Planned learning activities and teaching methods	• Lecture with integrated exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	After completing the module, students have a basic knowledge of the various system technology aspects of modularly expandable supply structures. They also acquire in-depth knowledge in the energy management of energy mix supply structures with different energy generation and storage technologies. This equips them to apply advanced methods to energy processing units for power conversion using electronic circuits and typologies. They are proficient in various methods of energy management strategies and procedures. In particular, they are able to design self-sufficient hybrid supply systems.
Professional competence : conative skills, analysis and synthesis of knowledge	The students have a very broad spectrum and skills in the integration of renewable and conventional energy generators into the power grid. They can design and evaluate different energy mix supply structures. They can design and evaluate different energy mix supply structures. The students have the ability to apply acquired knowledge.
Personal competence: Social abilities and skills	Students are able to lead and guide group work in a targeted manner. They can present the results of team work in an appropriate form and defend them professionally.
Personal competence: Independence / autonomy	Students consolidate and deepen their understanding of the issues covered in the lecture through exercises in self-study.
Competence levels according to GQF	6

Course unit contents	• Development of power supply with the energy transition • Electrochemical storage technologies • Fundamentals of energy mix structures (e.g. PV, WEA,BZ) • Power electronic circuits and typologies of energy processing units • Modular AC coupling and grid integration of decentralized energy units • Energy management strategies for autarkic and decentralized hybrid systems • Dimensioning of decentralized and autarkic energy mix supply systems
Recommended optional programme components	None
Additional specifics	None
Recommended or required reading	• Trzynadlowski, Andrzej M.: Introduction to Modern Power Electronics.UK., Wiley, 2015. • Rekioua, Djamila:Wind Power Electric Systems; Modeling, Simulation, Control and Power Management Control, Germany, Springer Nature Switzerland, Imprint: Springer, 2024. • S.M. Muyeen: Wind Energy Conversion Systems; Technology and Trends, Niederlande, Springer London, 2014. • Emilio Figueres: Photovoltaic and Wind Energy Conversion Systems, Schweiz, MDPI AG, 2021. • Ingo Stadler, Michael Sterner: Handbook of Energy Storage; Demand, Technologies, Integration, Deutschland, Springer Berlin Heidelberg, 2019. • A. Mahaboob Subahani, G. R. Kanagachidambaresan and M. Kathiresh: Integration of Renewable Energy Sources with Smart Grid, UK, Wiley, 2021. • Doppelbauer, Martin. Introduction to Electromobility: Technology, Best Practice, Energy and Environment. Deutschland, Springer Fachmedien Wiesbaden, 2024.
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Course unit title H19.2 364292 Special topics of Energy Management 2

This course unit forms part of module H19, it is Compulsory.

Name of lecturer(s)	Prof. Dr.-Ing. Ekkehard Laqua
Semester	7
Available in	winter semester
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	Special topics of Energy Management 2
Number of ECTS credits awarded	3.0
Contact hours per week (45 mins each)	2.0
Workload: Contact hours	30
Workload: Independent studies	45
Workload details	
Type of assessment	
Duration of assessment	90
Type of course unit	Compulsory
Prerequisites (see below)	Module Heating Ventilation and Air Conditioning (HVAC) (364210) recommended.
Planned learning activities and teaching methods	• Lecture with integrated exercises
Professional competence: In-depth knowledge and comprehension (Bloom)	The students have a broad and integrated knowledge in the field of designing combined heat and power plants and solar thermal energy systems using commercial software programs. Energy consultant software gives students an in-depth understanding of the energy balance of a building in accordance with the Energy in Buildings Directive.
Professional competence : conative skills, analysis and synthesis of knowledge	Students can create different variant comparisons for energy supply systems and select the most sensible variant. Knowledge of the relevant laws in their current versions enables students to create energy balances for residential and non-residential buildings and to create energy reports. Students can use the software they have learned to handle complex tasks and deepen their knowledge of how to carry out annual energy balances and recognize the interrelationships between various influencing factors.
Personal competence: Social abilities and skills	The students work together to solve challenging tasks in the field of energy efficiency and optimization. As part of software exercises, the students develop solutions for optimizing economic efficiency and present the results to other participants.
Personal competence: Independence / autonomy	Students can reflect on, evaluate and pursue their own learning and work goals in a self-directed manner.
Competence levels according to GQF	6

Course unit contents	• Energy in Buildings Directive in the currently valid version • Software program for designing solar thermal systems • Software program for designing CHP units • Software program for creating energy balance sheets for residential and non-residential buildings
Recommended optional programme components	None
Additional specifics	None
Recommended or required reading	• Valentin Energiesoftware, training materials T-Sol,2013 • Steinborn, training materials Mini BHKW-Plan • Hottgenroth, training materials, 2024
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	Will be published in the first three weeks of lectures

Module BT 364300 Bachelor Thesis and Colloquium

Duration	Semester
Contact hours per week (45 mins each)	
Type of assessment	Module examination consists of an individual performance with a presentation as a preliminary performance.
Number of ECTS credits awarded	15.0
Preconditions for obtaining ECTS credits	The topic of the Bachelor's thesis must be submitted in the 6th semester at the earliest and no later than 6 months after the end of the semester in which the last subject examination was successfully completed. (Mandatory!)
Module coordinator	Prof. Dr.-Ing. Ekkehard Laqua
Professional competence: In-depth knowledge and comprehension	
Lerninhalte	
Professional competence: In-depth knowledge and comprehension	Students are able to work independently on a defined topic in a results-oriented and appropriate manner according to scientific criteria and within a period of four months. The work includes: • Research, analysis, abstraction and structuring of information and technical literature • Independent acquisition of the relevant technical and methodological knowledge • Written formulation of the contents using the appropriate technical terms according to a scientific approach.
Professional competence: conative skills, analysis and synthesis of knowledge	• Apply scientific methods and procedures • Clearly structure content
Personal competence: Social abilities and skills	• The students can integrate themselves into the respective work environment. • They organize the necessary documents and make appointments with the supervisor and, if applicable, the respective other contact person. • They can accept criticism, deal with it constructively and incorporate it into the bachelor thesis. • The students are able to communicate their results and findings to experts, to argue and to represent them.
Personal competence: Independence / autonomy)	• Independent prioritization, differentiation and classification of the relevant technical and methodological knowledge in the bachelor thesis • Independently answer the question of the bachelor thesis by interpreting, evaluating and reflecting on the results obtained • Setting learning and work goals independently
Competence levels according to GQF	6

Prerequisites (see below)	The topic of the Bachelor's thesis must be submitted at the earliest in the 6th semester and at the latest 6 months after the end of the semester in which the last subject examination was successfully completed.
Module specifics	None
Scheduled	
Combined assessments	

Course unit title BT1.1 364301 Bachelor Thesis

This course unit forms part of module BT, it is Compulsory.

Name of lecturer(s)	Prof. Dr. Markus Speidel Prof. Dr.-Ing. Mohamed Ibrahim Prof. Dr.-Ing. Ekkehard Laqua Prof. Dr.-Ing. Anke Ostertag
Semester	7
Available in	each term
Mode of delivery	Event
Language of instruction	english
Course unit title (German)	Bachelor Thesis
Number of ECTS credits awarded	12.0
Contact hours per week (45 mins each)	
Workload: Contact hours	25
Workload: Independent studies	275
Workload details	
Type of assessment	Bachelor Thesis
Duration of assessment	
Type of course unit	Compulsory
Prerequisites (see below)	Practical semester and Internship colloquium, BT Colloquium
Planned learning activities and teaching methods	Independent development of a scientific paper.
Professional competence: In-depth knowledge and comprehension (Bloom)	See module description.
Professional competence : conative skills, analysis and synthesis of knowledge	See module description.
Personal competence: Social abilities and skills	See module description.
Personal competence: Independence / autonomy	See module description.
Competence levels according to GQF	6
Course unit contents	Learning objectives: Students independently choose a topic. Qualification objectives: Independent work and written presentation of a defined subject area in the context of the degree program in a given period of four months, taking into account scientific approaches.
Recommended optional programme components	

Additional specifics	Findings from the project lab and project lab report can be incorporated into the bachelor thesis.
Recommended or required reading	
Scheduled	
Combined assessments	

Course unit title BT1.2 364302 BT Colloquium

This course unit forms part of module BT, it is Compulsory.

Name of lecturer(s)	Prof. Dr. Markus Speidel Prof. Dr.-Ing. Mohamed Ibrahim Prof. Dr.-Ing. Ekkehard Laqua Prof. Dr.-Ing. Anke Ostertag
Semester	7
Available in	each term
Mode of delivery	Event/Exercise
Language of instruction	english
Course unit title (German)	BT Colloquium
Number of ECTS credits awarded	3.0
Contact hours per week (45 mins each)	
Workload: Contact hours	
Workload: Independent studies	75
Workload details	
Type of assessment	Preliminary examination based on a paper / a presentation
Duration of assessment	15
Type of course unit	Compulsory
Prerequisites (see below)	The prerequisite is the successful completion of the bachelor thesis
Planned learning activities and teaching methods	On-site event, scientific colloquium
Professional competence: In-depth knowledge and comprehension (Bloom)	Students are familiar with the specialist literature on their chosen topic. They are familiar with the scientific standards and guidelines for writing and presenting a final thesis.
Professional competence : conative skills, analysis and synthesis of knowledge	The students present the results of the bachelor thesis and the necessary technical principles orally. They present their work results in a comprehensible and coherent way in front of the class. They explain their approach and can competently answer questions about their work results.
Personal competence: Social abilities and skills	Students are able to exchange ideas on a problem, formulate their own point of view and their research methodology, as well as approaches to solutions, and argue in favor of them.
Personal competence: Independence / autonomy	Students can independently define and reflect on work objectives for their bachelor thesis and presentation. They can independently assess and evaluate the dimensions of designing and implementing the BT and its presentation.
Competence levels according to GQF	6
Course unit contents	In this course, students present and discuss the planned scientific thesis in front of the plenum.

Recommended optional programme components	
Additional specifics	None
Recommended or required reading	
Scheduled	StarPlan: https://splan.hs-heilbronn.de/
Combined assessments	