



Module Handbook for Exchange Students

Winter Semester 25/26

Please read the information before setting up your learning agreement.

1. Our Master courses **are not open for Bachelor students**, and we cannot make any exceptions.
2. The German half level course is recommended for exchange students (German A1.1). Intensive courses are not open to exchange students.
3. The admission requirement is a mandatory part of the course (e.g., practical course). Students can only qualify for the exam if they have successfully completed the admission requirement. Successfully completed means that all the different parts of the admission requirement must be passed. Please check if the course requires an admission requirement and **make sure that you will check this again with the lecturer during your first weeks into the semester.**
4. Courses which are not listed in the guest student's module handbook are not open for exchange students. Please do not contact us, the faculty, or the lecturer to ask for permission! Again: no exceptions are made!
5. Concerning the course "International Business Simulation": Please note: the computer simulation game must be accepted by **October 10th, 2025.**
6. Concerning the Business school courses "Strategic Management" and "Strategic Management – Case Studies": **Please note that both subjects of the module must be attended and passed to receive ECTS!!!**
7. Global Business – Master: These courses are available on request only! Students must have previous knowledge of business administration.
8. **This module handbook is subject to change.** The latest version of the module handbook will be published on the THI website beginning of October 2025.

During the Orientation Week our International Office will help you with the course registration.

Content:

- [Faculty of Mechanical Engineering](#)
- [Faculty Engineering and Management](#)
- [Faculty of Electrical Engineering and Information Technology](#)
- [Faculty of Computer Science](#)
- [Faculty of Business School](#)
- [Language Center](#)



Course Descriptions

Mechanical Engineering

International Office

Winter term 2025/26

As per: 2025-08-29

This program and course description becomes effective on 01.10.2025. It supplements the program and examination regulations and secures the offerings in courses. Additionally, it contains detailed information about courses, contents, assessments and examinations.

Energy Systems and Renewable Energies

Subject	SWS	ECTS
Basics of Mechanical Design	4	5
Computer Science in Engineering	4	5
Computer Science in Engineering (admission requirement)	2	0
Electrical Engineering	4	5
Energy from Biomass and Biogenic Residues	5	5
Engineering Mathematics 1	5	5
Fluid Mechanics	5	5
Fluid Mechanics (admission requirement)	2	0
Machine Elements	4	5
Measurement Engineering	4	5
Mobility within the Energy System	4	5
Statics	4	5
Thermodynamics 2	4	5

Master RES - **Master**

Subject	SWS	ECTS
Energy Management and Energy Efficiency	4	5
System Analysis and Control	4	5

Basics of Mechanical Design	
Module abbreviation:	BMDesign_ESYS
Curriculum:	Programmes
	Energy Systems and Renewable Energies (ESYS-B) - SPO-Nr.: 6
Responsible for module:	Moll, Klaus-Uwe
Lecturers:	Burger, Uli
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	6: Basics of Mechanical Design (BMDesign_ESYS)
Lecture types:	6-Basics of Mechanical Design: SU/Ü - lecture with integrated exercises (BMDesign_ESYS)
Studien- / Prüfungsleistungen:	
6-Basics of Mechanical Design: schrP120 - written exam, 120 minutes (BMDesign_ESYS)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>6 Basics of Mechanical Design:</i> The students • know which standards have to be taken into account for the creation of technical drawings. • can use these standards to create complete and standardized graphic representations of constructions. • can use the various projection methods. • know what tolerances exist and can apply this knowledge correctly. • can apply their knowledge of the representation of the representation of various machine elements in technical drawings. • can develop new components and assemblies by linking their knowledge and design them for production.	
Content:	
<i>6 Basics of Mechanical Design:</i> • Contents of technical drawings • Symbolic representations used • Projection methods for the graphic representation of technical products • Sectional representations, cutouts, views, details • Dimensioning, dimensioning rules, edge symbols • ISO tolerance system, surface information, shape and position tolerances, tolerance calculation • Typical machine elements and standard parts and their graphic representation • Design guidelines for various manufacturing processes • Creation of freehand sketches • Geometrical product specification	

Literature:

6 Basics of Mechanical Design (BMDesign_ESYS):

Compulsory:

- GOMERINGER, Roland and others, 2018. *Mechanical and Metal Trades Handbook*. Haan-Gruiten: Verlag Europa-Lehrmittel, Nourney, Vollmer GmbH & Co. KG. ISBN 978-3-8085-1915-8, 3-8085-1915-0
- ISO, 2020. *ISO 128-1:2020: Technical product documentation (TPD) — General principles of representation — Part 1: Introduction and fundamental requirements*. . Berlin: Beuth
- ISO, 2022. *ISO 128-2:2022: Technical product documentation (TPD) - General principles of representation - Part 2: Basic conventions for lines*. . Berlin: Beuth
- ISO, 2022. *ISO 128-3:2022: Technical product documentation (TPD) - General principles of representation - Part 3: Views, sections and cuts*. . Berlin: Beuth
- ISO, 2020. *ISO 128-100:2020: Technical product documentation - General principles of representation - Part 100: Index*. . Berlin: Beuth
- DIN EN ISO, 2013. *ISO 286-1:2010 + Cor 1:2013: Geometrical product specifications (GPS) - ISO code system for tolerances on linear sizes - Part 1: Basis of tolerances, deviations and fits*. . Berlin: Beuth
- DIN EN ISO, 2013. *ISO 286-2:2010 + Cor 1:2013: Geometrical product specifications (GPS) - ISO code system for tolerances on linear sizes - Part 2: Tables of standard tolerance classes and limit deviations for holes and shafts*. . Berlin: Beuth

Recommended:

None

Computer Science in Engineering	
Module abbreviation:	CScEng_ESYS
Curriculum:	Programmes
	Energy Systems and Renewable Energies (ESYS-B) - SPO-Nr.: 3
Responsible for module:	Lange, Marlene
Lecturers:	Lange, Marlene (CScEng_ESYS) Lange, Marlene (CScEngAR_ESYS)
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	3: Computer Science in Engineering (CScEng_ESYS) 3.1: Computer Science in Engineering (admission requirement) (CScEngAR_ESYS)
Lecture types:	SU/Ü/Pr - seminar based teaching / exercise course / laboratory
Studien- / Prüfungsleistungen:	
3-Computer Science in Engineering: schrP90 - written exam, 90 minutes (CScEng_ESYS) 3.1-Computer Science in Engineering (admission requirement): (Practical work), 2-7 experiments with 2-5 pages of documentation each (CScEngAR_ESYS) Additional Explanation: None	
Recommended prerequisites:	
None	
Objectives:	
<i>3 Computer Science in Engineering:</i> After attending the course, students - understand the basic principles of data representation and processing with computers. - have the ability to develop a solution to a given problem and to represent it as an algorithm so that it can be implemented into a programming language. - have basic programming knowledge that enables the creation and execution of simple programs and the ability to define and implement the interfaces of a system. - understand syntax and semantics of a programming language. - achieve basic skills about the implementation of arbitrary real-world entities into a programming language. - are able to create a structured model from a set of requirements that can be implemented in a programming language. - have a practical understanding about hard and software in the field of computer science. - can discuss within the field of computer science and engineering. <i>3 Computer Science in Engineering (admission requirement) (CScEngAR_ESYS):</i> The goal of the admission requirement is that the students learn to practically apply the theory of the computer science course. They learn: - to develop and implement simple algorithms. - to write, execute and debug a computer program.	

- the basic syntax and semantics of a programming language.

Content:

3 Computer Science in Engineering:

- History of computers and programming languages
- Data representation within computers
- Introduction to algorithms
- Basic syntax and semantics of a programming language
- Variables and data types
- Control structures (loops, conditionals)
- Functions for code organization
- Working with basic data structures
- Writing and debugging code
- The principles of object-oriented programming (OOP)
- Creating and using classes and objects

3 Computer Science in Engineering (admission requirement) (CScEngAR_ESYS):

The students have to solve a given number of tasks from the area of computer science. Depending on the level of task completion they are admitted to the final exam, or not.

Literature:

3 Computer Science in Engineering (CScEng_ESYS):

Compulsory:

None

Recommended:

- CORMEN, Thomas H. and others, 2009. *Introduction to algorithms*. Cambridge, Massachusetts; London, England: The MIT Press. ISBN 978-0-262-27083-0
- INDEN, Michael, 2022. *Python Challenges: 100 Proven Programming Tasks Designed to Prepare You for Anything* [online]. Berkeley, CA: Apress PDF e-Book. ISBN 978-1-4842-7398-2. Available via: <https://doi.org/10.1007/978-1-4842-7398-2>.
- PETZOLD, Charles, 2000. *CODE: the hidden language of computer hardware and software*. Redmond, Wash.: Microsoft Press. ISBN 0-7356-0505-X, 0-7356-1131-9
- MATTHES, Eric, 2023. *Python crash course: a hands-on, project-based introduction to programming*. San Francisco: No Starch Press. ISBN 978-1-7185-0270-3

3 Computer Science in Engineering (admission requirement) (CScEngAR_ESYS):

Compulsory:

None

Recommended:

- See recommended literature for the Computer Science in Engineering course.

Electrical Engineering	
Module abbreviation:	ETE_ESYS
Curriculum:	Programmes
	Energy Systems and Renewable Energies (ESYS-B) - SPO-Nr.: 10
Responsible for module:	Navarro Gevers, Daniel
Lecturers:	Navarro Gevers, Daniel; Ndong, Massa
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	10: Electrical Engineering (ETE_ESYS)
Lecture types:	10-Electrical Engineering: SU/Ü - lecture with integrated exercises (ETE_ESYS)
Studien- / Prüfungsleistungen:	
10-Electrical Engineering: schrP90 - written exam, 90 minutes (ETE_ESYS)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>10 Electrical Engineering:</i> The students • know and use specialist terminology confidently. • know the basic physical laws of electrical engineering and their connection. • know the boundary conditions of particular laws of physics. • are able to select the appropriate laws defining a given problem. • are proficient in calculations with appropriate units. • are proficient in methods calculating direct current and alternate current networks. • know the electrical field quantities and are able to calculate them. • know the magnetic field quantities and are able to calculate simple magnetic circuits. • know simple circuits with a transistor. • know basic circuits with an operational amplifier and are able to calculate those. • know measuring instruments for electric quantities and know their possible uses. • are able to familiarise themselves with subjects regarding electrical engineering self-reliant and within a team and are able to discuss these matters competently.	
Content:	
<i>10 Electrical Engineering:</i> • Direct current circuits: voltage, current, Ohm's law, energy, power, Kirchhoff's laws, Thevenin equivalent • Norton equivalent circuit, series connection, parallel connection, maximum power transfer, calculation of networks • Electric field: electric field quantities, capacitance, energy in the electrostatic field, forces in the electrostatic field, switching operations • Magnetic field: magnetic field quantities, coil inductance, magnetic circuit, magnetic flux law, magnetic	

energy of the coil, forces in the magnetic field, induction law, self-induction, switching operations

- Alternate current circuit: sinusoidal change of electric quantities, circuit analysis of alternate current networks using complex numbers, power
- Semiconductors: diode, transistor, operational amplifier, basics of electric circuits; digital circuits
- Measuring electric quantities

Literature:

10 Electrical Engineering (ETE_ESYS):

Compulsory:

- HACKER, Viktor and Christof SUMEREDER, 2020. *Electrical engineering : fundamentals*. München; Wien: De Gruyter Oldenbourg. ISBN 9783110521023
- KORIES, Ralf and Heinz SCHMIDT-WALTER, 2003. *Electrical Engineering : A Pocket Reference*. Berlin, Heidelberg: Springer. ISBN 978-3-540-43965-3

Recommended:

- Further literature will be announced in the lecture.

Energy from Biomass and Biogenic Residues	
Module abbreviation:	EBBR_ESYS
Curriculum:	Programmes
	Energy Systems and Renewable Energies (ESYS-B) - SPO-Nr.: 30 Maschinenbau Bachelor (MB-B) - SPO-Nr.: 27
Responsible for module:	Goldbrunner, Markus
Lecturers:	Goldbrunner, Markus
Language of instruction:	English
Credit points / SWS:	5 ECTS / 5 SWS
Workload:	Contact hours: 58 h
	Self-study: 67 h
	Total: 125 h
Subjects of the module:	30: Energy from Biomass and Biogenic Residues (EBBR_ESYS)
Lecture types:	30-Energy from Biomass and Biogenic Residues: SU/Ü/PR - seminar based teaching/Exercise course/laboratory (EBBR_ESYS)
Studien- / Prüfungsleistungen:	
30-Energy from Biomass and Biogenic Residues: schrP90 - written exam, 90 minutes (EBBR_ESYS) Additional Explanation: None	
Recommended prerequisites:	
Thermodynamics I, Thermal Energy Technologies and Power Plants	
Objectives:	
<i>30 Energy from Biomass and Biogenic Residues:</i> The students - are able to classify and evaluate the importance of bioenergy in today's and future energy supply. - know the most important renewable raw materials, their properties and sources of supply. - know the most important process engineering principles of the use of biomass (combustion, gasification, fermentation, fuel production) and can apply them. - know the technical concepts and the most important details of the various bioenergy plants for heat, electricity and fuel production and can use them in plant planning and evaluation. - can conceptualise a bioenergy plant, evaluate it economically and present the concept.	
Content:	
<i>30 Energy from Biomass and Biogenic Residues:</i> Introduction - Greenhouse effect and renewable energies (focus on biomass, cycle) - Properties and cultivation of renewable raw materials, problems - Pathways of biomass use - Organic residues, food waste and biowaste as feedstocks for energy use - Basic economic considerations - Aspects of licensing law Heat generation - Combustion concepts for large-scale plants - Combustion concepts for small-scale plants	

- Heat grids

Power generation through combustion

- Fundamentals of combustion
- Emissions
- Special features and design of the firing system
- Plant technology
- Use of waste wood and other residues

Power generation through thermal gasification

- Fundamentals of gasification, reaction kinetics
- Gasifier concepts
- Plant technology
- Utilisation of the gas
- Emissions

Power generation through fermentation (biogas)

- Substrate preparation / utilisation
- Basics of fermentation
- Plant technology
- Biogas pre-treatment, drying, cleaning (desulphurisation), special features of organic residues
- Gas treatment to natural gas quality (CO₂ separation, different processes)

Fuels from renewable raw materials

- Basics of fuel production, synthesis
- Biomethane as fuel, filling stations for agriculture (biogas filling stations)
- 1st generation fuels
- 2nd generation fuels

Seminar: Planning a bioenergy production plant

- Plant planning according to HOAI
- Economic efficiency calculation according to VDI 2067
- Conceptual design and presentation of the concept
- Approval

Literature:

30 Energy from Biomass and Biogenic Residues (EBBR_ESYS):

Compulsory:

- WELLINGER, Arthur, 2013. *The biogas handbook: science, production and application*. Oxford [u.a.]: Woodhead Publ.. ISBN 978-0-85709-498-8
- SPLIETHOFF, Hartmut, 2010. *Power Generation from Solid Fuels* [online]. Berlin: Springer Berlin PDF e-Book. ISBN 978-3-642-02856-4. Available via: <https://doi.org/10.1007/978-3-642-02856-4>.

Recommended:

- Further literature will be announced in the lecture.

Energy Management and Energy Efficiency - Master	
Module abbreviation:	WMod_EnManaEnEff_M-RES
Curriculum:	Programmes
	Master RES (M-Res) - SPO-Nr.: 8
Responsible for module:	Weitz, Klaus Peter
Lecturers:	Patel, Dharmik; Weitz, Klaus Peter
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	8: Energy Management and Energy Efficiency (WMod_EnManaEnEff_M-RES)
Lecture types:	8-Energy Management and Energy Efficiency: SU/Ü - lecture with integrated exercises (WMod_EnManaEnEff_M-RES)
Studien- / Prüfungsleistungen:	
8-Energy Management and Energy Efficiency: LN - written exam, 90 minutes (WMod_EnManaEnEff_M-RES)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>8 Energy Management and Energy Efficiency:</i> The students - understand the design rules of a photovoltaic system and will be able to layout specific systems. - are familiar with supply versus demand simulations of photovoltaic system in industrial environments and understand methods to increase self consumption of produced energy. - understand the different contributions of the electricity bill and know methods to reduce costs. - can analyze and understand electric load profiles and extract exposed loads. - understand energy management systems and know how to manage exposed loads. - are familiar with the cross-sectional technologies in industrial companies, can identify potential of savings and take measures to reduce energy consumption.	
Content:	
<i>8 Energy Management and Energy Efficiency:</i> - Photovoltaic: design rules for solid photovoltaic system layout (connection module to inverter). Overall planning of photovoltaic systems. Simulation of provided energy. - Electric load profile: analyzing electric load profiles and identification of exposed loads. - Supply versus demand simulation of photovoltaic systems in industrial environments. Methods of supply and demand displacements. - Contributions to energy costs of industrial companies and methods to reduce the cost level. - Energy management systems in industrial companies (DIN EN ISO 50001 and DIN EN 16247). - Methods to identify, measure and manage energy consumption of exposed loads. - Methods to analyze general cross-sectional technologies (compressed air, ventilation, cooling, process heating, lighting, heat recovery). - Methods to identify and reduce the energy consumption of cross-sectional technologies (electricity and	

other energy sources).

Literature:

8 Energy Management and Energy Efficiency (WMod_EnManaEnEff_M-RES):

Compulsory:

- BILGE, Ali Nezihi, 2015. *Energy systems and management* [online]. Cham: Springer International Publishing PDF e-Book. ISBN 978-3-319-16024-5, 978-3-319-16023-8. Available via: <https://doi.org/10.1007/978-3-319-16024-5>.
- THORPE, David, 2014. *Energy management in industry: the Earthscan Expert Guide*. London: Routledge, Taylor & Francis Group. ISBN 978-1-134-64941-9, 1-134-64941-X

Recommended:

None

Engineering Mathematics 1	
Module abbreviation:	EMath1_ESYS
Curriculum:	Programmes
	Energy Systems and Renewable Energies (ESYS-B) - SPO-Nr.: 1
Responsible for module:	Horak, Jiri
Lecturers:	Horak, Jiri
Language of instruction:	English
Credit points / SWS:	5 ECTS / 5 SWS
Workload:	Contact hours: 58 h
	Self-study: 67 h
	Total: 125 h
Subjects of the module:	1: Engineering Mathematics 1 (EMath1_ESYS)
Lecture types:	1-Engineering Mathematics 1: SU/Ü - lecture with integrated exercises (EMath1_ESYS)
Studien- / Prüfungsleistungen:	
1-Engineering Mathematics 1: schrP120 - written exam, 120 minutes (EMath1_ESYS)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>1 Engineering Mathematics 1:</i> The students • develop their ability to recognize which questions in engineering can be answered using mathematics and can ask such questions themselves. • understand logical reasoning, recognize condition, consequence and rule, and can build a chain of reasoning in the context of engineering applications. • recognize known types of tasks in known and new contexts, can solve these tasks using known procedures. • understand the mathematical language used in engineering literature and can describe their own reasoning and solution approaches orally and in writing. • are able to deal confidently with the mathematical methods presented. • possess a basic knowledge of number systems, the notion of convergence, differential and integral calculus of functions of one variable, elementary differential equations, and their applications in engineering.	
Content:	
<i>1 Engineering Mathematics 1:</i> • Functions: basics, continuity, applications • Differentiation in R: basics, rules, applications • Integration in R: basics, methods of integration, applications • Complex numbers: basics, rules, applications • Ordinary differential equations: basics, solution methods, applications	

Literature:*1 Engineering Mathematics 1 (EMath1_ESYS):*

Compulsory:

- STRANG, Gilbert, 2017. *Calculus*. Wellesley, MA: Wellesley-Cambridge Press. ISBN 978-0-9802327-5-2
- STEWART, James, 2021. *Calculus: early transcendentals*. Australia: Cengage Learning. ISBN 978-0-357-11351-6

Recommended:

- STROUD, Kenneth Arthur and Dexter J. BOOTH, 2021. *Engineering mathematics*. New York; London; Oxford; New Delhi; Sydney: Bloomsbury Academic. ISBN 978-1-352-01027-5

Fluid Mechanics	
Module abbreviation:	FluMech_ESYS
Curriculum:	Programmes
	Energy Systems and Renewable Energies (ESYS-B) - SPO-Nr.: 21
Responsible for module:	Bschorer, Sabine
Lecturers:	Bschorer, Sabine (FluMech_ESYS) Bschorer, Sabine (FluMechAR_ESYS)
Language of instruction:	English
Credit points / SWS:	5 ECTS / 5 SWS
Workload:	Contact hours: 58 h
	Self-study: 67 h
	Total: 125 h
Subjects of the module:	21: Fluid Mechanics (FluMech_ESYS) 21.1: Fluid Mechanics (admission requirement) (FluMechAR_ESYS)
Lecture types:	21-Fluid Mechanics: SU/Ü/PR - seminar based teaching/Exercise course/laboratory (FluMech_ESYS) 21.1-Fluid Mechanics (admission requirement): SU/Ü/PR - seminar based teaching/Exercise course/laboratory (FluMechAR_ESYS)
Studien- / Prüfungsleistungen:	
21-Fluid Mechanics: schrP90 - written exam, 90 minutes (FluMech_ESYS) 21.1-Fluid Mechanics (admission requirement): (Practical work), 2-7 experiments with 2-5 pages of documentation each (FluMechAR_ESYS) Additional Explanation: <i>21 Fluid Mechanics:</i> LN = admission requirement for the exam (Leistungsnachweis) Within a practical course a total of 5 experiments are carried out in the laboratory. The students prepare an experimental protocol for each experiment. In addition, an exercise task must be presented in class. Proof of performance (grade 'passed') is achieved if the experiments have been carried out successfully and the presentation of the task has been carried out satisfactorily. <i>21 Fluid Mechanics (admission requirement) (FluMechAR_ESYS):</i> Successful participation in 5 laboratory sessions and presentation of one exercise as a group	
Recommended prerequisites:	
None	
Objectives:	
<i>21 Fluid Mechanics:</i> After attending the module courses, participants will be able to - understand and use the technical terms. - calculate analytically and evaluate either incompressible and compressible flow through pipes and around bodies. - estimate analytically pressure losses and energy consumption of fluid mechanics problems. - describe roughly the flow simulation (Computational Fluid Dynamics), in other words the digitalization in the field of fluid mechanics. - use flow measuring devices independently and to evaluate experiments. <i>21 Fluid Mechanics (admission requirement) (FluMechAR_ESYS):</i>	

The students deepen the lecture material during laboratory hours (learning by doing), to use flow measuring devices independently and to evaluate experiments.

Content:

21 Fluid Mechanics:

- Introduction and basic concepts
- Properties of fluids (density, viscosity)
- Hydrostatics and aerostatics
- Conservation equations (continuity, Bernoulli, lateral pressure, momentum conservation and Navier-Stokes-equations)
- Dimensionless quantities: Re, Ma-number
- Incompressible flow through bodies: viscous pipe flow, laminar vs. turbulent, pressure loss, pipe friction, non-circular sections, losses in pipeline elements (manifolds, nozzle)
- Incompressible flow around bodies: laminar vs. turbulent boundary layer, pressure and frictional resistance, aerodynamic forces on vehicles and aerofoils, Magnus effect
- Compressible flow: fundamental equations, pipe flow, process of outflow, de Laval nozzle
- Overview of flow simulation (approach, base equations, examples of use)
- Laboratory work about the topics as wind tunnel, flow around and through bodies

21 Fluid Mechanics (admission requirement) (FluMechAR_ESYS):

- Laboratory work about the topics: Wind tunnel, external and internal flow, wind turbine, supersonic flow
- Calculation of an exercise and presenting it to the group

Literature:

21 Fluid Mechanics (FluMech_ESYS):

Compulsory:

None

Recommended:

- ÇENGEL, Yunus A., John M. CIMBALA and Mehmet KANOĞLU, 2020. *Fluid mechanics: fundamentals and applications*. [Singapore]: McGraw-Hill. ISBN 978-981-315-788-0, 981-315-788-7
- JANNA, William S., 2016. *Introduction to fluid mechanics*. Boca Raton, Fla. [u.a.]: CRC Press, Taylor & Francis Group. ISBN 978-1-4822-1161-0
- KUNDU, Pijush K., Ira M. COHEN and David R. DOWLING, 2016. *Fluid mechanics*. Amsterdam [u.a.]: Elsevier/Academic Press. ISBN 0-12-405935-X, 978-0-12-405935-1
- FALKOVICH, Gregory, 2018. *Fluid mechanics* [online]. Cambridge: Cambridge University Press PDF e-Book. ISBN 978-1-316-41660-0. Available via: <https://doi.org/10.1017/9781316416600>.
- FALKOVICH, Gregory, 2018. *Fluid mechanics*. Cambridge ; New York, NY ; Melbourne, VIC ; New Delhi ; Singapore: Cambridge University Press. ISBN 978-1-107-12956-6
- HUTTER, Kolumban, WANG, Yongqi, 2016. *Fluid and Thermodynamics: Volume 1: Basic Fluid Mechanics* [online]. Cham: Springer PDF e-Book. ISBN 978-3-319-33633-6, 978-3-319-33632-9. Available via: <https://doi.org/10.1007/978-3-319-33633-6>.
- HUTTER, Kolumban, WANG, Yongqi, 2016. *Fluid and Thermodynamics: Volume 2: Advanced Fluid Mechanics and Thermodynamic Fundamentals* [online]. Cham: Springer PDF e-Book. ISBN 978-3-319-33636-7, 978-3-319-33635-0. Available via: <https://doi.org/10.1007/978-3-319-33636-7>.
- HUTTER, Kolumban and Yongqi WANG, 2016. *Fluid and thermodynamics*. [Cham]: Springer.

Machine Elements	
Module abbreviation:	MachElem_ESYS
Curriculum:	Programmes
	Energy Systems and Renewable Energies (ESYS-B) - SPO-Nr.: 13
Responsible for module:	Moll, Klaus-Uwe
Lecturers:	Fuchs, Daniel
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	13: Machine Elements (MachElem_ESYS)
Lecture types:	13-Machine Elements: SU/Ü - lecture with integrated exercises (MachElem_ESYS)
Studien- / Prüfungsleistungen:	
13-Machine Elements: schrP90 - written exam, 90 minutes (MachElem_ESYS)	
Additional Explanation:	
None	
Recommended prerequisites:	
Statics, Basics of Mechanical Design, Mechanics of Materials, Material Science	
Objectives:	
<i>13 Machine Elements:</i> At the end of the course, the students will be able to • apply the terminology of the subject and discuss assignments with peers. • to independently select and dimension the machine elements required for a design and to integrate it into an overall construction. • apply the calculation and design methods for the treated machine elements on engineering level and to combine them with knowledge of statics, strength of materials, materials science and mechanical design. • transfer the knowledge gained to other machine elements.	
Content:	
<i>13 Machine Elements:</i> • Fastening screws (stress diagram, proof of strength statically and dynamically) • Pins and bolts (load bearing capacity, shear stress) • Springs (static and dynamic proof of strength for coil springs, disk springs, torsion springs) • Axles and shafts (design and fatigue strength) • Shaft-hub connections (positive and positive shaft-hub connections) • Rolling bearings (service life calculation, design of storage and bearing point) • Spur gears (gear law, design of spur gears and simple gears) • Clutches (switchable and non-switchable clutches) • seals and lubrication • Other machine elements	

Literature:

13 Machine Elements (MachElem_ESYS):

Compulsory:

- DIN, 2021. *6885-1: Drive type fastenings without taper action, parallel keys, keyways - Deep pattern*. . Berlin: Beuth
- DIN, 2021. *6885-2: Drive type fastenings without taper action, parallel keys, keyways - Deep pattern for machine tools*. . Berlin: Beuth
- DIN, 2021. *6885-3: Drive type fastenings without taper action, parallel keys, keyways - Low pattern - Part 3: Dimensions, tolerances, mass*. . Berlin: Beuth
- DIN, 2012. *743-1: Calculation of load capacity of shafts and axles - Part 1: General*. . Berlin: Beuth
- DIN, 2012. *743-2: Calculation of load capacity of shafts and axles - Part 2: Theoretical stress concentration factors and fatigue notch factors*. . Berlin: Beuth
- DIN, 2012. *743-3: Calculation of load capacity of shafts and axles - Part 3: Strength of materials*. . Berlin: Beuth
- DIN, 2012. *743-4: Calculation of load capacity of shafts and axles - Part 4: Fatigue limit, endurance limit - Equivalently damaging continuous stress*. . Berlin: Beuth

Recommended:

- DECKER, Karl-Heinz, Frank RIEG and Karlheinz KABUS, 2018. *Maschinenelemente - Funktion, Gestaltung und Berechnung: mit 871 Bildern, 164 Berechnungsbeispielen und einem Tabellenband mit 334 Tabellen und Diagrammen*. 20. edition. München: Hanser. ISBN 978-3-446-45029-5, 3-446-45029-7
- NISBETT, J. Keith and Richard G. BUDYNAS, 2024. *Shigley's Mechanical Engineering Design*. 12. edition. New York: McGraw-Hill Education. ISBN 978-1266929892

Measurement Engineering	
Module abbreviation:	MeasmEng_ESYS
Curriculum:	Programmes
	Energy Systems and Renewable Energies (ESYS-B) - SPO-Nr.: 22
Responsible for module:	Müller, Dieter
Lecturers:	Schwerd, Simon
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	22: Measurement Engineering (MeasmEng_ESYS)
Lecture types:	22-Measurement Engineering: SU/Ü/PR - seminar based teaching/Exercise course/laboratory (MeasmEng_ESYS)
Studien- / Prüfungsleistungen:	
22-Measurement Engineering: schrP90 - written exam, 90 minutes (MeasmEng_ESYS)	
Additional Explanation:	
None	
Recommended prerequisites:	
Engineering mathematics 1 and 2	
Objectives:	
<i>22 Measurement Engineering:</i> Students will • know the basic terms of measurement technology. • know important measuring sensors and their characteristics for frequently occurring measured quantities in mechanical engineering. • understand data sheets of measuring elements and devices. • can select suitable measuring elements and devices for measuring tasks. • can estimate, determine and evaluate measurement deviations. • can apply the distribution function, also beyond measurement technology.	
Content:	
<i>22 Measurement Engineering:</i> • Basic terms of measurement technology • Measurement deviations including: • Statistical principles for the treatment of random deviations. • Error propagation, - linear regression, - dynamic behaviour and dynamic deviations of measuring elements • Measurement of mechanical quantities • Measurement of electrical quantities, digital measurement, measurement systems • Temperature measurement • Flow measurement • Special sensors	

Literature:

22 Measurement Engineering (MeasmEng_ESYS):

Compulsory:

None

Recommended:

- MATILDA, S. and others, 2021. *Basic Electrical Electronics and Measurement Engineering*. Chennai: Ugam Books. ISBN 8194482543
- BALAYI, B. and others, 2021. *Basic Electrical, Electronics and Instrumentation Engineering*. Chennai: Ugam Books. ISBN 8194482550

Mobility within the Energy System	
Module abbreviation:	MobES_ESYS
Curriculum:	Programmes
	Energy Systems and Renewable Energies (ESYS-B) - SPO-Nr.: 29
Responsible for module:	Gelner, Alexander
Lecturers:	Gelner, Alexander; Kocak, Laura; Zade, Michel
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	29: Mobility within the Energy System (MobES_ESYS)
Lecture types:	29-Mobility within the Energy System: SU/Ü/PR - seminar based teaching/Exercise course/laboratory (MobES_ESYS)
Studien- / Prüfungsleistungen:	
29-Mobility within the Energy System: SA - Seminar paper with oral presentation (15 min), written elaboration (8-15 pages) or presentation (15-20 pages) (MobES_ESYS) Additional Explanation: None	
Recommended prerequisites:	
Basic battery knowledge Basic knowledge of energy economics Basic knowledge of renewable energies Basic knowledge of business administration Combination with other lectures/topics Builds on and deepens other lectures: - o Energy distribution and CHP - o Smart Grids and Wind Energy - o Energy systems and energy economics - o Energy markets and sector coupling (very important)	
Objectives:	
<i>29 Mobility within the Energy System:</i> The students • will have knowledge of different technologies for reducing CO2 emissions in the field of mobility, like electromobility, renewable gases (methane and hydrogen) and renewable liquid fuels. • will be able to classify the different technologies and evaluate their interactions with the energy system as well as their economic impacts. • will also be able to evaluate the electrical loads resulting from "fuel production" using renewable electricity. • will understand in detail the technological and economical aspects of E-mobility and its impact on the energy system. • will have an overview of possible changes in future mobility on the energy system areas: power generation, grid and consumption.	

Content:

29 Mobility within the Energy System:

Future mobility

- From the perspective of electricity demand
- Presentation of mobility options
- CO2 emissions and CO2 reduction

Legal and regulatory framework:

- Promotion of e-mobility
- Biofuel quota law, sustainability requirement
- Grid fees (electricity, gas), levies, taxes, energy tax
- Emission reduction requirements, fleet consumption
- Promotion of e-vehicles and promotion of gas-powered vehicles

The different energy sources for the mobility of the future are discussed:

Liquid fuels in internal combustion engines (overview):

- Biofuels (overview only, review of biomass lecture).
 - Ethanol in mobility, ethanol production
 - Biodiesel in mobility, biodiesel production
 - Second generation fuels (fuels from residues)
- Synthetic fuels
 - Synthetic fuels
 - Power to Liquid

E-mobility:

- Technology
- Effect on the power grid
- Billing

Gas Mobility:

- Introduction to gas vehicle technology using internal combustion engine and fuel cell:
- Tank technology
- Renewable gas production

Literature:

29 Mobility within the Energy System (MobES_ESYS):

Compulsory:

- DOPPELBAUER, Martin , 2024. *Introduction to Electromobility*. 2025. edition. Wiesbaden: Springer. ISBN 978-3-658-45481-4
- KLELL, Manfred , 2023. *Hydrogen in Automotive Engineering*. Wiesbaden: Springer. ISBN 978-3-658-45481-4
- HEYWOOD, John , 2018. *Internal Combustion Engines Fundamentals*. New York: McGrawHill Education. ISBN 978-1-26-011610-6

Recommended:

- Further literature will be announced in the lecture.

Statics	
Module abbreviation:	ST_ESYS
Curriculum:	Programmes
	Energy Systems and Renewable Energies (ESYS-B) - SPO-Nr.: 7
Responsible for module:	Feifel, Elke
Lecturers:	Feifel, Elke
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	7: Statics (ST_ESYS)
Lecture types:	SU/Ü - lecture with integrated exercises
Studien- / Prüfungsleistungen:	
7-Statics: schrP90 - written exam, 90 minutes (ST_ESYS) Additional Explanation: 7 Statics: None	
Recommended prerequisites:	
None	
Objectives:	
7 Statics: The students - understand the principles and methods of the statics of rigid bodies and can apply these to mechanical engineering tasks. - are able to convert real components and structures into simplified mechanical equivalent models. - are able to analyze the loads acting on a mechanical system - are able to calculate the bearing reactions and internal loads of statically determined structures under static loads. - are able to work on three-dimensional problems. - can calculate centers of gravity of lines, areas and volumes. - understand the basic concept of friction and can solve problems relating to this. - know the basic concepts of statics and can express themselves competently in the subject area. - are able to confidently apply mathematical principles to calculations. - have a capacity for abstraction and can solve tasks independently and in a team in a structured manner.	
Content:	
7 Statics: - Introduction to the basics of statics (bars, beams, plates, bearings and hinges, equilibrium conditions) - Central and common force systems - Analysis of mechanical structures, including trusses - Forces, moments, resultants, support reactions - Internal forces and moments - Spatial mechanical systems	

- Center of gravity
- Friction

Literature:

7 Statics (ST_ESYS):

Compulsory:

None

Recommended:

- GROSS, Dietmar and others, 2013. *Engineering Mechanics Statics*. Dordrecht: Springer. ISBN 978-3-662-53853-1
- HIBBELER, Russel C., 2016. *Engineering Mechanics: Statics in SI Units*. 14. edition. Hoboken: Pearson. ISBN 1-292-08923-7, 978-1-292-08923-2
- KESSEL, Siegfried and Dirk FRÖHLING, 2012. *Technische Mechanik - Engineering Mechanics Zweisprachiges Lehrbuch zu Grundlagen der Mechanik fester Körper - Bilingual Textbook on the Fundamentals of Solid Mechanics*. Wiesbaden: Springer. ISBN 978-3-8348-1719-8

System Analysis and Control	
Module abbreviation:	SysAnaCon_M-RES
Curriculum:	Programmes
	Master RES (M-Res) - SPO-Nr.: 2
Responsible for module:	Navarro Gevers, Daniel
Lecturers:	Navarro Gevers, Daniel
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	2: System Analysis and Control (SysAnaCon_M-RES)
Lecture types:	2-System Analysis and Control: SU/Ü - lecture with integrated exercises (SysAnaCon_M-RES)
Studien- / Prüfungsleistungen:	
2-System Analysis and Control: schrP90 - written exam, 90 minutes (SysAnaCon_M-RES)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>2 System Analysis and Control:</i> The students • can model a physical system. • Can characterize a control loop understanding what is the controller, the actuator, the measurement device and the system, • Can take a decision on the dynamic needs of a system response • Understands different methods of tuning the controllers to fulfill the dynamic demands • Know the different controller types and can decide which controller is needed for each case. • are able to apply different controller tuning methods and are able to predict the dynamic behavior of a system • are able to evaluate and discuss simulation results with respect to theory and experiments • can take the decision of existing hardware to design a given	
Content:	
<i>2 System Analysis and Control:</i> • System description • Definition of a control loop • Stability in a control loop • Transfer function • Frequency response • Main control variables • Root locus method • Alternative Design Methods	

- Design variables in a control system (calculation frequency, sample frequency, variables to be measured etc.)
- Response of first order and second order Systems
- Speed Control of a Wind turbine
- Frequency control in an electrical grid
- Application to practical problems (computer lab Matlab)

Literature:

2 *System Analysis and Control (SysAnaCon_M-RES)*:

Compulsory:

- OGATA, Katsuhiko, 2010. *Modern control engineering*. Boston [u.a.]: Pearson. ISBN 978-0-13-713337-6, 0-13-713337-5

Recommended:

None

Thermodynamics 2	
Module abbreviation:	ThermDyn2_ESYS
Curriculum:	Programmes
	Energy Systems and Renewable Energies (ESYS-B) - SPO-Nr.: 20
Responsible for module:	Bschorer, Sabine
Lecturers:	Bschorer, Sabine
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	20: Thermodynamics 2 (ThermDyn2_ESYS)
Lecture types:	20-Thermodynamics 2: SU/Ü/PR - seminar based teaching/Exercise course/laboratory (ThermDyn2_ESYS)
Studien- / Prüfungsleistungen:	
20-Thermodynamics 2: schrP90 - written exam, 90 minutes (ThermDyn2_ESYS) Additional Explanation: None	
Recommended prerequisites:	
None	
Objectives:	
<i>20 Thermodynamics 2:</i> After attending the module courses, participants will be able to • derive the differential equations of heat conduction on a volume element and solve these with given local/temporal boundary conditions. • characterize fluids using similarity parameters in order to calculate the heat transfer coefficient by means of appropriate Nusselt correlations. • plot temperature profiles in heat exchangers depending on the operating conditions and use characteristic diagrams to design heat exchangers or to evaluate feasible exit temperatures. • apply the principles of electro-magnetic heat radiation and of black and grey body radiation formula in order to approximate the heat transport of high temperature solids. • apply heat transfer mechanisms in the practical laboratory course.	
Content:	
<i>20 Thermodynamics 2:</i> Heat exchange by heat conduction • Fourier differential equation (heat conduction equation) • One-dimensional steady heat conduction • One-dimensional transient heat conduction Heat transfer by convection • Basics of thermo fluid dynamics • Forced convection • Natural convection • Heat exchangers	

Heat transfer by radiation

- Basic concepts of radiation
- Solid body radiation

Practical laboratory course

- Test preparation
- Test realisation
- Test evaluation

Literature:

20 Thermodynamics 2 (ThermDyn2_ESYS):

Compulsory:

None

Recommended:

- INCROPERA, Frank P. and others, 2017. *Incropera's principles of heat and mass transfer*. Hoboken, NJ: Wiley. ISBN 978-1-119-38291-1, 1-119-38291-2
- KARWA, Rajendra, 2020. *Heat and Mass Transfer* [online]. Singapore: Springer Singapore PDF e-Book. ISBN 978-981-153-988-6. Available via: <https://doi.org/10.1007/978-981-15-3988-6>.
- VENKATESHAN, S.P., 2021. *Heat Transfer* [online]. Cham: Springer International Publishing PDF e-Book. ISBN 978-3-030-58338-5. Available via: <https://doi.org/10.1007/978-3-030-58338-5>.
- NELLIS, G. F. and S. A. KLEIN, 2021. *Introduction to engineering heat transfer*. Cambridge: Cambridge University Press. ISBN 978-1-107-17953-0



Course Descriptions

Engineering and Management

International Office

Winter term 2025/26

As per: 2025-08-29

This program and course description becomes effective on 01.10.2025. It supplements the program and examination regulations and secures the offerings in courses. Additionally, it contains detailed information about courses, contents, assessments and examinations.

Design Leadership (Master)

<u>Subject</u>	<u>SWS</u>	<u>ECTS</u>
Advanced Management Theory and Methods	4	6

Engineering and Management

Subject	SWS	ECTS
Automation Technologies	4	5
Business Administration	4	5
Cost Accounting	4	5
Engineering Mechanics	5	5
Mathematics 1	5	5
Software Development	4	5

Master Automotive Production Engineering - Master

Subject	SWS	ECTS
Advanced Management Theory and Methods	4	6
Management Accounting & International Taxation	4	5
Automation and Equipment Technologies	4	5

Advanced Management Theory and Methods (Master)	
Module abbreviation:	AdMana_M-DL
Curriculum:	Programmes
	Design Leadership (M-DL) - SPO-Nr.: 3 Master Automotive Production Engineering (M-APE) - SPO-Nr.: 10
Responsible for module:	Schneider, Yvonne
Lecturers:	Schneider, Yvonne
Language of instruction:	English
Credit points / SWS:	6 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 103 h
	Total: 150 h
Subjects of the module:	3: Advanced Management Theory and Methods (AdMana_M-DL)
Lecture types:	SU/Ü - lecture with integrated exercises
Studien- / Prüfungsleistungen:	
3-Advanced Management Theory and Methods: schrP90 - written exam, 90 minutes (AdMana_M-DL) Additional Explanation: None	
Recommended prerequisites:	
None	
Objectives:	
<i>3 Advanced Management Theory and Methods:</i> By actively participating in this course, students: • are able to understand the basic elements of management in corporations. • are familiar with structures and processes in companies. • are aware of different roles and responsibilities in organizations. • understand decision-making processes in corporations. • know the key elements of a corporate strategy development in a company and the respective planning processes. • are aware of key strategy tools for analysis and should become able to use them. • get familiar with management accounting and financial tools of companies such as profit and loss statements, key performance indicators etc. • learn about functional aspects of a corporation, such as production or human resource management. • receive input how to exploit market opportunities via marketing activities. • obtain information on how to bring an idea to a start-up based on entrepreneurial activities. • gain ability to critically reflect corporate activities and decisions. Cases, examples and calculation exercises are integrated through the course to reinforce and to clarify major topics.	
Content:	
<i>3 Advanced Management Theory and Methods:</i> This module provides a general overview on theory, methods and challenges of Management. Among others, the following aspects will be discussed: • Leading the Organization	

- Developing Strategic Foresight
- Managing Financial performance
- Exploiting Market opportunities
- Excursus: Managing Start-up Activities

Literature:

3 Advanced Management Theory and Methods (AdMana_M-DL):

Compulsory:

- ROBBINS, Stephan P. and Mary COULTER, 2021. *Management*. ISBN 978-1-292-34088-3

Recommended:

- NICKELS, William G., James M. MCHUGH and Susan M. MCHUGH, 2022. *Understanding business*. New York, NY: McGraw-Hill. ISBN 978-1-266-04322-2, 1-266-04322-5

Automation and Equipment Technologies (Master)	
Module abbreviation:	WMod_A&ET_M-EGM
Curriculum:	Programmes
	Engineering and Management (M-EGM) - SPO-Nr.: 11
Responsible for module:	Großmann, Daniel
Lecturers:	Bednarz, Martin; Großmann, Daniel
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	11: (WMod_A&ET_M-EGM)
Lecture types:	SU/Ü-Lecture with exercises
Studien- / Prüfungsleistungen:	
11-Automation and Equipment Technologies: schrP90 - written exam, 90 minutes (WMod_A&ET_M-EGM) Additional Explanation: None	
Recommended prerequisites:	
None	
Objectives:	
11 : The students • get to know the fields of application of automation technologies in automotive production including suppliers. They can determine suitable application-oriented levels of automation (economic and technological). • know the structure and individual components of automation systems and their interaction in automotive production (amongst others, steerings, software, clamping systems, robots, transport technology, systems, factory). • can derive and assess interactions between automation technology and manufacturing technology/processes, product design, production design, productivity/availability. • can interpret robot systems in particular (single robot, robotic cells and gardens) mathematically and with planning (possibly do it themselves and programme using exercises/practical exercises in the lab). • know the planning and development processes of automation systems and equipment in automotive production (e.g. robot offline programming, accessibility simulations, virtual commissioning, tooling methods planning, forming simulation etc.) and their involvement in product/production development processes. • know the involvement, processes and technology of equipment manufacture for the development, construction and production of tools and systems. • learn the methods for the construction, commissioning and quality optimisation of systems and tools in conjunction with the production start-up processes. • get to know the tool machines used in automotive production and can assess these both technologically and economically (e.g. for procurement processes).	
Content:	
11 : • Robotics, automation and control technology in automotive manufacturing.	

- Equipment manufacturing: system manufacturing, tool and mould making, tool machines.

Literature:

Automation Technologies	
Module abbreviation:	AUT_EGM
Curriculum:	Programmes
	Engineering and Management (EGM-B) - SPO-Nr.: 26
Responsible for module:	Großmann, Daniel
Lecturers:	Großmann, Daniel
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	26: Automation Technologies (AUT_EGM)
Lecture types:	SU/Ü/Pr-Lecture with exercises and practical courses
Studien- / Prüfungsleistungen:	
26-Automation Technologies: schrP90 - written exam, 90 minutes (AUT_EGM)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>26 Automation Technologies:</i> After attending the lecture, students will be able to • have a basic understanding of automation technology. • recognise automation potential and the demand for automation. • have a basic understanding of information and communication technology in automation systems. • develop automation systems.	
Content:	
<i>26 Automation Technologies:</i> • Basics of industrial process and control • Sensors and actuators • Automation controller • Programming of automation controllers (with exercise) • Operation and monitoring • Industrial communication • Development of automation systems	
Literature:	
<i>26 Automation Technologies (AUT_EGM):</i> Compulsory: • DEY, Chanchal, SEN, Sunit Kumar, 2020. <i>Industrial automation technologies</i> [online]. Boca Raton ; London ; New York: CRC Press, Taylor & Francis Group PDF e-Book. ISBN 978-0-429-29934-6. Available via: https://doi.org/10.1201/9780429299346. Recommended:	

None

Business Administration	
Module abbreviation:	BA_EGM_E
Curriculum:	Programmes
	Engineering and Management (EGM-B) - SPO-Nr.: 9
Responsible for module:	Eisenberg, Andrea
Lecturers:	Albrecht, Tobias; Eisenberg, Andrea
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	9: Business Administration (BA_EGM_E)
Lecture types:	SU/Ü-Lecture with exercises
Studien- / Prüfungsleistungen:	
9-Business Administration: schrP90 - written exam, 90 minutes (BA_EGM_E)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>9 Business Administration:</i> The students - understand (on a high level) the various disciplines of business administration including the respective decision needs. - gain basic knowledge about selected practical business topics, which are not covered in subsequent subjects of the curriculum, including the setup of a company and human resource management. - can evaluate the implications of economics for business decisions. - can calculate and draw demand curve, supply curve and market equilibria as well as can apply the instruments to real life cases. - are able to analyse the importance of monetary policy, especially can explain the role of the central banks and can calculate a consumer price index and an inflation rate.	
Content:	
<i>9 Business Administration:</i> - Subjects of business administration and economics: economic principle, resources, companies, business as a science - Profit generation: the term profit, limitations, balance sheet, profit-/loss statement, shareholder value, entrepreneurial risks, leverage effect - Production factors (management, labour, means of production, raw material), further differentiation of management activities (leadership, planning, decision making, organization, monitoring) - Setup of a company: legal form, alliances & partnering, choice of industrial location - Human resource management: planning, recruiting, personnel layoff, personnel deployment, development, leadership - Microeconomics: market forms (polypoly, oligopoly, monopoly), price formation in the different market forms, market failure	

- Macroeconomics: monetary policy, definition of money, money creation, instruments of central banks, causes and consequences of inflation and deflation, consumer price index and inflation rate, economic welfare, gross domestic product (GDP), economic growth

Literature:

9 Business Administration (BA_EGM_E):

Compulsory:

- MANKIW, Nicholas Gregory and Mark P. TAYLOR, 2023. *Economics*. Andover, Hampshire: Cengage. ISBN 978-1-4737-8698-1

Recommended:

None

Cost Accounting	
Module abbreviation:	COSTA_EGM
Curriculum:	Programmes
	Engineering and Management (EGM-B) - SPO-Nr.: 18
Responsible for module:	Eisenberg, Andrea
Lecturers:	Eisenberg, Andrea
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	18: Cost Accounting (COSTA_EGM)
Lecture types:	SU/Ü-Lecture with exercises
Studien- / Prüfungsleistungen:	
18-Cost Accounting: schrP90 - written exam, 90 minutes (COSTA_EGM)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>18 Cost Accounting:</i> Students • can classify cost by nature of cost, by traceability of cost and by cost behaviour. • can prepare a simple calculation of inventory, COGS and price based on a blanket rate. • can perform an allocation and apportionment of overhead cost with a cost allocation sheet based on absorption costing and can apply the results to calculate the unit cost based on process costing and job order costing. • understand the concept of variable costing and the contribution margin and can apply it to problems of short-term decision such as product portfolio decision, break even analysis and decisions under limited resources. • understand the importance of standard costing, can prepare a static and a flexible budget and can calculate and interpret different types of variances.	
Content:	
<i>18 Cost Accounting:</i> • Difference between financial and cost accounting • Classification of cost according to nature, traceability and behaviour • Absorption costing: blanket rate, allocation and apportionment of overhead cost with cost allocation sheet, process costing, job order costing with plant-wide allocations rate, departmental overhead rate and machine hour rates • Variable costing: contribution margin, direct costing, multi-step contribution analysis, decision making with contribution margin, economies of scale, pricing decisions, break-even analysis, product mix, production process selection • Standard costing: purpose of standard costing, static and flexible budget, variance analysis • International comparison of accounting applications	

- Casework

Literature:

18 Cost Accounting (COSTA_EGM):

Compulsory:

- TASCHNER, Andreas and Michel CHARIFZADEH, 2016. *Management and cost accounting: tools and concepts in a central European context*. Weinheim: Wiley-VCH. ISBN 978-3-527-50822-8, 3-527-50822-8
- DRURY, Colin and Mike TAYLES, 2024. *Management and cost accounting*. Andover: Cengage. ISBN 978-1-4737-9124-4

Recommended:

None

Engineering Mechanics	
Module abbreviation:	EngMECH_EGM
Curriculum:	Programmes
	Engineering and Management (EGM-B) - SPO-Nr.: 15
Responsible for module:	Haug, Thomas
Lecturers:	Haug, Thomas
Language of instruction:	English
Credit points / SWS:	5 ECTS / 5 SWS
Workload:	Contact hours: 58 h
	Self-study: 67 h
	Total: 125 h
Subjects of the module:	15: Engineering Mechanics (EngMECH_EGM)
Lecture types:	S/Pr-Seminar/Practical course
Studien- / Prüfungsleistungen:	
15-Engineering Mechanics: schrP90 - written exam, 90 minutes (EngMECH_EGM) Additional Explanation: 15 Engineering Mechanics: Written exam, 90 minutes Permitted Non-programmable Written documents (handwritten or printed)	
Recommended prerequisites:	
None	
Objectives:	
15 Engineering Mechanics: After participating in the module courses, students are able to • explain the effects of forces and moments. • analyze and calculate static problems and apply equilibrium equations. • determine balance points and centroids of areas and bodies. • determine competent outer and inner load reactions. • solve friction problems. • estimate stresses, strains and deformations of bars and beams.	
Content:	
15 Engineering Mechanics: • Introduction to the basics of statics (bars, beams, plates, etc., bearings and hinges, equilibrium conditions) • Central and common force systems, free-body diagram, moments • Balance points, centroids • Supporting structures, Truss structures and Determinacy • Friction • Definition of stresses and strains, deformation, stress state, Mohr's circle • Linear elastic material law, elasticity theory • Combined loading	

- bending of beams, stress and deformation
- Torsion

Literature:

15 Engineering Mechanics (EngMECH_EGM):

Compulsory:

- GROSS, Dietmar, Band 12013. *Engineering mechanics* [online]. Berlin [u.a.]: Springer PDF e-Book. ISBN 978-3-642-30319-7. Available via: <https://doi.org/10.1007/978-3-642-30319-7>.
- GROSS, Dietmar, GROSS, Dietmar, HAUGER, Werner, SCHRÖDER, Jörg, WALL, Wolfgang A., BONET, Javier, Band 2[2018]. *Engineering mechanics* [online]. Berlin [u.a.]: Springer PDF e-Book. ISBN 978-3-662-56272-7. Available via: <https://doi.org/10.1007/978-3-662-56272-7>.

Recommended:

- GROSS, Dietmar, GROSS, Dietmar, HAUGER, Werner. *Technische Mechanik Band 1-4* [online]. PDF e-Book.
- GROSS, Dietmar and others, 2017. *Statics – formulas and problems : engineering mechanics 1*. Berlin, Heidelberg: Springer. ISBN 978-3-662-53854-8
- HIBBELER, Russell C. and Jun Hwa LEE, 2023. *Engineering mechanics, statics*. Harlow, UK: Pearson. ISBN 1-292-44404-5, 978-1-292-44404-8
- KESSEL, Siegfried, FRÖHLING, Dirk, 2012. *Technische Mechanik: zweisprachiges Lehrbuch zu Grundlagen der Mechanik fester Körper = Engineering mechanics : bilingual textbook on the fundamentals of solid mechanics* [online]. Wiesbaden: Springer Vieweg PDF e-Book. ISBN 978-3-8348-2182-9. Available via: <https://doi.org/10.1007/978-3-8348-2182-9>.
- GABBERT, Ulrich, RAECKE, Ingo, 2013. *Technische Mechanik für Wirtschaftsingenieure: mit 301 Abbildungen, 16 Tabellen, 83 Beispielen* [online]. München: Hanser PDF e-Book. ISBN 978-3-446-43595-7, 978-3-446-43253-6. Available via: <https://doi.org/10.3139/9783446435957>.
- HIBBELER, Russell C., 2018. *Mechanics of materials*. Harlow: Pearson. ISBN 978-1-292-17828-8

Management Accounting & International Taxation (Master)	
Module abbreviation:	MgtAcc_IntTax_M-EGM
Curriculum:	Programmes
	Engineering and Management (M-EGM) - SPO-Nr.: 6
Responsible for module:	Albrecht, Tobias
Lecturers:	Albrecht, Tobias; Eisenberg, Andrea
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	6: Management Accounting & International Taxation (MgtAcc_IntTax_M-EGM)
Lecture types:	SU/Ü-Lecture with integrated exercises
Studien- / Prüfungsleistungen:	
6-Management Accounting & International Taxation: schrP90 - written exam, 90 minutes (MgtAcc_IntTax_M-EGM) Additional Explanation: None	
Recommended prerequisites:	
None	
Objectives:	
<i>6 Management Accounting & International Taxation:</i> Students are capable to • understand the importance of international taxation systems for strategic decision-making. • achieve sound understanding of the most important aspects of international company taxation. • understand the core concepts of cost and management accounting. • use advanced management accounting concepts as a base for strategic management in global companies.	
Content:	
<i>6 Management Accounting & International Taxation:</i> • Economics of public sector, the tax systems • International taxation: taxation of global groups, Value added tax, withholding tax, transfer pricing • Principles of Cost Accounting • Advanced management accounting systems • Budgeting and strategic planning as a base for strategic decisions making	
Literature:	
<i>6 Management Accounting & International Taxation (MgtAcc_IntTax_M-EGM):</i> Compulsory: • ATRILL, Peter and Edward J. MCLANEY, 2021. <i>Management accounting for decision makers</i>. Harlow: Pearson Education Limited. ISBN 978-1-292-34945-9 • DOERNBERG, Richard L., 2009. <i>International taxation: in a nutshell</i>. St. Paul, Minn.: Thomson/West. ISBN	

0-314-19424-X, 978-0-314-19424-4

Recommended:

None

Mathematics 1	
Module abbreviation:	MA1_EGM_E
Curriculum:	Programmes
	Engineering and Management (EGM-B) - SPO-Nr.: 1
Responsible for module:	Schlickewei, Ulrich
Lecturers:	Schlickewei, Ulrich
Language of instruction:	English
Credit points / SWS:	5 ECTS / 5 SWS
Workload:	Contact hours: 58 h
	Self-study: 67 h
	Total: 125 h
Subjects of the module:	1: Mathematics 1 (MA1_EGM_E)
Lecture types:	SU/Ü-Lecture with exercises
Studien- / Prüfungsleistungen:	
1-Mathematics 1: schrP90 - written exam, 90 minutes (MA1_EGM_E)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>1 Mathematics 1:</i> Students: • have developed their ability to recognize which questions in engineering sciences can be tackled by mathematical methods, and are able to post such questions themselves. • understand the logical way of reasoning, distinguish between a premise, a consequence, and a rule, and, furthermore, are able to build a line of argument within engineering applications. • recognize known types of problems both in familiar and in new contexts, can solve such problems using known methods. • understand the mathematical language used in the engineering literature and are able to describe in both oral and written form their own reasoning and solution approaches. • have acquired confidence in handling the introduced mathematical methods; • are capable to apply a software system to support the solution of mathematical problems.	
Content:	
<i>1 Mathematics 1:</i> • Complex numbers: basics, rules, applications • Sequences and series: basics, convergence, applications • Real functions of a single variable: basics, elementary functions, limits and continuity • Differential calculus in R: derivatives, rules of differentiation, applications • Power series: basics, Taylor development, radius of convergence, applications • Integration in R: basics, methods of integration, applications	
Literature:	
<i>1 Mathematics 1 (MA1_EGM_E):</i>	

Compulsory:

- STRANG, Gilbert, 2010. *Calculus*. Wellesley, Mass.: Wellesley-Cambridge Press. ISBN 978-0-9802327-4-5
- STEWART, James, 2016. *Calculus*. Belmont, Calif.: Thomson Brooks/Cole. ISBN 978-1-305-26672-8, 1-305-26672-2
- HARTMAN, Gregory, FITZPATRICK, Sean, JORDAN, Alex, VOLLET, Carly, 2018. *APEX Calculus 1* [online]. PDF e-Book. ISBN 978-1719219594. Available via: <https://opentext.uleth.ca/apex-calculus/apex-calculus.html>.
- HARTMAN, Gregory, FITZPATRICK, Sean, JORDAN, Alex, VOLLET, Carly, 2018. *APEX Calculus 2* [online]. PDF e-Book. ISBN 978-1719263382. Available via: <https://opentext.uleth.ca/apex-calculus/apex-calculus.html>.
- HARTMAN, Gregory, FITZPATRICK, Sean, JORDAN, Alex, VOLLET, Carly, 2018. *APEX Calculus 3* [online]. PDF e-Book. ISBN 978-1719263665. Available via: <https://opentext.uleth.ca/apex-calculus/apex-calculus.html>.
- HARTMAN, Gregory, STITZ, Carl, ZEAGER, Jeff, FITZPATRICK, Sean, 2024. *Elementary Linear Algebra* [online]. PDF e-Book. Available via: <https://opentext.uleth.ca/Math1410/>.

Recommended:

- ARENS, Tilo, 2015. *Mathematik* [online]. Berlin [u.a.]: Springer Spektrum PDF e-Book. ISBN 978-3-642-44919-2, 978-3-642-44918-5. Available via: <https://doi.org/10.1007/978-3-642-44919-2>.
- WEITZ, Edmund and Heike STEPHAN, 2021. *Konkrete Mathematik (nicht nur) für Informatiker: mit vielen Grafiken und Algorithmen in Python*. Berlin: Springer Spektrum. ISBN 978-3-662-62617-7
- KOCH, Jürgen and Martin STÄMPFLE, 2018. *Mathematik für das Ingenieurstudium*. München: Hanser. ISBN 978-3-446-45166-7, 3-446-45166-8

Software Development	
Module abbreviation:	SWD_EGM
Curriculum:	Programmes
	Engineering and Management (EGM-B) - SPO-Nr.: 14
Responsible for module:	Schiendorfer, Alexander
Lecturers:	Kriegl, Daniel; Lodes, Lukas
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	14: Software Development (SWD_EGM)
Lecture types:	SU/Ü/Pr-Lecture with exercises and practical courses
Studien- / Prüfungsleistungen:	
14-Software Development: schrP90 - written exam, 90 minutes (SWD_EGM)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>14 Software Development:</i> The students gain a practical understanding of the field of software development as an engineering tool to solve problems. After completing the module they are able to: • design, build, and test software applications using the Python programming language. • understand and document customer requirements and solve problems using coding/technology. • communicate the architecture of their software effectively to a team of software developers. • improve and debug existing code. • use automated tests to make sure the software is implemented correctly. • understand the need to work with other professionals, e.g. UX designer, graphic designer, product manager, technical writer.	
Content:	
<i>14 Software Development:</i> • Application areas of software development: mobile apps, web applications, tools for automation of repeating tasks, smart factories, artificial intelligence, etc. • The Python programming language • Variables, conditional statements, functions and code reuse • Data structures: Lists, dictionaries • Effective testing and debugging • Object-oriented analysis & design (Inheritance, Polymorphism) • Simple algorithms and an informal introduction to algorithmic complexity • Development of user-friendly graphical user interfaces • The whole software development process from analysis to testing	

Literature:

14 Software Development (SWD_EGM):

Compulsory:

None

Recommended:

- KLEIN, Bernd, 2021. *Einführung in Python 3: für Ein- und Umsteiger*. München: Hanser. ISBN 978-3-446-46556-5
- PILONE, Dan and Russ MILES, 2008. *Head first software development: [a brain-friendly guide]*. Beijing [u.a.]: O'Reilly. ISBN 0-596-52735-7, 978-0-596-52735-8
- FREEMAN, Eric and Elisabeth ROBSON, 2020. *Head first design patterns*. ISBN 978-1-492-07800-5



Course Descriptions

Electrical Engineering and Information Technology

International Office

Winter term 2025/26

As per: 2025-08-28

AI Engineering of Autonomous Systems - Master

Subject	SWS	ECTS
Automotive Control Engineering	4	5
Automotive Electronics	4	5
Knowledge Modelling and Sensor Data Fusion	4	5
Data Engineering and Analytics	4	5
Ethical Considerations in Autonomous System Design	2	2.5
Sensor Networks Technologies and Sensor Data Fusion	4	5

Automated Driving and Vehicle Safety - **Master**

Subject	SWS	ECTS
Knowledge Modelling and Simulation	4	5

Autonomous Vehicle Engineering

Subject	SWS	ECTS
Digital Signal Processing	6	7
Practical Course Digital Signal Processing	2	0
Modelling and Simulation	6	7
Practical Course Modelling and Simulation	2	0

International Automotive Engineering - Master

Subject	SWS	ECTS
Artificial Intelligence and Automotive Systems	4	5
Knowledge Modeling and Machine Learning	4	5
Automotive Control Engineering	4	5
Automotive Electronics	4	5
Power Supply and Energy Distribution	4	5
Power Train	4	5
Sensor Technology and Signal Processing	4	5
Vehicle Crash Mechanics and Biomechanics	4	5

Artificial Intelligence and Automotive Systems - Master	
Module abbreviation:	IAE_AIAS
Curriculum:	Programmes
	International Automotive Engineering (IAE-M) - SPO-Nr.: 17
Responsible for module:	Zimmer, Alessandro
Lecturers:	Zimmer, Alessandro
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 79 h
	Total: 126 h
Subjects of the module:	17: Artificial Intelligence and Automotive Systems (IAE_AIAS)
Lecture types:	17-Artificial Intelligence and Automotive Systems: SU/Ü - lecture with integrated exercises (IAE_AIAS)
Studien- / Prüfungsleistungen:	
17-Artificial Intelligence and Automotive Systems: (IAE_AIAS)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>17 Artificial Intelligence and Automotive Systems:</i> After successfully completing the module the students shall be able to - understand the basic principles that lie behind different Artificial Intelligence techniques that can be used in the context of automotive systems. - identify the most suitable Artificial Intelligence techniques to be used in a given scenario. - model a problem of automotive safety using Artificial Intelligence systems. - implement basic intelligent algorithms in Matlab.	
Content:	
<i>17 Artificial Intelligence and Automotive Systems:</i> - Introduction to AI. Problems and search space. Knowledge representation and Pattern Recognition. - AI and Automotive Systems/Automotive Safety Systems. - Theory, concepts and applications of Neural Networks. Neurodynamics, topology of Neural Networks and learning methods. - Fuzzy sets and systems. Modelling of Fuzzy System's Applications. - Concepts of Evolutionary Systems. Genetic Algorithms and optimization problems.	
Literature:	
<i>17 Artificial Intelligence and Automotive Systems (IAE_AIAS):</i> Compulsory: None Recommended: RUSSELL, Stuart J. and Peter NORVIG, 2021. <i>Artificial intelligence: a modern approach</i>. Hoboken: Pearson.	

ISBN 978-0-13-461099-3

- MICHELUCCI, Umberto, 2018. *Applied deep learning: a case-based approach to understanding deep neural networks* [online]. Berkeley, CA: Apress PDF e-Book. ISBN 978-1-4842-3790-8. Available via: <https://doi.org/10.1007/978-1-4842-3790-8>.
- SINGH, Himanshu, LONE, Yunis Ahmad, 2020. *Deep Neuro-Fuzzy Systems with Python: With Case Studies and Applications from the Industry* [online]. Berkeley, CA: Apress PDF e-Book. ISBN 978-1-4842-5361-8. Available via: <https://doi.org/10.1007/978-1-4842-5361-8>.
- BUONTEMPO, Frances and Tammy CORON, January 2019. *Genetic algorithms and machine learning for programmers: create AI models and evolve solutions*. Book version: P 1. edition. Raleigh, North Carolina: The Pragmatic Bookshelf. ISBN 978-1-68050-620-4
- ESCALANTE, Hugo Jair, 2018. *Explainable and Interpretable Models in Computer Vision and Machine Learning* [online]. Cham: Springer PDF e-Book. ISBN 978-3-319-98131-4. Available via: <https://doi.org/10.1007/978-3-319-98131-4>.

Automotive Control Engineering - Master	
Module abbreviation:	IAE_ACE
Curriculum:	Programmes
	AI Engineering of Autonomous Systems (AI-M) - SPO-Nr.: 12 International Automotive Engineering (IAE-M) - SPO-Nr.: 7
Responsible for module:	Gregor, Rudolf
Lecturers:	Gregor, Rudolf
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	12: Automotive Control Engineering (IAE_ACE)
Lecture types:	12-Automotive Control Engineering: SU/Ü - lecture with integrated exercises (IAE_ACE)
Studien- / Prüfungsleistungen:	
12-Automotive Control Engineering: schrP90 - written exam, 90 minutes (IAE_ACE) Additional Explanation: None	
Recommended prerequisites:	
None	
Objectives:	
<i>12 Automotive Control Engineering:</i> After successfully completing the module students are able to • analyze and describe systems in time and frequency domain • select and design controllers based on classical control engineering methods (root locus, bode diagram) • model and analyze LTI-systems in state space • design state space controllers for SISO and MIMO-systems using different methods (pole placement, modal control, optimal control) • design observers for LTI-systems • solve simple control tasks for non-linear systems	
Content:	
<i>12 Automotive Control Engineering:</i> • Repetition of classical control engineering methods • State space representation of linear time invariant systems (SISO and MIMO) • Analysis of system properties (dynamics, stability, (output) controllability, observability) in state space • Calculation of the state transition matrix to solve the state equation • Design of state feedback control (pole placement, modal control, optimal control) to improve system dynamics • Design of prefilters and integral action for static accuracy • Design of state observers • Representation and analysis of non-linear control systems • Lab work: Design and test of different types of control systems by use of Matlab-Simulink	

Literature:

12 Automotive Control Engineering (IAE_ACE):

Compulsory:

- GREGOR, Rudolf, KRÄMER, Wolfgang, 2023. *Slides, exercises, supplementary material*. [online]. PDF e-Book.

Recommended:

- BOLTON, William, 2010. *Control engineering*. Harlow u.a.: Prentice Hall. ISBN 978-0-582-32773-3
- BURNS, Roland S., 2001. *Advanced control engineering*. Oxford [u.a.]: Butterworth-Heinemann. ISBN 0-7506-5100-8
- FRANKLIN, Gene F., J. David POWELL and Abbas EMAMI-NAEINI, 2020. *Feedback control of dynamic systems*. Upper Saddle River, NJ [u.a.]: Pearson. ISBN 978-1-292-27452-2, 1-292-27452-2
- DORF, Richard C. and Robert H. BISHOP, 2022. *Modern control systems*. Harlow, United Kingdom: Pearson. ISBN 978-1-292-42235-0

Automotive Electronics - Master	
Module abbreviation:	IAE_AES
Curriculum:	Programmes
	AI Engineering of Autonomous Systems (AI-M) - SPO-Nr.: 12 International Automotive Engineering (IAE-M) - SPO-Nr.: 5
Responsible for module:	Arnold, Armin
Lecturers:	Arnold, Armin
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	12: Automotive Electronics (IAE_AES)
Lecture types:	12-Automotive Electronics: SU/Ü - lecture with integrated exercises (IAE_AES)
Studien- / Prüfungsleistungen:	
12-Automotive Electronics: schrP90 - written exam, 90 minutes (IAE_AES)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>12 Automotive Electronics:</i> After successfully completing the module, the students have a • knowledge of automotive electronics architectures • knowledge of the architecture of automotive control units and applied integrated circuits • knowledge of automotive sensor technologies • knowledge of automotive actuator technologies • comprehension of the functional dependencies • ability to apply the knowledge to specify and design control units	
Content:	
<i>12 Automotive Electronics:</i> • basics of electrical and electronic engineering • recapitulation of microcontroller technology • control unit circuits for input and sensor signal conditioning, output drivers and controlling actuators, power supply • physical layer of automotive communication networks and onboard communication • introduction to automotive electric standards • basics of automotive sensors and actuators • basics of automotive software engineering	
Literature:	
<i>12 Automotive Electronics (IAE_AES):</i>	

Compulsory:

None

Recommended:

- ZAMAN, Najamuz, 2015. *Automotive electronics design fundamentals* [online]. Cham [u.a.]: Springer PDF e-Book. ISBN 978-3-319-17584-3, 978-3-319-17583-6. Available via: <http://dx.doi.org/10.1007/978-3-319-17584-3>.
- IDA, Nathan, 2015. *Engineering electromagnetics* [online]. Cham [u.a.]: Springer PDF e-Book. ISBN 978-3-319-07806-9, 978-3-319-07805-2. Available via: <http://dx.doi.org/10.1007/978-3-319-07806-9>.
- ROBERT BOSCH GMBH (ED.), 2014. *Bosch Automotive Electrics and Automotive Electronics: Systems and Components, Networking and Hybrid Drive* [online]. PDF e-Book. ISBN 978-3-658-01784-2. Available via: <http://dx.doi.org/10.1007/978-3-658-01784-2>.

Data Engineering and Analytics - Master	
Module abbreviation:	AI_DataEng
Curriculum:	Programmes
	AI Engineering of Autonomous Systems (AI-M) - SPO-Nr.: 3
Responsible for module:	Schmidtner, Stefanie
Lecturers:	Horn, Alexander; Schmidtner, Stefanie
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	3: Data Engineering and Analytics (AI_DataEng)
Lecture types:	3-Data Engineering and Analytics: SU/Ü - lecture with integrated exercises (AI_DataEng)
Studien- / Prüfungsleistungen:	
3-Data Engineering and Analytics: schrP90 - written exam, 90 minutes (AI_DataEng)	
Additional Explanation:	
None	
Recommended prerequisites:	
Probability and Statistics, Concept of Random Variables; Linear Algebra; Analysis	
Objectives:	
<i>3 Data Engineering and Analytics:</i> Upon completion of the module, students will be able to • choose and calculate appropriate metrics and visualizations for describing a data set. • understand and master fundamental data analysis and machine learning methods. • acquire deep knowledge about model assessment and inference techniques for linear and non-linear models. • know fundamentals of data engineering.	
Content:	
<i>3 Data Engineering and Analytics:</i> • Data visualization • Data cleaning and data quality • Fundamentals of statistical learning and machine learning • Linear Regression • Classification • Model assessment, selection and inference: Cross-Validation & Bootstrap • Decision Trees • Unsupervised Learning • Neural networks (ANN, ResNet, CNN) • Fundamentals of data engineering (data modeling, data warehouse, data lake, parallel and distributed computing, data pipelines)	

Literature:

3 Data Engineering and Analytics (AI_DataEng):

Compulsory:

None

Recommended:

- WILKE, Claus, March 2019. *Fundamentals of data visualization: a primer on making informative and compelling figures*. Beijing: O'Reilly. ISBN 978-1-492-03108-6
- JAMES, Gareth, WITTEN, Daniela, HASTIE, Trevor, TIBSHIRANI, Robert, TAYLOR, Jonathan, 2023. *An Introduction to Statistical Learning: with Applications in Python* [online]. Cham: Springer International Publishing PDF e-Book. ISBN 978-3-031-38747-0. Available via: <https://doi.org/10.1007/978-3-031-38747-0>.
- HASTIE, Trevor, TIBSHIRANI, Robert, FRIEDMAN, Jerome H., 2017. *The elements of statistical learning: data mining, inference, and prediction* [online]. New York, NY, USA: Springer PDF e-Book. ISBN 978-0-387-84858-7. Available via: <https://doi.org/10.1007/978-0-387-84858-7>.
- BISHOP, Christopher M., 2009. *Pattern recognition and machine learning*. New York [u.a.]: Springer. ISBN 0-387-31073-8, 978-1-4939-3843-8
- LESKOVEC, Jure, Anand RAJARAMAN and Jeffrey D. ULLMAN, 2020. *Mining of massive datasets*. Cambridge: Cambridge University Press. ISBN 978-1-108-47634-8
- RYZA, Sandy and others, 2017. *Advanced analytics with Spark: patterns for learning from data at scale*. Beijing: O'Reilly. ISBN 978-1-4919-7295-3

Digital Signal Processing	
Module abbreviation:	AVE_PractDiSigProc
Curriculum:	Programmes
	Autonomous Vehicle Engineering (AVE-B) - SPO-Nr.: 13 Autonomous Vehicle Engineering (AVE-B) - SPO-Nr.: 13
Responsible for module:	Mecking, Michael
Lecturers:	Mecking, Michael
Language of instruction:	English
Credit points / SWS:	7 ECTS / 6 SWS
Workload:	Contact hours: 70 h
	Self-study: 105 h
	Total: 175 h
Subjects of the module:	13.2: Practical Course Digital Signal Processing (AVE_PractDiSigProc)
Lecture types:	SU/Ü - seminar class/exercise; Pr - practical course;
Studien- / Prüfungsleistungen:	
13.2-Practical Course Digital Signal Processing: LN - participation without/with success (AVE_PractDiSigProc) Additional Explanation: <i>13 Practical Course Digital Signal Processing:</i> Successful completion of the practical course is a prerequisite for admission to the written examination. The practical course is considered to be passed successfully if the required simulation programs have been created independently for all topics, yield the desired results and have been handed in on time.	
Recommended prerequisites:	
thorough understanding of complex calculus and mathematical analysis	
Objectives:	
After the successful completion of the module the students will be able to 1. represent and manipulate signals in the time and frequency domain, 2. describe and analyse the properties of discrete-time linear systems in the time and frequency domain using discrete-time transforms, 3. design linear discrete-time filters with prescribed properties, 4. evaluate different realisations of discrete-time systems based on canonical structures, 5. understand the impact of finite word-length effects in the realisation of discrete-time systems, 6. determine the limitations and impact of sampling and quantisation on the conversion of analogue to digital signals, 7. apply (fast) Fourier-Transforms to analyse and realise discrete-time signal processing systems, use MATLAB to analyse and synthesise discrete-time signals and systems.	
Content:	
8. Discrete-time signals and systems: description in the time-domain, impulse response, convolution, linearity, time-invariance, causality, stability 9. Frequency-domain representation: frequency response, discrete-time Fourier-Transform and its properties 10. Analysis of LTI-systems: the z-Transform and its properties, system transfer function, allpass and minimum phase systems, linear-phase systems 11. Design of digital filters with prescribed properties using windowing techniques, optimisation, the bilinear transform as well as band-transforms	

12. Realisation of discrete-time filters: filter structures and signal flow graphs, transposition methods, canonical as well as cascade and parallel architectures
 13. Review of the Fourier-Series representation of periodic signals and the Fourier-Transform for continuous signals
 14. Sampling and reconstruction of band-limited signals, analogue-to-digital conversion, quantisation
 15. Digital multi-rate systems, decimation and interpolation, oversampling analogue-to-digital conversion
- The Discrete Fourier-Transform and fast algorithms (FFT) using decimation in time and frequency, applications of the DFT

Literature:

16. HOLTON, Thomas, 2021. *Digital signal processing: principles and applications*. Cambridge, United Kingdom: Cambridge University Press. ISBN 978-1-108-41844-7
17. OPPENHEIM, Alan V. and Ronald W. SCHAFER, 2014. *Discrete-time signal processing*. T. edition. Harlow: Pearson. ISBN 978-1-292-03815-5
18. ANTONIOU, A., 2017. *Digital Filters - Analysis, Design and Signal Processing Applications*. ISBN 0071846034

Ethical Considerations in Autonomous System Design - Master	
Module abbreviation:	AI_Ethics
Curriculum:	Programmes
	AI Engineering of Autonomous Systems (AI-M) - SPO-Nr.: 5
Responsible for module:	Richter, Florian
Lecturers:	Richter, Florian
Language of instruction:	English
Credit points / SWS:	2.5 ECTS / 2 SWS
Workload:	Contact hours: 25 h
	Self-study: 38 h
	Total: 63 h
Subjects of the module:	5: Ethical Considerations in Autonomous System Design (AI_Ethics)
Lecture types:	5-Ethical Considerations in Autonomous System Design: SU/Ü - lecture with integrated exercises (AI_Ethics)
Studien- / Prüfungsleistungen:	
5-Ethical Considerations in Autonomous System Design: mdIP - oral exam, 15-20 minutes (AI_Ethics)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>5 Ethical Considerations in Autonomous System Design:</i> Upon completion of the module, students will be able to: • Outline the most pressing questions currently discussed in the ethics of autonomous systems. • Distinguish meta-ethical, normative, and empirical arguments in ethics. • Know the most important normative theories and are able apply them to the field of autonomous system design. • Apply ethical arguments to case studies from the field of autonomous systems, e.g., self-driving cars. • Discuss the role of empirical research for the ethics of human-machine interaction and machine ethics. • Transcend their own normative viewpoint by critically reflecting on it.	
Content:	
<i>5 Ethical Considerations in Autonomous System Design:</i> The ethics of autonomous systems deals with questions of machine ethics and ethics of human-machine interaction. We will tackle both fields in the course. Machine ethics asks which morality artificial systems should apply. In which sense can they take ethical decisions? Who should bear the responsibility if something goes wrong? Should we ever leave ethical decisions to autonomous systems or do we always have to keep the human in the loop? The ethics of human-machine interaction is interested in the ethical influence that the cooperation and competition with autonomous systems has on our own moral conduct. We need a profound empirical understanding about the unintentional and often subtle effects that these interactions have on us as humans. Do we still own our decisions if we merely follow the advice of a recommender system? Does the mediation of our experience through technology change the way we think about moral issues? Can we shape people's moral behaviour through the design of human-machine interfaces?	

Literature:
Will be specified at the beginning

Knowledge Modeling and Machine Learning - Master	
Module abbreviation:	AUF_WissMod
Curriculum:	Programmes
	International Automotive Engineering (IAE-M) - SPO-Nr.: 17
Responsible for module:	Botsch, Michael
Lecturers:	Botsch, Michael
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 79 h
	Total: 126 h
Subjects of the module:	17: Knowledge Modeling and Machine Learning (AUF_WissMod)
Lecture types:	17-Knowledge Modeling and Machine Learning: SU/Ü - lecture with integrated exercises (AUF_WissMod)
Studien- / Prüfungsleistungen:	
17-Knowledge Modeling and Machine Learning: schrP90 - written exam, 90 minutes (AUF_WissMod)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>17 Knowledge Modeling and Machine Learning:</i> Upon successful completion of the course, students will be able to, - understand and apply the mathematical foundations of statistical signal processing for knowledge modeling and machine learning - mathematically describe, implement, and apply classical methods for classification and regression models - mathematically describe, implement and apply advanced machine learning methods for classification and regression models - understand generative machine learning models - use machine learning methods in automated driving applications	
Content:	
<i>17 Knowledge Modeling and Machine Learning:</i> - Fundamentals of statistical signal processing (random variables, maximum likelihood and maximum a posteriori parameter estimation, kernel density estimators, bias-variance decomposition, model selection procedures) - Bayes classifier and Bayes regression - Linear classification and regression models (derivation, implementation, applications) - Classification by means of "softmax", k-NN, Nadaraya-Watson regression function (derivation, implementation, applications) - Gradient descent method and automatic differentiation in reverse mode (backpropagation) - Multi-layer perceptron neural networks (derivation, implementation, applications) - Deep Convolutional Neural Networks (derivation, implementation, applications) - Radial basis function networks (derivation, implementation, applications)	

- Autoencoder
- Generative Adversarial Neural Networks
- Applications in the field of automated driving

Literature:

17 Knowledge Modeling and Machine Learning (AUF_ WissMod):

Compulsory:

None

Recommended:

- BOTSCH, Michael, UTSCHICK, Wolfgang, 2020. *Fahrzeugsicherheit und automatisiertes Fahren: Methoden der Signalverarbeitung und des maschinellen Lernens* [online]. München: Hanser PDF e-Book. ISBN 978-3-446-46804-7. Available via: <https://doi.org/10.3139/9783446468047>.
- GOODFELLOW, Ian and others, 2018. *Deep Learning: das umfassende Handbuch : Grundlagen, aktuelle Verfahren und Algorithmen, neue Forschungsansätze*. Frechen: mitp. ISBN 978-3-95845-701-0
- BISHOP, Christopher M., 2009. *Pattern recognition and machine learning*. New York [u.a.]: Springer. ISBN 0-387-31073-8, 978-1-4939-3843-8
- BISHOP, Christopher M., BISHOP, Hugh, 2024. *Deep Learning: Foundations and Concepts* [online]. Cham: Springer International Publishing PDF e-Book. ISBN 978-3-031-45468-4. Available via: <https://doi.org/10.1007/978-3-031-45468-4>.

Modelling and Simulation	
Module abbreviation:	AVE_ModSim
Curriculum:	Programmes
	Autonomous Vehicle Engineering (AVE-B) - SPO-Nr.: 12 Autonomous Vehicle Engineering (AVE-B) - SPO-Nr.: 12
Responsible for module:	Schiele, Thomas
Lecturers:	Schiele, Thomas
Language of instruction:	English
Credit points / SWS:	7 ECTS / 6 SWS
Workload:	Contact hours: 70 h
	Self-study: 105 h
	Total: 175 h
Subjects of the module:	12.2: Practical Course Modelling and Simulation (AVE_PractModSim)
Lecture types:	12.2-Practical Course Modelling and Simulation: Pr - laboratory (AVE_PractModSim)
Studien- / Prüfungsleistungen:	
12.2-Practical Course Modelling and Simulation: schrP90 - written exam, 90 minutes (AVE_PractModSim) Additional Explanation: <i>12 Practical Course Modelling and Simulation:</i> As part of the practical course several audits (focussing on derivation, implementation and validation of real experimental setups as simulation models in MATLAB/Simulink) must be obtained. Upon successful completion of the predefined tasks, the lecturer will award one certificate for each audit. A total of five out of six audits must be completed successfully by each group. The final solutions have to be presented by the practical course groups within a fixed time frame (one audit every 7-14 days), whereby questions about the solution concept and the programs and models created must also be answered. Only if at least five of the six audits are completed on time the practical course will be graded as successfully completed. Participating in the practical course means that five of six audits have been taken in person and on time.	
Recommended prerequisites:	
Mathematics 1 + 2 Electronics, Signals and Measurement Foundations of Engineering Sciences	
Objectives:	
<i>12 Practical Course Modelling and Simulation:</i> After successful participation of the practical course students are able to: • apply different methods (discussed in the lecture) to derive differential equations of electrical, mechanical and electro-mechanical systems • use standard implementation methods in Matlab/Simulink • determination and optimization of model parameters based on methods discussed during the lecture • validate the implemented models using measurement data generated during lab experiments	
Content:	
<i>12 Practical Course Modelling and Simulation:</i> Practical Course: • Introduction into implementation of dynamic systems in Matlab/Simulink • Implementation and parameter identification of a non-linear mechanical system (comparison between	

mathematical and physical pendulum model)

- Modeling, implementation, validation and parameter optimization of a linear electrical system (oscillating circuit)
- Modeling, implementation, validation and parameter optimization of a switched electrical system (DC-DC converter, buck converter)
- Implementation and validation of electromechanical systems (simple vehicle, DC-motor to lift a mass, crane trolley system)

Literature:

Will be specified at the beginning

Power Supply and Energy Distribution - Master	
Module abbreviation:	IAE_PSED
Curriculum:	Programmes
	International Automotive Engineering (IAE-M) - SPO-Nr.: 7
Responsible for module:	Pfarr, Johannes
Lecturers:	Pfarr, Johannes
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	7: Power Supply and Energy Distribution (IAE_PSED)
Lecture types:	7-Power Supply and Energy Distribution: SU/Ü - lecture with integrated exercises (IAE_PSED)
Studien- / Prüfungsleistungen:	
7-Power Supply and Energy Distribution: schrP90 - written exam, 90 minutes (IAE_PSED)	
Additional Explanation:	
None	
Recommended prerequisites:	
Basic knowledge of electronics	
Objectives:	
<i>7 Power Supply and Energy Distribution:</i> After successfully completing the master's thesis, students are able to • have good knowledge in the field of modern energy distribution systems in cars and of the components used in the automotive energy nets. • understand why energy management systems are important for the operation of electric energy nets in cars. • understand the operation principle of power electronic converters for automotive applications. • understand and to use methods to develop steady-state and dynamic models of power electronic converters for given type of problems. • understand the operation principle of modern electric machines for electric and hybrid electric vehicles including the control of the electric machines. • derive models of given automotive energy nets and the components and to perform simulations for optimization purposes	
Content:	
<i>7 Power Supply and Energy Distribution:</i> Introduction, background and design of vehicular electrical energy distribution networks and power electronic systems and devices: • power devices and converter topologies • 14V / 48V power supply and energy distribution • generation of electric power in vehicles • energy management Systems • high voltage electric energy distribution for hybrid vehicles • electric motor drives and motion control	

- simulation of power devices and energy distribution

Literature:

7 Power Supply and Energy Distribution (IAE_PSED):

Compulsory:

None

Recommended:

- VELTMAN, André, PULLE, Duco W. J., DE DONCKER, Rik W., 2016. *Fundamentals of Electrical Drives* [online]. Cham: Springer International Publishing PDF e-Book. ISBN 978-3-319-29409-4, 978-3-319-29408-7. Available via: <https://doi.org/10.1007/978-3-319-29409-4>.
- ERICKSON, Robert W. and Dragan MAKSIMOVIĆ, 2004. *Fundamentals of power electronics*. Dordrecht: Kluwer. ISBN 0-7923-7270-0, 978-0-7923-7270-7
- LEONHARD, Werner, 2001. *Control of electrical drives*. Berlin [u.a.]: Springer. ISBN 3-540-41820-2
- EHSANI, Mehrdad, Yimin GAO and Ali EMADI, 2010. *Modern electric, hybrid electric, and fuel cell vehicles: fundamentals, theory, and design*. Boca Raton, FL [u.a.]: CRC Press, Taylor & Francis Group. ISBN 978-1-4200-5400-2, 978-1-4200-5398-2

Power Train - Master	
Module abbreviation:	IAE_PT
Curriculum:	Programmes
	International Automotive Engineering (IAE-M) - SPO-Nr.: 3
Responsible for module:	Birkner, Christian
Lecturers:	Birkner, Christian
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	3: Power Train (IAE_PT)
Lecture types:	SU/Ü - seminaristischer Unterricht/Übung
Studien- / Prüfungsleistungen:	
3-Power Train: schrP90 - written exam, 90 minutes (IAE_PT)	
Additional Explanation:	
None	
Recommended prerequisites:	
basic knowledge of physics (Work, Power, Forces, Torques, ...), engineering mathematics (differential and integral calculus), engineering mechanics	
Objectives:	
<i>3 Power Train:</i> After successfully completing the module the students • know details about legal framework conditions for current and future powertrain developments (CO2- and emission legislation, test procedures, test cycles, ...) • understand advantages and disadvantages of different drivetrain concepts according to driving performance and energy consumption • show detailed knowledge of internal combustion engine design principles and operation strategies • are able to explain the operating principles of different gearbox constructions and know advantages and disadvantages of the different concepts • have a detailed understanding of hybrid drivetrain architectures and know about the potentials of hybrid drivetrain technology • know different energy storage systems for vehicle applications and their advantages and disadvantages • are able to set up models and evaluate results from dynamic drivetrain simulations focussing on the impact of operation principles on factors like driving performance and efficiency	
Content:	
<i>3 Power Train:</i> • basics of vehicle movement and driving resistances • market-specific test procedures for series-production vehicles / certification • design principles of internal combustion engines (ICE) • advantages/disadvantages of different IC-engine concepts (diesel/gasoline, ...) • concepts for fuel consumption reduction in modern IC-engines • emission generation in IC-engines / exhaust gas aftertreatment	

- gearbox concepts and start-up elements
- hybrid and electric drivetrain concepts
- potentials of electrified drivetrains according to fuel consumption and emission generation
- energy storage systems for vehicle applications
- modelling and simulation of different drivetrain concepts

Literature:

3 Power Train (IAE_PT):

Compulsory:

None

Recommended:

- MASHADI, Behrooz, CROLLA, David, 2012. *Vehicle powertrain systems* [online]. Chichester: Wiley PDF e-Book. ISBN 978-0-470-66602-9, 978-1-11-995836-9. Available via: <http://onlinelibrary.wiley.com/book/10.1002/9781119958376>.
- TODSEN, Uwe, 2012. *Verbrennungsmotoren* [online]. München: Hanser PDF e-Book. ISBN 978-3-446-42846-1, 978-3-446-41843-1. Available via: <http://www.hanser-elibrary.com/action/showBook?doi=10.3139%2F9783446428461>.
- KLEMENT, Werner, 2011. *Fahrzeuggetriebe* [online]. München: Hanser PDF e-Book. ISBN 978-3-446-42807-2, 978-3-446-42600-9. Available via: <http://www.hanser-elibrary.com/action/showBook?doi=10.3139%2F9783446428072>.
- HOFMANN, Peter, 2014. *Hybridfahrzeuge: ein alternatives Antriebskonzept für die Zukunft* [online]. Wien [u.a.]: Springer PDF e-Book. ISBN 978-3-7091-1780-4. Available via: <http://dx.doi.org/10.1007/978-3-7091-1780-4>.

Sensor Networks Technologies and Sensor Data Fusion - Master	
Module abbreviation:	AI_SensorNetworks
Curriculum:	Programmes
	AI Engineering of Autonomous Systems (AI-M) - SPO-Nr.: 6
Responsible for module:	Giesler, Björn
Lecturers:	Giesler, Björn
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	6: Sensor Networks Technologies and Sensor Data Fusion (AI_SensorNetworks)
Lecture types:	6-Sensor Networks Technologies and Sensor Data Fusion: SU/Ü - lecture with integrated exercises (AI_SensorNetworks)
Studien- / Prüfungsleistungen:	
6-Sensor Networks Technologies and Sensor Data Fusion: schrP90 - written exam, 90 minutes (AI_SensorNetworks) Additional Explanation: None	
Recommended prerequisites:	
(digital) signal processing, time-domain and frequency analysis	
Objectives:	
<i>6 Sensor Networks Technologies and Sensor Data Fusion:</i> Upon completion of the module, students will be able to: • Demonstrate an understanding of the fundamental principles underlying sensor networks. • Explain the key concepts and mechanisms of communication within sensor networks. • Apply advanced linear and non-linear digital signal processing to a multitude of sensors. • Describe and model the most common sensors used in sensor fusion applications. • Implement basic algorithms for simultaneous localisation and mapping (SLAM). • Apply sensor fusion to different sensors like cameras, radar, etc.. • Use AI methods like, e.g., federated learning to the field of sensor fusion and sensor networks.	
Content:	
<i>6 Sensor Networks Technologies and Sensor Data Fusion:</i> The module comprises the following aspects of sensor networks and sensor data fusion: • basics and advanced concepts of wireless sensor networks, • hardware aspects of sensor nodes, • routing in wireless networks, • time synchronisation and localisation in wireless networks, • data/signal processing in wireless sensor networks, • need for multi-sensor data fusion, • various approaches to data fusion, • representations of data and data fusion architectures,	

- algorithmic approaches to data fusion,
- applications of wireless sensor networks.

Literature:

6 Sensor Networks Technologies and Sensor Data Fusion (AI_SensorNetworks):

Compulsory:

None

Recommended:

- KARL, Holger and Andreas WILLIG, 2007. *Protocols and architectures for wireless sensor networks*. Chichester [u.a.]: Wiley. ISBN 978-0-470-51923-3, 0-470-51923-1
- KOCH, Wolfgang, 2014. *Tracking and Sensor Data Fusion: Methodological Framework and Selected Applications* [online]. Heidelberg: Springer PDF e-Book. ISBN 978-3-642-39271-9, 978-1-306-20127-8. Available via: <https://doi.org/10.1007/978-3-642-39271-9>.

Sensor Technology and Signal Processing - Master	
Module abbreviation:	IAE_ST&SP
Curriculum:	Programmes
	Automatisiertes Fahren und Fahrzeugsicherheit (AUF-M) - SPO-Nr.: 11 International Automotive Engineering (IAE-M) - SPO-Nr.: 7
Responsible for module:	Botsch, Michael
Lecturers:	Botsch, Michael
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	11: Sensor Technology and Signal Processing (IAE_ST&SP)
Lecture types:	11-Sensor Technology and Signal Processing: SU/Ü - lecture with integrated exercises (IAE_ST&SP)
Studien- / Prüfungsleistungen:	
11-Sensor Technology and Signal Processing: LN - written exam, 90 minutes (IAE_ST&SP) Additional Explanation: None	
Recommended prerequisites:	
None	
Objectives:	
<i>11 Sensor Technology and Signal Processing:</i> After successfully completing the master's thesis, students are able to • describe major trends in the automotive sensor market. • categorize automotive sensors with respect to the underlying physical effects. • analyze sensor signals in the time- and frequency-domain. • apply statistical signal processing algorithms (e. g., Kalman filter) to automotive sensor data. • evaluate algorithms for sensor data fusion. • design and apply simple machine learning algorithms. • implement statistical signal processing algorithms in Matlab.	
Content:	
<i>11 Sensor Technology and Signal Processing:</i> • introduction to automotive sensors ○ automotive sensor market ○ sensor technologies ○ sensor types and characteristics ○ multi-modal sensor systems • statistical signal processing ○ signal types and characteristics ○ basics of statistical signal processing ○ pattern recognition ○ Kalman filter	

- sensor data fusion
 - data association
 - track-to-track fusion
- analog and digital processing of signals
 - analog filters, amplifiers and A/D-converters
 - Fourier-series and -transform, Laplace- and z-transform
 - digital filters

Literature:

Recommended:

- BAR-SHALOM, Yaakov, LI, Xiao-Rong, KIRUBARAJAN, Thiagalingam, 2001. *Estimation with applications to tracking and navigation* [online]. New York: Wiley PDF e-Book. ISBN 0-471-46521-6, 978-0-471-46521-8. Available via: <http://onlinelibrary.wiley.com/book/10.1002/0471221279>.
 - 19. REIF, Konrad, 2016. *Sensoren im Kraftfahrzeug* [online]. Wiesbaden: Springer Vieweg PDF e-Book. ISBN 978-3-658-11211-0, 978-3-658-11210-3. Available via: <https://doi.org/10.1007/978-3-658-11211-0>.
 - 20. BOTSCH, Michael and Wolfgang UTSCHICK, 2020. *Fahrzeugsicherheit und automatisiertes Fahren: Methoden der Signalverarbeitung und des maschinellen Lernens*. ISBN 978-3-446-45326-5
- , . Current publications from IEEE Symposium on Intelligent Vehicle and from IEEE International Conference on Intelligent Transportation Systems. In: .

Vehicle Crash Mechanics and Biomechanics - Master	
Module abbreviation:	IAE_VCM
Curriculum:	Programmes
	International Automotive Engineering (IAE-M) - SPO-Nr.: 7
Responsible for module:	Brandmeier, Thomas
Lecturers:	Graf, Michael; Sequeira, Gerald; Vriesman, Daniel
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	7.2.1: Vehicle Crash Mechanics and Biomechanics (IAE_VCM)
Lecture types:	SU/Ü - seminaristischer Unterricht/Übung
Studien- / Prüfungsleistungen:	
7.2.1-Vehicle Crash Mechanics and Biomechanics: schrP90 - written exam, 90 minutes (IAE_VCM)	
Additional Explanation:	
None	
Recommended prerequisites:	
knowledge of basics in mechanics, in electrics/electronics, of communication systems and of vehicle electronics	
Objectives:	
<i>7 Vehicle Crash Mechanics and Biomechanics:</i> After successfully completing the module, students know the basic concepts and knowledge in vehicle safety and crash mechanics. The program is structured to cover the important topics related to the vehicle safety: Crash modelling for frontal and lateral collisions and rollovers, finite element analysis, occupant protection strategies, Passive vehicle safety systems (airbag control unit, conventional crash sensors, algorithms, safety actuators) and biomechanics. At the completion of this course, students should be able to understand crash processes, to construct and simulate simple crash models, understand human anatomy and its mechanics during vehicle crash.	
Content:	
<i>7 Vehicle Crash Mechanics and Biomechanics:</i> The following topics are covered: • Basic terms and definitions in vehicle safety • Crash Mechanics • Crash Modelling, Multibody Modelling, Finite Element Analysis • Passive Safety Systems • Frontal and lateral collision, Rollover • Crash- & Safety-Sensors, Crash detection Algorithms, Use of environmental sensors in Passive Safety • Irreversible and reversible Safety Actuators • Emergency Medicine • Biomechanics	
Literature:	
<i>7 Vehicle Crash Mechanics and Biomechanics (IAE_VCM):</i>	

Compulsory:

None

Recommended:

- KRAMER, Florian, 1998. *Passive Sicherheit von Kraftfahrzeugen: Grundlagen — Komponenten — Systeme* [online]. Wiesbaden: Vieweg+Teubner Verlag PDF e-Book. ISBN 978-3-322-96883-8, 978-3-322-96884-5. Available via: <https://doi.org/10.1007/978-3-322-96883-8>.



Course Descriptions

Computer Science

International Office

Winter term 2025/26

As per: 2025-08-28

This program and course description becomes effective on 01.10.2025. It supplements the program and examination regulations and secures the offerings in courses. Additionally, it contains detailed information about courses, contents, assessments and examinations.

Computer Science and Artificial Intelligence

Subject	SWS	ECTS
Algorithms for AI 2	6	7
Practical Course Algorithms for AI 2	2	0
Advanced Webtechnologies	4	5
Data Visualization and Data Analytics	4	5
Introduction to Computer Science I	6	7
Mathematics 1	4	7
Optimization Algorithms	4	5
Probability and Statistics	4	7
Programming 1	6	7
Practical Course Programming 1	2	0
Software Engineering	6	7
Practical Course Software Engineering	2	0
Web Technologies	6	7
Practical Course Web Technologies	2	0
eTHlcs_basic	4	5

Cyber Security

Subject	SWS	ECTS
Advanced Topics in Software Security	4	5
Webtechnologies	4	5

Flug- und Fahrzeuginformatik

Subject	SWS	ECTS
Machine Learning	4	5
Quantum Computing	4	5

Computer Science Bachelor

Subject	SWS	ECTS
Principles of Modern Software Development	4	5

User Experience Design (Master)

Subject	SWS	ECTS
Mobile UX Prototyping	4	5
Project	4	5
Vibe Coding for User Experience Designers	4	5

Advanced Topics in Software Security	
Module abbreviation:	CSI_AS
Curriculum:	Programmes
	Cybersicherheit (CSI-B) - SPO-Nr.: 29
Responsible for module:	Hutzelmann, Thomas
Lecturers:	Hutzelmann, Thomas
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 46 h
	Self-study: 79 h
	Total: 125 h
Subjects of the module:	29: Advanced Topics in Software Security (CSI_AS)
Lecture types:	29-Advanced Topics in Software Security: SU/Ü - lecture with integrated exercises (CSI_AS)
Studien- / Prüfungsleistungen:	
29-Advanced Topics in Software Security: LN - written exam, 90 minutes (CSI_AS)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>29 Advanced Topics in Software Security:</i> Nach einer aktiven Teilnahme können die Studierenden am Ende der Veranstaltung ... • Programmcode und die sicherheitsrelevanten Eigenschaften in verschiedenen Abstraktionen repräsentieren und analysieren • grundlegende Man-at-the-End-(MATE)-Angriffe selbst durchführen • grundlegende Abwehrmechanismen gegen MATE-Angriffe entwickeln und testen • ausgewählte automatische Programmanalysen starten und nachvollziehen • den Einsatz der Abwehrmechanismen sowohl technisch als auch unternehmensverantwortlich beurteilen	
Content:	
<i>29 Advanced Topics in Software Security:</i> • Abstract Software Representations (Graph Representations, LLVM Microcode) • the technical and social perspective on Man-at-the-End-(MATE)-attacks and Digital Rights Management (DRM) • Binary Integrity Protection • Obfuscation • White-Box Cryptography and Homomorphic Encryption • Malware Detection and Analysis • Mobile Phone and App Security • Secure User Interaction and Anti-Patterns • Current Binary Vulnerabilities and Exploits (e.g. Out-of-Bounds Read and Write, Use After Free, NULL Pointer Dereference) • Security-focused Static (e.g. Information flow and Taint Analysis) and Dynamic Program Analysis (e.g.	

Fuzzing)

- Virtualization + Container Security

Literature:

29 *Advanced Topics in Software Security (CSL_AS)*:

Compulsory:

- ANDRIESSE, Dennis, 2019. *Practical binary analysis: build your own Linux tools for binary instrumentation, analysis, and disassembly*. San Francisco: No Starch Press, Inc.. ISBN 978-1-59327-912-7, 1-59327-912-4
- TAKANEN, Ari and others, 2018. *Fuzzing for software security testing and quality assurance*. Boston ; London: Artech House. ISBN 978-1-63081-519-6
- DRAKE, Joshua J. and others, 2014. *Android Hacker's Handbook*. Somerset: Wiley. ISBN 978-1-118-92225-5, 978-1-118-60864-7
- ANDERSON, Ross, 2020. *Security engineering: a guide to building dependable distributed systems* [online]. Indianapolis: Wiley PDF e-Book. ISBN 978-1-119-64468-2, 978-1-119-64283-1. Available via: <https://onlinelibrary.wiley.com/doi/book/10.1002/9781119644682>.

Recommended:

None

Advanced Webtechnologies	
Module abbreviation:	CAI_AWT
Curriculum:	Programmes
	Computer Science and Artificial Intelligence (CAI-B) - SPO-Nr.: 14
Responsible for module:	Windisch, Hans-Michael
Lecturers:	Windisch, Hans-Michael
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	27: Advanced Webtechnologies (CAI_AWT)
Lecture types:	27-Advanced Webtechnologies: SU - lecture (CAI_AWT)
Studien- / Prüfungsleistungen:	
27-Advanced Webtechnologies: LN - written exam, 90 minutes (CAI_AWT) Additional Explanation: <i>27 Advanced Webtechnologies:</i> To successfully complete the module students need to pass a written exam.	
Recommended prerequisites:	
None	
Objectives:	
<i>27 Advanced Webtechnologies:</i> By the end of the lecture, students will be able to • use HTML, CSS and JavaScript and TypeScript to develop web applications. • design web applications based on modern web application software architectures. • design and implement REST APIs with nodeJS. • develop medium sized web applications (client side) with Angular. • develop medium sized web applications (client side) with React. • design and implement React web applications with Next.js. • dockerize web apps and run them in docker containers.	
Content:	
<i>27 Advanced Webtechnologies:</i> 1 Client-Side Technology Stack: ○ HTML5, CSS3, JavaScript ○ Overview of modern client-side development tools and libraries. ○ Build tools and package managers 1. Software Architectures for Web Applications: ○ Server side page generation ○ JS client and REST server ○ Server side components, server side rendering 2. TypeScript: ○ Introduction to TypeScript and its benefits over JavaScript.	

- Understanding TypeScript syntax and features: types, interfaces, and classes.
- 3. REST APIs:
 - Principles of RESTful architecture and its importance in web development.
 - Designing and implementing RESTful APIs.
- 4. Building Web Applications with Angular:
 - Overview of Angular framework and its core concepts.
 - Setting up an Angular project and understanding the Angular CLI.
 - Developing single-page applications (SPAs) with Angular components, services, and routing.
- 5. React:
 - Introduction to React and its component-based architecture.
 - Managing state and props in React applications.
 - Utilizing React hooks and context API for advanced state management.
- 6. Building Web Applications with React/Next.js:
 - Combining React with Next.js for server-side rendering (SSR) and static site generation (SSG).
 - Setting up a Next.js project and exploring its file-based routing system.
 - Implementing SSR, SSG, and dynamic routing in Next.js applications.
- 7. Containerizing Apps with Docker:
 - Introduction to Docker and its role in modern web development.
 - Creating and managing Docker containers for development and production.
 - Best practices for containerizing web applications and working with Docker Compose.

Literature:

27 Advanced Webtechnologies (CAI_AWT):

Compulsory:

- WIERUCH, Robin, 2023. *The road to React: with React 18 and React Hooks : required knowledge: JavaScript*. [Erscheinungsort nicht ermittelbar]: [Verlag nicht ermittelbar]. ISBN 9781720043997

Recommended:

None

Algorithms for AI 2	
Module abbreviation:	CAI_AAI2
Curriculum:	Programmes
	Computer Science and Artificial Intelligence (CAI-B) - SPO-Nr.: 14 Computer Science and Artificial Intelligence (CAI-B) - SPO-Nr.: 14
Responsible for module:	Nagel, Christian
Lecturers:	Nagel, Christian
Language of instruction:	English
Credit points / SWS:	7 ECTS / 6 SWS
Workload:	Contact hours: 70 h
	Self-study: 105 h
	Total: 175 h
Subjects of the module:	14.2: Practical Course Algorithms for AI 2 (CAI_AAI2Pr)
Lecture types:	14.1: SU/Ü - lecture with integrated exercises (CAI_AAI1)
	14.2: Pr - laboratory (CAI_AAI1Pr)
Studien- / Prüfungsleistungen:	
14.2-Practical Course Algorithms for AI 2: schrP90 - written exam, 90 minutes (CAI_AAI2Pr) Additional Explanation: <i>14 Practical Course Algorithms for AI 2:</i> Students must successfully complete and submit at least 6 exercise sheets. 9 exercise sheets will be available.	
Recommended prerequisites:	
None	
Objectives:	
In this module, students learn to use more advanced algorithms of artificial intelligence and their applications on structures, unstructured and temporal data. The basic idea and mathematical backgrounds of neural networks are introduced. Students learn how to train simple neural networks to learn patterns from data for regression and classification tasks. Further, Deep Learning and its most common architectures are introduced, including Convolutions and recurrent connections. Students learn how to effectively train deep learning, networks by choosing optimal hyperparameters and how to avoid overfitting. Thus, methods like Regularization and Dropout are explained. The goal of this module is further to introduce unsupervised learning to the students, as well as its application to solve clustering problems. The application of unsupervised learning in combination with neural networks is illustrated by introducing autoencoders. In addition, it is shown how to use unsupervised learning methods to reduce the dimensionality of datasets using feature selection and PCA techniques. After successfully attending this module, students know: • How to handle structured, unstructured and temporal data. • What a neural network is and how it can be trained using backpropagation. • How to use different optimizers for neural networks. • The most important deep learning architectural layers like convolutions. • How to effectively train neural networks and to avoid overfitting.	

- The basic principles of unsupervised learning and their applications to real world problems.
- How to use features selection and PCA methods to reduce the dimensionality of datasets.
- Different forms of collaborative groups work.
- How to gather knowledge and share it within their learning group.
- How to summarize and present the most important information of a specific topic.

Content:

Learning with structured, unstructured and temporal data

- Basic principles of neural networks
- Backpropagation and different Optimizer
- Convolutional layer
- Recurrent neural networks
- Regularization and Dropout
- Optimizing Hyperparameters
- Unsupervised Learning
 - o Clustering and its most important algorithms
 - o Autoencoders
 - o Dimensionality Reduction

Literature:

- *GOODFELLOW, Ian, Yoshua BENGIO and Aaron COURVILLE, 2016. Deep learning. Cambridge, Massachusetts; London, England: The MIT Press. ISBN 978-0-262-33737-3*
- *BISHOP, Christopher M, 2016. Pattern recognition and machine learning. New York: Springer. ISBN 978-1-4939-3843-8*
- *RUSSEL, Stuart and Peter NORVIG, 2021. Artificial intelligence: a modern approach. 4. edition. ISBN 978-1-292-40113-3; 1-292-40113-3*

Data Visualization and Data Analytics	
Module abbreviation:	CAI_DVsAn
Curriculum:	Programmes
	Computer Science and Artificial Intelligence (CAI-B) - SPO-Nr.: 15
Responsible for module:	Navarro Bullock, Beate
Lecturers:	Navarro Bullock, Beate
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	15: Data Visualization and Data Analytics (CAI_DVsAn)
Lecture types:	SU/Ü - lecture with integrated exercises
Studien- / Prüfungsleistungen:	
15-Data Visualization and Data Analytics: schrP90 - written exam, 90 minutes (CAI_DVsAn)	
Additional Explanation:	
None	
Recommended prerequisites:	
Basic knowledge of Python	
Objectives:	
<i>15 Data Visualization and Data Analytics:</i> At the end of the class, students will • get an understanding of technologies and software tools to handle fundamental steps in the data analysis pipeline. • know how to acquire data, for example using web scrapers, APIs or data platforms and how to structure them to most conveniently work with them. • be able to preprocess and manipulate data. • apply basic data analysis techniques using Python and real word datasets. • know common methods to answer basic questions about the data and how to interpret the results. • have an understanding of data presentation and visualization (reporting, graphical analysis, representation of results).	
Content:	
<i>15 Data Visualization and Data Analytics:</i> This course provides a broad overview of principles and algorithms for data analytics and visualization. Specific topics include: • How to get and structure the data (data collection, usage of web scrapers, APIs etc., data formats, types and structure of data) • How to process the data (data wrangling and transformation, data reduction, aggregation of data) • How to analyze data • How to visualize data (human perception, types of visualizations, visualization design, interactive visualizations, algorithms) • How to deal with specific types of data (for example time series, text, spatial data) The lecture is accompanied with (practical) exercises using Python and a selection of visualization tools.	

Literature:

15 Data Visualization and Data Analytics (CAI_DVsAn):

Compulsory:

None

Recommended:

- MURRAY, Scott, 2017. *Interactive Data Visualization for the Web*. ISBN 978-1491921289
- MUNZNER, Tamara, 2015. *Visualization analysis & design*. Boca Raton [u.a.]: CRC Press, Taylor & Francis Group. ISBN 978-1-4665-0893-4, 978-1-4665-0891-0
- MCKINNEY, Wes, 2017. *Python for Data Analysis*. ISBN 978-1491957660
- VANDERPLAS, Jake, 2017. *Python Data Science Handbook: Essential Tools for Working with Data*. ISBN 978-1491912058

eTHlcs_basic	
Module abbreviation:	IB_ETHICS_en
Curriculum:	Programmes
	Computer Science and Artificial Intelligence (CAI-B) - SPO-Nr.: 27
Responsible for module:	Richter, Florian
Lecturers:	Richter, Florian
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	27: eTHlcs_basic (IB_ETHICS_en)
Lecture types:	27-eTHlcs_basic: SU/Ü - lecture with integrated exercises (IB_ETHICS_en)
Studien- / Prüfungsleistungen:	
27-eTHlcs_basic: LN - seminar paper (10-15 pages) and oral presentation (15-30 minutes) (IB_ETHICS_en) Additional Explanation: 27 eTHlcs_basic: Grading is three quarters based on five papers (~ 2 pages each) that will be handed in over the course of the term. Paper submissions will be complemented by obligatory in-class presentations (~ 20 minutes).	
Recommended prerequisites:	
None	
Objectives:	
27 eTHlcs_basic: On successful completion of the course, students will be able to • outline the most pressing questions currently discussed in the ethics of technology. • distinguish meta-ethical, normative, and empirical arguments in ethics. • apply normative theories from ethics to the field of technology. • apply ethical arguments to case studies from the field of artificial intelligence, e.g., self-driving cars. • discuss the role of empirical research for the ethics of human-machine interaction and machine ethics. • transcend their own normative viewpoint by critically reflecting on it. • formulate their own research questions to inquire into the ethics of technology and outline research designs to address them.	
Content:	
27 eTHlcs_basic: The ethics of technology deals with moral questions that concern the usage of technologies. It raises fundamental questions about our relationship with technologies. • Should we delegate ethical tasks to machines? • Which normative principles should guide the design of our artefacts? • How does the interaction with artefacts influence our moral behavior? • Can we change this influence by the ethically aligned design of the human-machine interface? Certain technologies may raise more specific questions. • What are the challenges of hybrid traffic in which manual and automatized cars will have to cooperate? • How should medical recommender system communicate uncertainty to medical professionals?	

- What effects does social media have on our society's culture?

In this module, we will discuss recent topics from the realm of the ethics of technology. In biweekly lectures, changing experts will share their views on the ethical implications of different technologies.

These lectures will be complemented by a pre-reading course in which students will individually familiarize themselves with relevant literature from the field and together subject this literature to criticism.

Students will be required to summarize their learnings from the lectures and the literature in reflection reports. To complete the module, they will also have to actively participate in the "eTHICS conference," in which they will give a presentation on a relevant topic and participate in a peer-evaluation of the topics presented.

Literature:

27 eTHICS_basic (IB_ETHICS_en):

Compulsory:

None

Recommended:

- SHAFER-LANDAU, Russ, 2019. *A Concise Introduction to Ethics*. ISBN 978-0190058173
- LIAO, S. Matthew, 2020. *Ethics of artificial intelligence*. New York, NY: Oxford University Press. ISBN 978-0-19-090503-3, 978-0-19-090504-0

Introduction to Computer Science 1	
Module abbreviation:	CAI_CS1
Curriculum:	Programmes
	Computer Science and Artificial Intelligence (CAI-B) - SPO-Nr.: 2
Responsible for module:	Sofra, Nikoletta
Lecturers:	Sofra, Nikoletta
Language of instruction:	English
Credit points / SWS:	7 ECTS / 6 SWS
Workload:	Contact hours: 70 h
	Self-study: 105 h
	Total: 175 h
Subjects of the module:	2.1: Introduction to Computer Science 1 (CAI_CS1)
Lecture types:	2.1: SU - integrated lecture 2.2: Ü - exercises
Studien- / Prüfungsleistungen:	
2.1-Introduction to Computer Science 1: schrP90 - written exam, 90 minutes (CAI_CS1)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>2 Introduction to Computer Science 1:</i> The objective of this course is to develop a basic understanding of how algorithms (sequences of machine-executable computational steps) are executed on computers (program-controlled information processing systems). After successful participation, the students are able • to explain the concept of an algorithm. • to assess whether a problem is calculable, i.e. an algorithm can be formulated to solve it. • to estimate the complexity of a given algorithm. • to prove the correctness of simple algorithms. • to understand how information is processed on a computer. • to describe the structure of a universal computer and how it works. • to classify various advanced computer architecture concepts.	
Content:	
<i>2 Introduction to Computer Science 1:</i> Algorithms • The concept of an algorithm ◦ Proving algorithm correctness ◦ Estimating algorithm complexity • Computability ◦ Turing computability ◦ Church-Turing thesis • Decidability	

- Halting problem
- RICE's theorem
- Complexity
 - O , Θ , Ω notation
 - Complexity classes P and NP
 - Time and space complexity

Computer architecture

- Binary representation of information
 - Natural, negative, fractional numbers
 - Machine instructions and programs
- Digital circuits
 - Logical elements, combinational circuits
 - Storage elements, registers, counters, sequential circuits
- Von Neumann architecture
- Advanced concepts in today's computer architectures
 - Caching
 - Multi-core architectures
 - Instruction pipelining
 - Graphics processing units

Literature:

2 Introduction to Computer Science 1 (CAI_CS1):

Compulsory:

- SIPSER, Michael, 2013. *Introduction to the Theory of Computation*.
- PATTERSON, David A. and John L. HENNESSY, 2021. *Computer organization and design: the hardware software interface*. Cambridge, MA: Morgan Kaufmann. ISBN 978-0-12-820109-1
- STALLINGS, William, 2022. *Computer organization and architecture: designing for performance*. 11. edition.
- CORMEN, Thomas H. and others, 2022. *Introduction to Algorithms*.
- ARORA, Sanjeev and Boaz BARAK, 2012. *Computational Complexity - A Modern Approach*.

Recommended:

None

Machine Learning	
Module abbreviation:	IB_ML
Curriculum:	Programmes
	Flug- und Fahrzeuginformatik (FFI-B) - SPO-Nr.: 29
Responsible for module:	Regensburger, Franz
Lecturers:	Nagel, Christian
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	29: Machine Learning (IB_ML)
Lecture types:	29-Machine Learning: SU - lecture (IB_ML)
Studien- / Prüfungsleistungen:	
29-Machine Learning: LN - written exam, 90 minutes (IB_ML)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>29 Machine Learning:</i> In this learning module, algorithms and their applications are illustrated by real world examples. After successfully attending this module, students know and understand the basic principles of learning systems and their applications to real world problems. They know • the different methods how to learn from data • the mathematical basis and the most important algorithms to train machine learning models on their own • the different building blocks of deep neural networks and how to apply them to solve real world problems, e.g. for computer vision or natural language processing. • how to evaluate and validate machine learning models • the basic pitfalls and problems when training models and how to solve them efficiently	
Content:	
<i>29 Machine Learning:</i> • Basic concepts of Machine Learning • Preprocessing • Supervised Learning ◦ Regression ◦ Classification • Unsupervised Learning • Reinforcement Learning • Evaluation and Validation • Neural Networks • Deep Learning	

- | |
|---|
| <ul style="list-style-type: none">• Frameworks and Tools• Practical applications of modern machine learning algorithms |
| Literature: |
| Will be specified at the beginning |

Mathematics 1	
Module abbreviation:	CAI_Math1
Curriculum:	Programmes
	Computer Science and Artificial Intelligence (CAI-B) - SPO-Nr.: 3
Responsible for module:	Roegner, Katherine
Lecturers:	Roegner, Katherine
Language of instruction:	English
Credit points / SWS:	7 ECTS / 4 SWS
Workload:	Contact hours: 70 h
	Self-study: 105 h
	Total: 175 h
Subjects of the module:	3.1: Mathematics 1 (CAI_Math1)
Lecture types:	3.1: SU - integrated lecture 3.2: Ü - exercises
Studien- / Prüfungsleistungen:	
3.1-Mathematics 1: schrP90 - written exam, 90 minutes (CAI_Math1) Additional Explanation: <i>3 Mathematics 1:</i> No requirements. A solid understanding of school mathematics is beneficial.	
Recommended prerequisites:	
high school level algebra and geometry	
Objectives:	
<i>3 Mathematics 1:</i> After successful completion of this course, the student is able to - state the basic facts in logic and apply results to appropriate examples. - understand the structure of proofs and construct proofs in computer-science related problems (for example, mathematical induction). - represent complex numbers in various forms in order to solve equations and inequalities. - analyze limit processes to sequences (explicit and recursively defined). - state, apply, and interpret formulas and theorems in differential calculus. - develop Taylor polynomials and approximate the error using Lagrange remainders. - develop infinite series and determine their radii and intervals of convergence. - state and apply the definition of Riemann integrals, the fundamental theorem of calculus and the mean value theorem for integrals. Apply the basic integration techniques such as substitution and partial integration.	
Content:	
<i>3 Mathematics 1:</i> - Foundations of logic - Methods of proof, especially mathematical induction - Relations and functions - Sequences and series, convergence - Continuity - Differentiation	

- Integration

Literature:

3 Mathematics 1 (CAI_Math1):

Compulsory:

None

Recommended:

- FRIEDMAN, Menahem, KANDEL, Abraham, 2011. *Calculus light* [online]. Berlin [u.a.]: Springer PDF e-Book. ISBN 978-3-642-17848-1, 978-3-642-17847-4. Available via: <https://doi.org/10.1007/978-3-642-17848-1>.
- RAHMANI-ANDEBILI, Mehdi, 2021. *Calculus: Practice Problems, Methods, and Solutions* [online]. Cham: Springer International Publishing PDF e-Book. ISBN 978-3-030-64980-7. Available via: 10.1007/978-3-030-64980-7 .
- ARANGALA, Crista, 2023. *Linear Algebra with Machine Learning and Data*. Milton: CRC Press LLC. ISBN 978-1-00-085620-0

Mobile UX Prototyping - Master	
Module abbreviation:	UXDM_MUXP
Curriculum:	Programmes
	User Experience Design (Master) (UXD-M) - SPO-Nr.: 6
Responsible for module:	Nestler, Simon
Lecturers:	Nestler, Simon
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	6: Mobile UX Prototyping (UXDM_MUXP)
Lecture types:	6-Mobile UX Prototyping: SU/Ü - lecture with integrated exercises (UXDM_MUXP)
Studien- / Prüfungsleistungen:	
6-Mobile UX Prototyping: seminar paper and presentation (UXDM_MUXP) Additional Explanation: <i>6 Mobile UX Prototyping:</i> The seminar paper has a length of approx. 5,000 words (minimum 4,500, maximum 5,500). The duration of the final presentation is set at 30 minutes (it is recommended to create a slide deck with approx. 15-20 slides)	
Recommended prerequisites:	
There are no prerequisites or corequisites for this class. However, a basic understanding of the practical application of the human-centered design process, experience in prototyping software applications and in the evaluation of interactive systems, and expertise in conducting heuristic evaluations and/or usability tests would be beneficial.	
Objectives:	
<i>6 Mobile UX Prototyping:</i> After active participation in the course, students • ...have acquired in-depth knowledge of the mobile market and know what characterizes competitive apps • ...have acquired the competence to develop mockups and prototypes for mobile applications themselves • ... can analyze and interpret the mobile user experience of existing applications and derive appropriate solutions • ...have gained a thorough understanding of the concept of push notification and can apply it to create new app user experiences • ...have gained the knowledge to reliably and successfully deal with new opportunities and challenges in user experience • ...have acquired the competence to implement the "Offline First" paradigm in their developments Self- and social competences: Upon completion of the module, students • ...have acquired the competence to present their usability studies on mobile apps in a focused presentation and to moderate a sound discussion with the audience • ...can communicate professionally at an adequate level of abstraction using appropriate forms of media	

- ...have gained extensive experience in intercultural cooperation
- ...have sufficient abstraction skills and analytical thinking to be able to independently familiarize themselves with new, unfamiliar areas of expertise and complex problems and implement solutions for it

Content:

6 Mobile UX Prototyping:

- “How to build a billion-dollar app”
- The mobile market
- Technologies for apps
- Navigation, menus and patterns
- Search strategies and auto-completion
- Types of forms incl. authentication/passwords
- Tables and tabular data
- Tools, toolbars, and screen control
- System status, affordance, and feedback/error messages
- Help systems, User guides/FAQs, contextual help
- Tutorials and invitations: Engage the user
- Social patterns and gamification
- Visualization: Charts, dashboards, tables
- “Anti-patterns”: Metaphors and mental model (mismatch)

Literature:

6 Mobile UX Prototyping (UXDM_MUXP):

Compulsory:

- LIEBEL, Christian, 2019. *Progressive Web Apps: das Praxisbuch*. Bonn: Rheinwerk Verlag. ISBN 978-3-8362-6494-5
- NEIL, Theresa, 2014. *Mobile design pattern gallery: UI patterns for smartphone apps*. Sebastopol, CA: O'Reilly.
- ATER, Tal, 2017. *Building Progressive Web Apps: bringing the power of native to the browser*. Beijing; Boston; Farnham: O'Reilly. ISBN 978-1-4919-6162-9
- JOOSR, 2016. *A Joosr guide to How to build a billion dollar app by George Berkowski*. ISBN 978-1-78567-516-4
- SEMLER, Jan and Kira TSCHIERSCHE, 2019. *App-Design*. Bonn: Rheinwerk Verlag. ISBN 978-3-8362-7052-6
- STAUFFER, Matt, April 2019. *Laravel: up & running: a framework for building modern PHP apps*. Sebastopol, CA: O'Reilly Media. ISBN 978-1-492-04121-4, 1492041211
- TIDWELL, Jenifer, Charles BREWER and Aynne VALENCIA, 2020. *Designing interfaces: patterns for effective interaction design*. Beijing: O'Reilly. ISBN 978-1-492-05193-0, 978-1-492-05191-6

Recommended:

None

Optimization Algorithms	
Module abbreviation:	CAI_OpAlg
Curriculum:	Programmes
	Computer Science and Artificial Intelligence (CAI-B) - SPO-Nr.: 13
Responsible for module:	Krüger, Max
Lecturers:	Krüger, Max
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	13: Optimization Algorithms (CAI_OpAlg)
Lecture types:	13-Optimization Algorithms: SU/Ü - lecture with integrated exercises (CAI_OpAlg)
Studien- / Prüfungsleistungen:	
13-Optimization Algorithms: schrP90 - written exam, 90 minutes (CAI_OpAlg)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>13 Optimization Algorithms:</i> After successfully completing the module the students ... • Category Knowledge: ... have knowledge of important notations, concepts, and methods of optimization. • Category Comprehension: ... understand the benefit of optimization in the treatment of application problems and as foundation of machine learning and artificial intelligence. • ... can explain important notations and concepts using examples and thereby understand the essential methods. • Category Application: ... independently solve typical optimization tasks. • ... recognize optimization problems that arise when working on application problems and solve them with suitable methods. • ... familiarize themselves with new optimization methods if necessary. • Category Analysis: ... critically question optimization methods with regard to their applicability for existing problems and check the results for plausibility. • Category Evaluation: ... interpret and assess the results in the application context. After successful participation in the Optimization module, the students will be able to meet the mathematical requirements of the advanced subjects and are able to familiarize themselves with further optimization methods in the area of machine learning and artificial intelligence.	
Content:	
<i>13 Optimization Algorithms:</i>	

Overview and foundations:

- Introduction and overview to optimization
- General optimization problem
- Classification of optimization problems and methods
- Topological foundations of n-dimensional real sets
- Functions with several variables and continuity
- Convexity of sets and functions

Analytical optimization:

- Optimization with one variable
- Partial and directional derivatives
- Gradients, Hessian matrix and definiteness-criteria of matrices
- Optimization without constraints I
- Optimization without constraints II
- Optimization with equality-constraints

Numerical optimization:

- Introduction to numerical methods and numerical scalar optimization
- Numerical vector optimization
- Gradient methods I
- Gradient methods II
- Nelder-Mead method

Linear optimization:

- Linear optimization
- Simplex method
- Integer and binary optimization
- Tools for linear optimization I
- Tools for linear optimization II

Graph Optimization

- Graph Theory
- Trees and tree search
- Shortest Paths and Minimal Spanning Trees

Literature:

13 Optimization Algorithms (CAI_OpAlg):

Compulsory:

None

Recommended:

- DEISENROTH, Marc Peter, A. Aldo FAISAL and Cheng Soon ONG, 2020. *Mathematics for machine learning*. Cambridge: Cambridge University Press. ISBN 978-1-108-45514-5
- AGGARWAL, Charu C., 2020. *Linear algebra and optimization for machine learning: a textbook* [online]. Cham: Springer PDF e-Book. ISBN 978-3-030-40344-7. Available via: <https://doi.org/10.1007/978-3-030-40344-7>.
- DIESTEL, Reinhard, 2017. *Graph theory*. Berlin: Springer. ISBN 978-3-662-53621-6, 978-3-662-57149-1

Principles of Modern Software Development	
Module abbreviation:	IB_PMSD
Curriculum:	Programmes
	Informatik Bachelor (INF-B) - SPO-Nr.: 31
Responsible for module:	Regensburger, Franz
Lecturers:	Neumeier, Stefan; Weiss, Peter
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	31: Principles of Modern Software Development (IB_PMSD)
Lecture types:	SU/Ü - integrated lecture / exercises
Studien- / Prüfungsleistungen:	
31-Principles of Modern Software Development: LN - written exam, 90 minutes (IB_PMSD) Additional Explanation: None	
Recommended prerequisites:	
Basics of programming and knowledge of at least one specific programming language	
Objectives:	
<i>31 Principles of Modern Software Development:</i> On successful completion of the course, students will be able to: • understand modern software development principles • identify pros and cons of programming languages for specific projects • understand how safety and resource efficient programming can work • know how to apply the Rust programming language to support the goals of modern software development with focus on resource efficiency and safety • understand Software Testing and the respective process • apply techniques for profiling and tracing	
Content:	
<i>31 Principles of Modern Software Development:</i> • Modern software development principles • Introduction of different approaches for programming languages and the corresponding pros and cons • Introduction and identification of safety-critical aspects in modern software • Programming in Rust to support safe and resource-efficient programming “by design” • Embedding of Rust in existing software development processes and interaction with other programming languages • Techniques for profiling and tracing	
Literature:	
<i>31 Principles of Modern Software Development (IB_PMSD):</i> Compulsory:	

None

Recommended:

- KLABNIK, Steve and Carol NICHOLS, 2018. *The Rust programming language*. San Francisco: No Starch Press. ISBN 978-1-59327-828-1, 1-59327-828-4
- MARTIN, Robert C. and others, 2018. *Clean architecture: a craftsman's guide to software structure and design*. Boston: Prentice Hall. ISBN 978-0-13-449416-6, 0-13-449416-4
- ANDRIST, Björn, Viktor SEHR and B. GARNEY, 2020. *C++ high performance: master the art of optimizing the functioning of your C++ code*. Birmingham ; Mumbai: Packt Publishing. ISBN 978-1-83921-258-1

Probability and Statistics	
Module abbreviation:	CAI_PrSt
Curriculum:	Programmes
	Computer Science and Artificial Intelligence (CAI-B) - SPO-Nr.: 4
Responsible for module:	Krüger, Max
Lecturers:	Kotonski, Julia
Language of instruction:	English
Credit points / SWS:	7 ECTS / 4 SWS
Workload:	Contact hours: 70 h
	Self-study: 105 h
	Total: 175 h
Subjects of the module:	4.1: Probability and Statistics (CAI_PrSt)
Lecture types:	4.1: SU - lecture
	4.2: Ü - exercises
Studien- / Prüfungsleistungen:	
4.1-Probability and Statistics: schrP90 - written exam, 90 minutes (CAI_PrSt)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>4 Probability and Statistics:</i> After successfully completing the module the students ... • Category Knowledge: ... have knowledge of important concepts, processes and applications of applied statistics. • Category Comprehension: ... understand the importance of statistics in the description and treatment of application problems. • ... can explain important statistical procedures using examples and thereby understand the essential procedures. • Category Application: ... independently solve typical statistical tasks. • ... recognize statistical problems that arise when working on application problems and solve them with suitable methods. • ... familiarize themselves with new statistical methods if necessary. • Category Analysis: ... critically question statistical methods with regard to their applicability for existing problems and check the results for plausibility. • Category Evaluation: ... interpret and assess the results in the application context. After successful participation in the Probability and Statistics module, the students will be able to meet the stochastic requirements of the advanced subjects and are able to familiarize themselves with further procedures.	
Content:	
<i>4 Probability and Statistics:</i>	

Descriptive Statistics:

- attributes, scales, and random samples
- tabular and graphical representations
- location and variability measures
- bivariate covariance and correlation
- linear and nonlinear regression

Probability Theory:

- random events and probability
- probability calculus and combinatorics
- Bayesian probability
- discrete random variables
- continuous random variables
- discrete probability distributions
- continuous probability distributions
- quantiles of probability distributions

Inferential Statistics:

- limit theorems and parameter estimation
- foundations of confidence intervals
- confidence-interval estimators
- foundations of test theory
- construction of parameter tests
- parameter tests
- independence and goodness-of-fit tests

Literature:

4 Probability and Statistics (CAI_PrSt):

Compulsory:

None

Recommended:

- NAVIDI, William, 2020. *Statistics for engineers and scientists*. New York, NY: McGraw-Hill Education. ISBN 978-1-260-54788-7, 1-260-54788-4
- HAGHIGHI, Aliakbar Montazer and Indika Rathnathungalage WICKRAMASINGHE, 2021. *Probability, statistics, and stochastic processes for engineers and scientists*. Boca Raton, FL: CRC Press. ISBN 978-0-8153-7590-6
- WEINBERG, Sharon Lawner, Daphna HAREL and Sarah Knapp ABRAMOWITZ, 2021. *Statistics using R: an integrative approach*. Cambridge: Cambridge University Press. ISBN 978-1-108-71914-8

Programming 1	
Module abbreviation:	CAI_Prog1
Curriculum:	Programmes
	Computer Science and Artificial Intelligence (CAI-B) - SPO-Nr.: 1
Responsible for module:	Gold, Robert
Lecturers:	Gold, Robert (CAI_Prog1) Zippelius, Andreas (CAI_Prog1Pr)
Language of instruction:	English
Credit points / SWS:	7 ECTS / 6 SWS
Workload:	Contact hours: 70 h
	Self-study: 105 h
	Total: 175 h
Subjects of the module:	1.1: Programming 1 (CAI_Prog1) 1.2: Practical Course Programming 1 (CAI_Prog1Pr)
Lecture types:	1.1: SU/Ü - integrated lecture and exercises 1.2: Pr - practical course
Studien- / Prüfungsleistungen:	
1.1-Programming 1: schrP90 - written exam, 90 minutes (CAI_Prog1) 1.2-Practical Course Programming 1: LN - participation without/with success (CAI_Prog1Pr) Additional Explanation: <i>1 Programming 1:</i> <i>1 Practical Course Programming 1 (CAI_Prog1Pr):</i> In the practical part, several programming assignments must be completed. Upon successful completion of each assignment, the instructor will award a certificate for each assignment. A total of four assignments must be completed, covering key topics from the lecture. The completed solutions in the Python programming language must be presented individually within a fixed timeframe (approximately one certificate every 14 days), and questions regarding the solution concept and the created program must also be answered. Only if all four certificates are completed on time will the student be considered to have completed the assignment.	
Recommended prerequisites:	
None	
Objectives:	
<i>1 Programming 1:</i> The module is designed to teach students to program in Python in a practical manner using industry standard methods, tools and technologies. It not only teaches students the Python programming language but also improves their algorithmic thinking and problem-solving capabilities so that they can write code that actually works and produces the desired functional results. After completion of the module the students will be able to - understand the programming basics (operations, control structures, data types, etc.). - readily use the Python programming language. - apply various data types and control structure. - understand and begin to implement code.	

Content:*1 Programming 1:*

The module Programming 1 provides an initial, basic introduction to programming. Python is used as programming language. The following topics are covered:

- Working with a development environment, creating programs/scripts
- Data types and variables
- Simple operators
- Input and output
- Loops and conditional statements
- Functions, modules and test-driven development, default parameters, keyword parameters and procedures, local and global variables, recursive functions, type annotations
- Tuples, lists, sorting lists, dictionaries
- Importing modules from standard libraries
- Matplotlib, command-line parameters, lambda functions, list abstractions, the map function

Literature:*1 Programming 1 (CAI_Prog1):*

Compulsory:

None

Recommended:

- LAMBERT, Kenneth A. and Martin OSBORNE, 2019. *Fundamentals of Python: first programs*. Boston, MA: Cengage. ISBN 1-337-56009-X, 978-1-337-56009-2
- ERNESTI, Johannes and Peter KAISER, 2022. *Python 3: the comprehensive guide*. New York, NY: Rheinwerk Publishing. ISBN 978-1-493-22303-9

Project - Master	
Module abbreviation:	UXDM_PR
Curriculum:	Programmes
	User Experience Design (Master) (UXD-M) - SPO-Nr.: 10
Responsible for module:	Riener, Andreas
Lecturers:	Anwar Bibi, Sven; Sturm, Christian
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	10: Project (UXDM_PR)
Lecture types:	10-Project: Prj - project (UXDM_PR)
Studien- / Prüfungsleistungen:	
10-Project: project report (min. 5 pages excluding tables and graphs, font size 10-12 pt.) and a presentation (10-15 minutes) (UXDM_PR) Additional Explanation: None	
Recommended prerequisites:	
There are no prerequisites or corequisites for this class. However, depending on the role, a participant wants to play in the project, appropriate prior knowledge (i.e., basic knowledge of agile project management and PM tools, programming experience, design skills, knowledge of user research, data analysis, and visualization, or statistics) would be beneficial.	
Objectives:	
<i>10 Project:</i> After active participation in the course, students • ...have developed a broad understanding of the interdisciplinary context • ...can apply management techniques to support the development and distribution of systems and products throughout their life cycle • ...know how to effectively cooperate in interdisciplinary teams • ...have acquired knowledge about how to organize team processes • ...know how to apply creativity techniques and moderate groups • ...have acquired the ability to evaluate project milestones and argue the decision to move forward in the process • ...know about the benefits of the iterative development process and can apply them in the product development process • ... can evaluate and improve the usability of products and to differentiate usability from user experience • ...have acquired the ability to recognize and evaluate the quality of design Self- and social competences: Upon completion of the module, students • ...have improved on methodological skills and social competence • ...can communicate professionally at an adequate level of abstraction using appropriate forms of media • ... can present research results to different audiences, either as oral presentation or written report • ...have acquired the competence to work successfully in (global) teams	

Based on the role taken individually, learning outcomes may differ.

Content:

10 Project:

Each semester, several projects with different thematic alignments are offered. Depending on the project, the focus and thus also the contents differ.

- Introduction to the project/problem statement
- Related work analysis/state-of-the-art research
- Brainstorming/Ideation processes
- User research
- Implementation of software/hardware prototypes
- Study design and execution of user studies
- Data analysis, results presentation and interpretation
- Derivation of recommendations
- Preparing of presentations, teaser video, project report

Literature:

10 Project (UXDM_PR):

Compulsory:

- FLEWELLING, Paul, 2018. *The agile developer's handbook: get more value from your software development : get the best out of the agile methodology*. Birmingham, UK: Packt Publishing. ISBN 978-1-78728-020-5

Recommended:

- LAYTON, Mark C., Steven J. OSTERMILLER and Dean J. KYNASTON, 2020. *Agile Project Management for Dummies*. Newark: John Wiley & Sons, Incorporated. ISBN 978-1-119-67706-2
- SUTHERLAND, Jeff, 2019. *SCRUM: the art of doing twice the work in half the time*. London: Random House Business. ISBN 978-1-847-94110-7

Quantum Computing	
Module abbreviation:	IC_QC_eng
Curriculum:	Programmes
	Flug- und Fahrzeuginformatik (FFI-B) - SPO-Nr.: 29
Responsible for module:	Margull, Ulrich
Lecturers:	Margull, Ulrich
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 46 h
	Self-study: 79 h
	Total: 125 h
Subjects of the module:	29: Quantum Computing (IC_QC_eng)
Lecture types:	29-Quantum Computing: SU/Ü - lecture with integrated exercises (IC_QC_eng)
Studien- / Prüfungsleistungen:	
29-Quantum Computing: LN - written exam, 90 minutes (IC_QC_eng)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>29 Quantum Computing:</i> On completion of the course a student - understands the fundamental difference between classical computing and quantum computing. - understands quantum based circuits and is able to design them. - is able to solve problems using a quantum computer. - understands the principles of quantum cryptographic protocols. - understands the potential of quantum applications and is able to rank future trends in quantum computing and quantum hardware.	
Content:	
<i>29 Quantum Computing:</i> - Principles of quantum computing: qubit, quantum register, quantum circuit - Programming a quantum computer (with practical exercises, using IBM Qiskit) - Algorithms of quantum computing - Quantum based communication (quantum internet) - Quantum cryptographic protocols - Quantum hardware and error correction - Current applications of quantum computing - Mathematical and physical basics: complex numbers, matrices, vector spaces, basic quantum mechanic effects, like superposition, entanglement	
Literature:	
<i>29 Quantum Computing (IC_QC_eng):</i>	

Compulsory:

None

Recommended:

- NIELSEN, Michael A. and Isaac L. CHUANG, 2010. *Quantum computation and quantum information*. 10. edition. Cambridge: Cambridge University Press. ISBN 978-1-107-00217-3, 978-0-511-99400-5
- YANOFSKY, Noson S. and Mirco A. MANNUCCI, 2008. *Quantum computing for computer scientists*. Cambridge: Cambridge Univ. Press. ISBN 978-0-521-87996-5

Software Engineering	
Module abbreviation:	CAI_SwEng
Curriculum:	Programmes
	Computer Science and Artificial Intelligence (CAI-B) - SPO-Nr.: 11
Responsible for module:	Djanatliev, Anatoli
Lecturers:	Djanatliev, Anatoli (CAI_SwEng) Asif, Saara (CAI_SwEngPr)
Language of instruction:	English
Credit points / SWS:	7 ECTS / 6 SWS
Workload:	Contact hours: 70 h
	Self-study: 105 h
	Total: 175 h
Subjects of the module:	11.1: Software Engineering (CAI_SwEng) 11.2: Practical Course Software Engineering (CAI_SwEngPr)
Lecture types:	11.1 SU/Ü - seminar-based teaching/exercise 11.2: Pr - practical course
Studien- / Prüfungsleistungen:	
11.1-Software Engineering: schrP90 - written exam, 90 minutes (CAI_SwEng) 11.2-Practical Course Software Engineering: LN - participation without/with success (CAI_SwEngPr) Additional Explanation: <i>11 Practical Course Software Engineering (CAI_SwEngPr):</i> To successfully pass the course, continuous participation and individual (re)processing of tasks on the computer is mandatory - especially, if there is only little or no previous knowledge in the field of software development available. In the practical course, various tasks dealing with different topics from the lecture are to be completed. Students must successfully complete at least 6 out of 8 task sheets to successfully pass the practical course. The solutions are to be handed in individually or in small groups within a specified schedule (usually every 1 - 2 weeks), whereby questions about the solution are to be answered. The timetable is coordinated with the course of the lecture. Only if at least 6 out of 8 tasks are completed successfully in time, the predicate "successfully passed" is achieved.	
Recommended prerequisites:	
Basics Basics of Computer Science	of programming
Objectives:	
<i>11 Software Engineering:</i> After participating in this module students are able to... • explain the foundations of software engineering; • analyse and structure software requirements; • formally describe software components and interfaces; • develop, test and document simple software components in a high-level programming language; • use development tools (software engineering tool-chain) effectively; • cooperate in and across teams during the development of software applications. <i>11 Practical Course Software Engineering (CAI_SwEngPr):</i>	

After attending the practical course

- the students have their own practical experience in applying software engineering methods.
- the students have practical experiences in the analysis, planning and conversion of software systems.
- the listeners can document requirements to a software product in a structured way.
- the students are able to describe software system with the help of UML diagrams.
- are the listeners able to design and document the software architecture.
- are the students in the position to convert the architecture of a software.
- students are able to specify test cases and document test executions.

Content:

11 Software Engineering:

- Foundations of software engineering
- Systematic analysis of software requirements
- Modelling of requirements and components of a software product
- Specification and documentation of software component interfaces
- Development of software modules in teams including test and documentation
- Consistent use of software engineering tools (IDE, sourcecode-, build-, artifact-management)

11 Practical Course Software Engineering (CAI_SwEngPr):

Requirements engineering

- Stakeholderanalyses and System context
- Literal documentation of requirements
- Use cases modelling
- Class diagrams
- State diagrams

Software architecture & design

- Derive a component architecture with Entity-Boundary-Controller and Sequence diagrams
- Component diagrams

Implementation

- Implementation of a component architecture

Testing

- Blackboxtesting
- Whiteboxtesting

Literature:

11 Software Engineering (CAI_SwEng):

Compulsory:

None

Recommended:

- THOMAS, David and Andrew HUNT, 2020. *The pragmatic programmer: your journey to mastery*. 20. edition. Boston: Addison-Wesley. ISBN 978-0-13-595705-9, 0-13-595705-2
- MILES, Russ and Kim HAMILTON, 2006. *Learning UML 2.0: [a pragmatic introduction to UML]*. Sebastopol, CA: O'Reilly & Associates. ISBN 0-596-00982-8
- GAMMA, Erich and others, 1994. *Design Patterns - Elements of Reusable Object-Oriented Software*. ISBN 0-201-63361-2

11 Practical Course Software Engineering (CAI_SwEngPr):

Compulsory:

None

Recommended:

None

Vibe Coding for User Experience Designers - Master	
Module abbreviation:	UXDM_FW_VCUX
Curriculum:	Programmes
	User Experience Design (Master) (UXD-M) - SPO-Nr.: 11
Responsible for module:	Alvarez, Ignacio
Lecturers:	Alvarez, Ignacio
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	11: Vibe Coding for User Experience Designers (UXDM_FW_VCUX)
Lecture types:	11-Vibe Coding for User Experience Designers: SU/Ü - lecture with integrated exercises (UXDM_FW_VCUX)
Studien- / Prüfungsleistungen:	
11-Vibe Coding for User Experience Designers: LN - practical assignment (UXDM_FW_VCUX)	
Additional Explanation:	
None	
Recommended prerequisites:	
There are no prerequisites for this class. However, a basic familiarity with user-centered design processes, and some comfort with exploring digital tools is highly recommended.	
Objectives:	
<i>11 Vibe Coding for User Experience Designers:</i> After active participation in the course, students ...have a comprehensive understanding of generative AI concepts and how Large Language Models (LLMs) are trained and deployed. ...are able to use and compare various AI-assisted coding tools ("vibe coding") to rapidly prototype interactive web and Python-based applications. ...have gained practical skills in creating, analyzing, and synthesizing user research data with the support of generative AI. ...know how to apply principles of prompt engineering to effectively communicate design goals and user contexts to AI systems. ...are able to design, build, and deploy functional AI agents tailored to specific user problems. Self- and social competences: Upon completion of the module, students ...have gained the capability to independently explore new generative AI technologies, critically evaluating their potential for user experience design. ...can communicate complex ideas with advanced agentic tools to create appropriate UXD assets. ...can critically reflect on the ethical implications and social impacts of integrating autonomous AI solutions in UX design. ...are able to collaborate effectively in interdisciplinary teams, leveraging diverse backgrounds to enhance creative and technical outputs.	
Content:	
<i>11 Vibe Coding for User Experience Designers:</i>	

The course provides a practical introduction to the integration of generative AI and "vibe coding" into UX workflows. Students will:

- Explore foundational concepts of Generative AI, focusing on LLMs.
- Learn techniques of prompt engineering to effectively direct AI tools.
- Apply AI-driven methods to enhance UX research processes, from data collection to synthesis and prototyping.
- Utilize AI-assisted development platforms, such as ChatGPT, Replit or Cursor, to prototype interactive user interfaces, tools, and applications.
- Investigate the emerging paradigm of Agentic AI and its potential to autonomously resolve user experience challenges.
- Undertake a comprehensive final project, culminating in designing, building, and deploying a specialized AI agent addressing a defined UX issue.

Literature:

Will be specified at the beginning

Web Technologies	
Module abbreviation:	CSI_WEB
Curriculum:	Programmes
	Cybersicherheit (CSI-B) - SPO-Nr.: 16
Responsible for module:	Hof, Hans-Joachim
Lecturers:	Eggendorfer, Tobias
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	16: Web Technologies (CSI_WEB)
Lecture types:	Einsetzungstext ist leer!
Studien- / Prüfungsleistungen:	
16-Web Technologies: schrP90 - written exam, 90 minutes (CSI_WEB)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>16 Web Technologies:</i> After participating in the module, students are able to • explain commonly used technologies in web applications and web services. • write their own web applications. • write their own web services. • analyze web applications.	
Content:	
<i>16 Web Technologies:</i> • WWW Fundamentals (design principles, protocols like HTTP(S), DNS) • Client-side technologies (ISGML, XML, HTML, XHTML, HTML5, CSS, JavaScript, DOM,...) • Server-side technologies (session management, PHP, AJAX, NodeJS, APIs, Cookies...) • Design of web applications and web services (REST, MVC, ...) • Legal issues • SEO	
Literature:	
<i>16 Web Technologies (CSI_WEB):</i> Compulsory: • NIXON, Robin, January 2025. <i>Learning PHP, MySQL & JavaScript: a step-by-step guide to creating dynamic websites</i>. Sebastopol, CA: O'Reilly. ISBN 978-1-098-15231-4 • AMUNDSEN, Michael, October 2022. <i>Restful web API patterns and practices cookbook: connecting and orchestrating microservices and distributed data</i>. Beijing ; Boston ; Farnham: O'Reilly. ISBN 978-1-098-10674-4	

- FLANAGAN, David, 2021. *JavaScript – Das Handbuch für die Praxis: Meistern Sie die beliebte Sprache für Web und Node.js*.

Recommended:

- LEONARD, Richardson, Mike AMUNDSEN and Sam RUBY, 2013. *Restful Web APIs: Services for a Changing World*.
- SNYDER, Chris, MYER, Thomas, SOUTHWELL, Michael, 2010. *Pro PHP security: from application security principles to the implementation of XSS defenses* [online]. Berkeley, CA: Chris Snyder, Thomas Myer, Michael Southwell PDF e-Book. ISBN 978-1-4302-3319-0. Available via: <https://doi.org/10.1007/978-1-4302-3319-0>.

Web Technologies	
Module abbreviation:	CAI_WebT
Curriculum:	Programmes
	Computer Science and Artificial Intelligence (CAI-B) - SPO-Nr.: 12
Responsible for module:	Djanatliev, Anatoli
Lecturers:	Djanatliev, Anatoli (CAI_WebT) Djanatliev, Anatoli (CAI_WebTPr)
Language of instruction:	English
Credit points / SWS:	7 ECTS / 6 SWS
Workload:	Contact hours: 70 h
	Self-study: 105 h
	Total: 175 h
Subjects of the module:	12.1: Web Technologies (CAI_WebT) 12.2: Practical Course Web Technologies (CAI_WebTPr)
Lecture types:	12.1: SU/Ü - lecture with integrated exercises 12.2: Pr - laboratory
Studien- / Prüfungsleistungen:	
12.1-Web Technologies: schrP90 - written exam, 90 minutes (CAI_WebT) 12.2-Practical Course Web Technologies: LN - participation without/with success (CAI_WebTPr) Additional Explanation: <i>12 Web Technologies:</i> A prerequisite for participation in the written examination is a successfully completed practical course (see SPO No. 12.2). <i>12 Practical Course Web Technologies (CAI_WebTPr):</i> Five test certificates must be acquired in the practical course. The lecturer will award one testate each upon successful completion of the assignment. In total, at least 80% of the testates must be completed, which cover essential topics of the lecture.	
Recommended prerequisites:	
Programming concepts like Serialization and Processing of Markup Languages in Python	
Objectives:	
<i>12 Web Technologies:</i> After attending the course, students • have theoretical knowledge of modern client- and server-side web technologies. • are able to specify web pages with HTML and to design the layout of the pages by using CSS. • are able to develop dynamic web pages by using the corresponding possibilities of JavaScript. • will be able to develop web applications using PHP and databases. • are able to design and implement standard software architectures for web applications. • know web services and REST to define server interfaces and can develop servers using these interfaces. <i>12 Practical Course Web Technologies (CAI_WebTPr):</i> After the practical course students know the basic structure of a web applications, and how a web browser interacts with a web server.	

Content:*12 Web Technologies:*

Core technologies of the Web:

- HTML and CSS (HyperText Markup Language and Cascading Style Sheets)
- HTTP (HyperText Transfer Protocol)
- Client-side Programming Using JavaScript
- Ajax (Asynchronous JavaScript & XML) and JSON (JavaScript Object Notation)
- Server-side Programming using PHP and JavaScript
- Databases for web applications

Subsidiary topics:

- Web Services (REST), Web Security and Privacy Tools
- Responsive Website Design

12 Practical Course Web Technologies (CAI_WebTPr):

Programming tasks

- introducing to the Hypertext Transfer Protocol (HTTP) request/response cycle and obtaining an understanding of Hypertext Markup Language (HTML), as well as the overall structure of a Django application
- exploring the Model-View-Controller (MVC) pattern for web applications and how it relates to Django

Literature:*12 Web Technologies (CAI_WebT):*

Compulsory:

None

Recommended:

- FELKE-MORRIS, Terry Ann, 2017. *Web development and design foundations with HTML5*. Boston: Pearson. ISBN 978-1-292-16408-3
- GAGLIARDI, Valentino, 2021. *Decoupled Django: Understand and Build Decoupled Django Architectures for JavaScript Front-ends* [online]. Berkeley, CA: Apress PDF e-Book. ISBN 978-1-4842-7144-5. Available via: <https://doi.org/10.1007/978-1-4842-7144-5>.
- GUTIERREZ, Carlos, FERNÁNDEZ-MEDINA, Eduardo, PIATTINI, Mario, 2010. *Web services security development and architecture: theoretical and practical issues* [online]. Hershey ; New York: Information Science Reference PDF e-Book. ISBN 978-1-60566-951-9. Available via: <http://services.igi-global.com/resolvedoi/resolve.aspx?doi=10.4018/978-1-60566-950-2>.
- MANVI, Sunilkumar, SHYAM, Gopal Krishna, 2021. *Cloud computing: concepts and technologies* [online]. Boca Raton ; London ; New York: CRC Press, Taylor & Francis Group PDF e-Book. ISBN 978-1-00-309367-1. Available via: <https://doi.org/10.1201/9781003093671>.



Course Descriptions

Business School

International Office

Winter term 2025/26

As per: 2025-09-01

This program and course description becomes effective on 01.10.2025. It supplements the program and examination regulations and secures the offerings in courses. Additionally, it contains detailed information about courses, contents, assessments and examinations.

1 Overview

Betriebswirtschaft (Bachelor)

Subject	SWS	ECTS
Marketing	4	5
Methods & Instruments of Strategic Controlling	4	6
Strategic Management	6	8
Sustainability and CSR Management	4	6
Supply Chain Management	4	6
Risk of greenwashing: How to communicate sustainability	2	3
Successful Management in a Global World	2	3
Successful Negotiations in a Global World	2	3

“Strategic Management” is a module that consists of two subjects: “Strategic Management (BW_StratM)” and “Strategic Management / Case Studies (BW_StratM-CS)”: **Please note that both subjects of the module must be attended and passed to receive ECTS!!!**

Global Economics and Business Management (Bachelor)

Subject	SWS	ECTS
Corporate Finance	4	5
HR Management, Organization and Leadership	4	5
International Management	4	5
Marketing and Sales	4	5

International Management (Bachelor)

Subject	SWS	ECTS
Cost Accounting and Cost Management	4	5
Corporate Finance	4	5
Current Issues in Economics	4	6
Global Supply Chain Management	4	5
International Business Simulation	3	5
International Project	4	5
Marketing & Sales	4	5

Medienpsychologie und Digital Business (Bachelor)

Subject	SWS	ECTS
Behavioral Economics	4	5

Entrepreneuership and Corporate Venturing (Master)

Subject	SWS	ECTS
Corporate Venturing & Innovation	4	5
Entrepreneurial Methods	4	5
Lean Analytics	4	5

Financial Management und Controlling (Master)

Subject	SWS	ECTS
Intercultural Business and Business in China	4	5

Global Business (Master)

Subject	SWS	ECTS
Advanced Topics in Internationalization	4	5
Global Business and Economics 1	4	5
Global Business Model Design	4	5
Modern Leadership	4	5
Research methods for Business	4	5

These courses are available on request only! Students must have previous knowledge of business administration.

Marketing / Sales / Media (Master)

Subject	SWS	ECTS
International Marketing	4	5

Retail and Consumer Management (Master)

Subject	SWS	ECTS
Digital Analytics and Artificial Intelligence in Retailing	4	5
Retail Lab: Consumer Projects and Project Management	4	5
Retail Locations and International Retailing	4	5

These courses are available on request only!

2 Module Descriptions

Advanced Topics in Internationalization (Master)	
Module abbreviation:	GBU_ATI
Curriculum:	Programmes
	Global Business (GBU-M) - SPO-Nr.: 8
Responsible for module:	Isakulov, Temurbek
Lecturers:	Isakulov, Temurbek
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	8: Advanced Topics in Internationalization (GBU_ATI)
Lecture types:	SU/Ü - lecture with integrated exercises
Studien- / Prüfungsleistungen:	
8-Advanced Topics in Internationalization: Proj - Project work (5-25 pages) with oral presentation (15 minutes) (GBU_ATI) Additional Explanation: None	
Recommended prerequisites:	
None	
Objectives:	
Knowledge • demonstrate knowledge of legal frameworks and compliance requirements in international business. • are familiar with the reasons for, objectives, forms, chances and threats of going and being international in business. • know how to deal theoretically and practically with various factors that impact the process of internationalizing and measures which could be used to handle the same. • know selected instruments and strategies for the design and further development of an international concept. • know specific features, problems and characteristic traits of international business in a problem-orientated way. Methodology • create actionable business reports and dashboards using business intelligence tools. • use case studies to exercise contents learned. • apply the tools of internationalization. Personality • maintain a global mindset while addressing local needs in business strategies. Social Competence • develop relationships with stakeholders across different global markets.	

Content:
<i>8 Advanced Topics in Internationalization:</i> International Trends • Development of branded environments • Technical aspects and sustainable aspects. • International Experience Development, relevance & dimensions of internationalization in business • Strategies and instruments • Chances and threats • Case studies
Literature:
<i>8 Advanced Topics in Internationalization (GBU_ATI):</i> Compulsory: • KONINA, Natalia, 2021. <i>Digital strategies in a global market: navigating the fourth industrial revolution</i> [online]. Cham: palgrave macmillan PDF e-Book. ISBN 978-3-030-58267-8. Available via: https://doi.org/10.1007/978-3-030-58267-8. • FUCHS, Manfred, 2022. <i>International Management: The Process of Internationalization and Market Entry Strategies</i> [online]. Berlin: Springer Gabler PDF e-Book. ISBN 978-3-662-65870-3. Available via: https://doi.org/10.1007/978-3-662-65870-3. Recommended: None

Behavioral Economics	
Module abbreviation:	MPS_VM_BE
Curriculum:	Programmes
	Medienpsychologie und Digital Business (MPS-B) - SPO-Nr.: 2
Responsible for module:	Gallier, Carlo
Lecturers:	Gallier, Carlo
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	2.11: Behavioral Economics (MPS_VM_BE)
Lecture types:	SU/Ü - lecture with integrated exercises
Studien- / Prüfungsleistungen:	
2.11-Behavioral Economics: LN - written exam, 90 minutes (MPS_VM_BE)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
Knowledge competence: - Students will gain the knowledge to analyze when and how actual human behavior systematically deviates from standard economic predictions. Methodological competence: - Students - will use this knowledge to develop the methodological competencies to combine economic theories with psychological insights into behavioral economic approaches. - will use the methodological competencies to apply behavioral economics to economic situations and explain why human behavior deviates from standard economic predictions. Personal/self-competence: - Students will apply the competencies to reflect on their own personal choices and design mechanisms to help themselves and others make better decisions. Social competence: - Students will apply the competencies to design and critically discuss mechanisms for effectively addressing major societal challenges.	
Content:	
<i>2 Behavioral Economics:</i> The course provides an applied introduction to behavioral economics. Students learn to combine economic theories with psychological insights to explain why humans make the choices that they do. We focus on economic decision-making at both the individual and organizational level. Standard economic theory often fails to explain actual human behavior. The “homo economicus” at the center of standard economic theory is a prototype who always acts rationally, is selfish, and has unlimited willpower. Behavioral economics puts these assumptions to the test. It shows that humans are often more	

prone to cognitive biases, process information less effectively, and behave more impulsively and socially than the homo economicus would suggest. Students learn to apply insights from behavioral economics to better understand actual human decision making and thus improve the predictive power of economic theories.

Throughout the course, we will cover the central concepts and methods of behavioral economics. We apply this knowledge to a variety of business decisions. The interdisciplinary approach helps students to question their own choices, to better understand consumer behavior, to optimize cooperative processes, and to effectively address societal challenges – such as mitigating climate change.

With a strong focus on applications, we cover

- the basics of economic decision making
- the principles of behavioral economics
- the methods of behavioral economics
- heuristics and cognitive biases
- decisions under risk and uncertainty
- intertemporal decisions
- social norms, fairness, and reciprocity
- and much more if time permits.

Literature:

2 Behavioral Economics (MPS_VM_BE):

Compulsory:

- CARTWRIGHT, Edward, 2018. *Behavioral Economics*.

Recommended:

- KAHNEMAN, Daniel, 2013. *Thinking, fast and slow*. New York: Farrar, Straus and Giroux.
- THALER, Richard and Cass SUNSTEIN, 2008. *Nudge: Improving decisions about health, wealth, and happiness*.

Corporate Finance	
Module abbreviation:	GBM_CF
Curriculum:	Programmes
	Global Economics and Business Management (GBM-B) - SPO-Nr.: 1
Responsible for module:	Graap, Torsten
Lecturers:	Graap, Torsten
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	1.9: Corporate Finance (GBM_CF)
Lecture types:	Lecture with integrated exercises. The teaching method is a weekly lecture with exercise. The lecture provides an overview and students can apply their skills in the exercises consisting of tasks and case studies. Apart from that, they are required to solve problems by them-selves and/or as part of a group in preparation for their next lecture.
Studien- / Prüfungsleistungen:	
1.9-Corporate Finance: schrP90 - written exam, 90 minutes (GBM_CF) Additional Explanation: None	
Recommended prerequisites:	
The students should have a basic knowledge of mathematics. Further knowledge beyond the university entrance qualification is not required. An in-depth study of literature is highly recommended.	
Objectives:	
<i>1 Corporate Finance:</i> The Students • know common financial instruments and are able to classify and describe them • are able to outline the importance and message of the leverage effect • can apply different methods of capital budgeting to derive investment decisions • know about targets and challenges of financing and doing investments in internationally operating companies	
Content:	
<i>1 Corporate Finance:</i> 1. Introduction to International Finance 2. Basics of Financial Mathematics 3. Capital Structure 3.1 Equity Financing 3.2 Debt Financing 3.3 Leverage Effect 4. Capital Budgeting	

- 5. Working Capital
- 6. International Finance
 - 6.1 Currency Risk
 - 6.2 Country Risk
- 7. Selected Topics

Literature:

1 Corporate Finance (GBM_CF):

Compulsory:

- KEOWN, Arthur J., John D. MARTIN and J. William PETTY, 2020. *Foundations of Finance, The Logic and Practice of Financial Management*. 10. edition. Harlow, Essex: Pearson. ISBN 978-1-292-31873-8; 978-1-292-31880-6
- BERK, JONATHAN and PETER DEMARZO, 2023. *Corporate Finance*. Harlow, Essex: Pearson. ISBN 978-1-292-44641-7

Recommended:

- MADURA, Jeff and Roland FOX, 2020. *International Financial Management*. Andover, Hampshire: Cengage. ISBN 978-1-4737-7050-8
- MOFFETT, MICHAEL H., ARTHUR I. STONEHILL and DAVID K. EITEMAN, 2021. *Fundamentals of Multinational Finance*. Harlow, Essex: Pearson. ISBN 978-1-292-21521-1; 978-1-292-21527-3
- BREALEY, Richard and others, 2023. *Principles of Corporate Finance*. 14. edition. New York: McGraw-Hill Education. ISBN 9781264080946
- EUN, Cheol S., Bruce G. RESNICK and Tuugi CHULUUN, 2023. *International financial management*. 10. edition. New York: McGraw-Hill Education. ISBN 978-1-266-22405-8

Corporate Finance	
Module abbreviation:	IG_CF
Curriculum:	Programmes
	International Management (IG-B) - SPO-Nr.: 2
Responsible for module:	Graap, Torsten
Lecturers:	Graap, Torsten
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	2.2: Corporate Finance (IG_CF)
Lecture types:	SU/Ü - Lecture with integrated exercises
Studien- / Prüfungsleistungen:	
2.2-Corporate Finance: schrP90 - written exam, 90 minutes (GBM_CF)	
Additional Explanation:	
None	
Recommended prerequisites:	
The students should have a basic knowledge of mathematics. Further knowledge beyond the university entrance qualification is not required. An in-depth study of literature is highly recommended.	
Objectives:	
<i>2 Corporate Finance:</i> The Students • know common financial instruments and are able to classify and describe them • are able to outline the importance and message of the leverage effect • can apply different methods of capital budgeting to derive investment decisions • know about targets and challenges of financing and doing investments in internationally operating companies	
Content:	
<i>2 Corporate Finance:</i> • Definitions and basic concepts of financial management and financial mathematics • Overview of financial markets, financial instruments and their functions • Characteristics of equity and it's valuation • Characteristics of bonds and their valuation • Cost of capital and capital structure: leverage effect, challenges at international level • Capital budgeting: different methods and instruments, challenges at international level • Risks in an international environment: managing currency and country risk	
Literature:	
<i>2 Corporate Finance (IG_CF):</i> Compulsory: • KEOWN, Arthur J., John D. MARTIN and J. William PETTY, 2020. <i>Foundations of Finance, The Logic and Practice of Financial Management</i>. 10. edition. Harlow, Essex: Pearson. ISBN 978-1-292-31873-8; 978-1-	

292-31880-6

- BERK, JONATHAN and PETER DEMARZO, 2023. *Corporate Finance*. Harlow, Essex: Pearson. ISBN 978-1-292-44641-7

Recommended:

- MADURA, Jeff and Roland FOX, 2020. *International Financial Management*. Andover, Hampshire: Cengage. ISBN 978-1-4737-7050-8
- MOFFETT, MICHAEL H., ARTHUR I. STONEHILL and DAVID K. EITEMAN, 2021. *Fundamentals of Multinational Finance*. Harlow, Essex: Pearson. ISBN 978-1-292-21521-1; 978-1-292-21527-3
- BREALEY, Richard and others, 2023. *Principles of Corporate Finance*. 14. edition. New York: McGraw-Hill Education. ISBN 9781264080946
- EUN, Cheol S., Bruce G. RESNICK and Tuugi CHULUUN, 2023. *International financial management*. 10. edition. New York: McGraw-Hill Education. ISBN 978-1-266-22405-8

Corporate Venturing & Innovation (Master)	
Module abbreviation:	ECV_CVI
Curriculum:	Programmes
	Entrepreneuership and Corporate Venturing (ECV-M) - SPO-Nr.: 2
Responsible for module:	Funk, Andrea
Lecturers:	Funk, Andrea
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	2.1: Corporate Venturing & Innovation (ECV_CVI)
Lecture types:	SC / E: seminar course with exercises
Studien- / Prüfungsleistungen:	
2.1-Corporate Venturing & Innovation: Proj - Project work (5-25 pages) with oral presentation (15 minutes) (ECV_CVI)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>2 Corporate Venturing & Innovation:</i> On completing the module part Corporate Venturing and Innovation, the students will have achieved the following learning outcomes on the basis of scientific methods: • Understand Corporate Venturing Concepts: Students will grasp the fundamental concepts of corporate venturing, including internal and external innovation strategies, and their role in fostering business growth. • Develop Strategic Thinking: Students will learn how to design and implement corporate venturing strategies, aligning new business initiatives with the parent company's goals. • Evaluate and Nurture Innovations: Students will be able to identify, assess, and support promising business ideas within and outside corporate structures. • Navigate Innovation Ecosystems: Students will understand how to build and leverage innovation ecosystems by collaborating with startups, venture capitalists, and other stakeholders. • Manage Organizational Dynamics: Students will recognize internal barriers to innovation and develop tactics to overcome political and cognitive hurdles within established firms. • Apply Practical Tools: Students will use frameworks like the Corporate Venturing Navigator to systematically guide the venturing process, from profiling and designing to investing and harvesting • Students are able to successfully integrate the listed competencies with the content of other modules from their degree program and develop new, overarching approaches. All objectives will be fulfilled through a project-based lecture, using group work, case studies and field practice to create a solid understanding of the management of innovations and corporate ventures. All the theory and tools presented will be applied in real cases, reinforcing the constructed knowledge during the classes.	
Content:	
<i>2 Corporate Venturing & Innovation:</i>	

The module part Corporate Venturing and Innovation will follow the outline:

- Introduction to Corporate Venturing
 - Definitions and significance
 - Historical evolution and contemporary relevance
- Corporate Venturing Strategies
 - Internal venturing: corporate incubators, innovation labs
 - External venturing: corporate venture capital (CVC), strategic partnerships
 - Hybrid models and emerging trends
- The Corporate Venturing Process
 - Profiling: Identifying innovation opportunities
 - Designing: Structuring new business models
 - Investing: Funding and resource allocation
 - Harvesting: Exit strategies and integration into the parent company
- Building Innovation Ecosystems
 - Partnering with startups and VCs
 - Creating win-win collaborations
 - Case studies of successful innovation ecosystems
- Organizational Challenges and Solutions
 - Internal resistance to innovation
 - Strategies for managing stakeholder expectations
 - Tools for fostering an entrepreneurial mindset within corporations
- Case Studies and Real-world Applications
 - Analysis of corporate venturing practices from companies like Google, Siemens, and Roche
 - Guest lectures from industry experts
- Team-based development of a corporate venturing strategy for a selected company
- Final presentation and peer review

Literature:

2 Corporate Venturing & Innovation (ECV_CVI):

Compulsory:

- GRICHNIK, Dietmar and others, 2024. *The Corporate Venturing Handbook: A Step-by-Step Guide to the Value Creation Process*.

Recommended:

- BURNS, Paul, 2020. *Corporate entrepreneurship and innovation*. London: Red Globe Press. ISBN 978-1-352-00879-1
- GIMMY, Gregor, 2023. *Buy, don't invest: The Venture Client Model: A Paradigm Shift in Corporate Venturing*. ISBN 979-8865435501
- KINET, Laurent, 2024. *Corporate Venturing - A Framework: 100 Ways Startups Can Transform Your Organisation*. ISBN 979-8320121727
- CHESBROUGH, Henry, 2011. *Open innovation: the new imperative for creating and profiting from technology*. Boston, Mass.: Harvard Business School Press. ISBN 1-4221-0283-1, 978-1-4221-0283-1
- CHRISTENSEN, Clayton M. and Marc R. BENIOFF, 2024. *The innovator's dilemma: when new technologies cause great firms to fail*. Boston, Massachusetts: Harvard Business Review Press. ISBN 978-1-64782-676-5
- KEELEY, Larry, 2013. *Ten types of innovation: the discipline of building breakthroughs*. Hoboken, N.J.: Wiley. ISBN 978-1-118-57141-5
- SCHILLING, Melissa A., 2023. *Strategic management of technological innovation*. New York, NY: McGraw Hill. ISBN 978-1-265-07335-0

Cost Accounting and Cost Management	
Module abbreviation:	IG_CA&CM
Curriculum:	Programmes
	International Management (IG-B) - SPO-Nr.: 1
Responsible for module:	Schmidt, Karin
Lecturers:	Schmidt, Karin
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	1.8: Cost Accounting and Cost Management (IG_CA&CM)
Lecture types:	Lecture with integrated exercises
Studien- / Prüfungsleistungen:	
1.8-Cost Accounting and Cost Management: schrP90 - written exam, 90 minutes (IG_CA&CM)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>1 Cost Accounting and Cost Management:</i> The students are able to - distinguish between financial accounting and cost accounting - apply the appropriate vocabulary when talking about cost and pricing - know about differences in cost accounting of German and Angloamerican systems - calculate the cost per product and know how to detect cost inefficiencies - apply different techniques to calculate a company's profit - explain different cost management techniques and know which one to apply in specific situations The course addresses the following Learning Objectives: - business competences (basically addressed) - application strength (basically addressed) - analytical competence (basically addressed) - intercultural competences (basically addressed)	
Content:	
<i>1 Cost Accounting and Cost Management:</i> - Principles of cost accounting and cost management - Cost accounting: - cost accounting techniques in different countries - process costing - cost center accounting - calculating the cost per product and per period - pricing a product	

- Cost accounting systems and cost management techniques:
 - contribution margins
 - cost-volume-profit relationships
 - activity based costing
 - target costing
 - principles of planning and budgeting

Literature:

Compulsory:

- DATAR, Srikant M., Madhav V. RAJAN and Charles T. HORNGREN, 2021. *Horngren's cost accounting: a managerial emphasis*. 17. edition. Harlow; London; New York, NY; München [und viele weitere]: Pearson. ISBN 978-1-292-36307-3, 1-292-36307-X
- DRURY, Colin and Mike TAYLES, 2024. *Management and cost accounting*. Andover: Cengage. ISBN 978-1-4737-9124-4

Recommended:

- CAREY, Mary, Cathy KNOWLES and Jane TOWERS-CLARK, 2017. *Accounting: a smart approach*. Oxford: Oxford University Press. ISBN 978-0-19-874513-6
- SCHMIDT, Andreas, 2022. *Kostenrechnung: Grundlagen der Vollkosten-, Deckungsbeitrags- und Plankostenrechnung sowie des Kostenmanagements*. Stuttgart: Verlag W. Kohlhammer. ISBN 978-3-17-041110-4
- COENENBERG, Adolf Gerhard and others, 2024. *Kostenrechnung und Kostenanalyse*. 10. edition. Stuttgart: Schäffer-Poeschel Verlag. ISBN 978-3-7910-5492-6, 978-3-7910-5852-8

Current Issues in Economics	
Module abbreviation:	IG_CIE
Curriculum:	Programmes
	International Management (IG-B) - SPO-Nr.: 2
Responsible for module:	Schauberger, Katharina
Lecturers:	Schauberger, Katharina
Language of instruction:	English
Credit points / SWS:	6 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 103 h
	Total: 150 h
Subjects of the module:	2.10: Current Issues in Economics (IG_CIE)
Lecture types:	Lecture with integrated exercises. The teaching method is a weekly lecture with exercise. The lecture provides an overview and students can apply their skills in the exercises consisting of tasks and case studies. Apart from that, they are required to solve problems by themselves and/or as part of a group in preparation for their next lecture.
Studien- / Prüfungsleistungen:	
2.10-Current Issues in Economics: LN - written exam, 90 minutes (IG_CIE) Additional Explanation: None	
Recommended prerequisites:	
Basic knowledge of microeconomics and macroeconomics is required. An in-depth study of literature is highly recommended.	
Objectives:	
<i>2 Current Issues in Economics:</i> Subject Competence: Students will be able to: - Describe and explain the relationship between inflation and unemployment in both the short run and the long run, using macroeconomic models and empirical evidence. - Understand and evaluate the role and economic impact of multinational enterprises (MNEs) in different economic contexts. - Identify and explain the causes of child labor in a globalized economy, considering both economic and social dimensions. Methodological competence Students will be able to: - Interpret and analyze macroeconomic indicators related to the economic, fiscal, monetary, and external position of countries. - Examine and assess changes to the short-run Phillips Curve and their policy implications. - Interpret global economic forecasts by leading international organizations and evaluate corresponding policy recommendations. - Evaluate and compare internationalization strategies of multinational enterprises based on real-world examples. - Critically discuss and assess different strategies aimed at effectively combating child labor, taking into	

account their strengths and limitations.

Personal Competence:

Students will be able to:

- Independently analyze macroeconomic and global development challenges.
- Formulate appropriate responses and propose solution strategies, drawing on relevant economic theory and real-world data.

Social Competence:

Students will be able to:

- Cooperate effectively in teams, contributing to collaborative problem-solving.
- Communicate ideas and arguments clearly, while respecting different perspectives in a group setting.

Content:

2 Current Issues in Economics:

- Introduction into major macroeconomic concepts: GDP/growth, unemployment rate, inflation rate, fiscal balance, output gap and current account balance
- The Relationship between Inflation and Unemployment
- Global Economic Outlook
- The Economics of Multinational Enterprises
- The Economics of Child Labor

Literature:

2 Current Issues in Economics (IG_CIE):

Compulsory:

- MANKIW, Nicholas Gregory and Mark P. TAYLOR, 2023. *Economics*. London: Cengage Learning. ISBN 978-1-4737-8698-1
- *Selected articles by international organizations and reserachers..*
- SCHOLING, E., 2006. Kinderarbeit. Eine ökonomische Analyse. In: *Wirtschaftswissenschaftliches Studium: WiSt; Zeitschrift für Studium und Forschung*. (2), p.82-86.
- FORSGREN, Mats, 2024. *Theories of the Multinational Firm. A Multidimensional Creature in the Global Economy*. Cheltenham, UK: Edward Elgar Publishing, Inc. ISBN 978 1 03533 596 1
- KRUGMAN, P. and R. WELLS, 2024. *Economics*. New York, United States: Macmillan Learnin.

Recommended:

- DORMAN, Peter, 2014. *Macroeconomics: a fresh start* [online]. Berlin [u.a.]: Springer PDF e-Book. ISBN 978-3-642-37440-1, 978-3-642-37441-8. Available via: <https://doi.org/10.1007/978-3-642-37441-8>.
- HEATHER, Ken and Simka STEFANOVA, 2017. *Maths for economics: a companion to Mankiw and Taylor economics*. Hampshire: Cengage Learning. ISBN 978-1-4737-2542-3

Digital Analytics and Artificial Intelligence in Retailing (Master)	
Module abbreviation:	RCM_DA&AIR_1.3 Ind. Elective
Curriculum:	Programmes
	Global Business (GBU-M) - SPO-Nr.: 10
Responsible for module:	Jungbluth, Michael
Lecturers:	Jungbluth, Michael
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	10: Digital Analytics and Artificial Intelligence in Retailing (RCM_DA&AIR_1.3 Ind. Elective)
Lecture types:	SU/Ü - lecture with integrated exercises
Studien- / Prüfungsleistungen:	
10-Digital Analytics and Artificial Intelligence in Retailing: project report. Practical work. Written composition approx. 10-15 pages with presentation 15-30 minutes. (RCM_DA&AIR_1.3 Ind. Elective) Additional Explanation: None	
Recommended prerequisites:	
None	
Objectives:	
<i>10 Digital Analytics and Artificial Intelligence in Retailing:</i> Subject-related competences By the end of the course students are able to • explain the role of digital analytics in retail and consumer commerce and its integration into competitive business strategies. • describe, compare, and differentiate key data science methodologies (descriptive, predictive, prescriptive) in the context of retail decision-making. • assess how analytics and AI can automate processes, augment retail value chains, and generate sustainable competitive advantages. • analyze and articulate the responsibilities of an “analytics translator” in bridging business, analytics, and technology domains. Methodological competences Students can • apply data exploration, inference, hypothesis testing, clustering, segmentation, visualization, regression, decision trees, and recommendation engine methods to retail use cases. • operate and evaluate digital analytics tools (e.g., Google Analytics) to collect, process, and interpret data for strategic and operational insights. • formulate and justify actionable recommendations by linking technical analysis results to prioritized business problems. Personal competences Students • research, organize, and critically evaluate technical and business information in digital analytics and AI.	

- **design and implement** solutions for predominantly digital challenges in retail using analytics and AI.
- **demonstrate** resilience, adaptability, and constructive problem-solving when managing uncertainty and complexity in data-driven innovation processes.

Social competences

Students

- **collaborate** effectively in interdisciplinary teams, **integrating** perspectives from multiple functional areas.
- **present, defend, and adapt** analytics-based recommendations convincingly for diverse stakeholder groups.
- **provide, receive, and incorporate** constructive feedback to improve collaborative project outcomes.

Content:

10 Digital Analytics and Artificial Intelligence in Retailing:

- Approximately 1/3 of each lesson will be devoted to the underlying analytics theory, to selected use cases within the field of retailing and to hands-on problem solving with open source software.
- We cover methods of data exploration, inference and hypothesis testing, clustering and segmentation, visualization and storytelling, regression, decision trees, experiments, testing and causation, recommendation engines, big data, machine learning and AI.
- Google Analytics will be introduced as the current market dominating digital analytics tool. Utilizing Google Analytics, students will learn how to use Digital Analytic software technology in the context of analytical, exploratory and reporting capabilities. Students will learn by doing: that is, guided by the instructor and using software, they will focus on data discovery and communicating insights.
- Open source code will be provided as Google Collaboratory notebooks for best traceability and learning support for IT-savvy as well as non-IT-savvy students.

Literature:

Compulsory:

- KUMAR, U Dinesh, 2017. *Business Analytics: The Science of Data-Driven Decision Making*. India: Wiley. ISBN 9788126568772
- KAMKI, Jumin, 2017. *Digital Analytics: Data Driven Decision Making in Digital World*. ISBN 978-1946556196

Recommended:

- SPONDER, Marshall and Gohar F. KHAN, 2018. *Digital analytics for marketing*. New York and London: Routledge, Taylor & Francis Group. ISBN 978-1-138-19067-2, 978-1-138-19068-9
- MOKALIS, Alexa L. and Joel J. DAVIS, 2018. *Google Analytics Demystified*. ISBN 978-1545486917
- WHEELAN, Charles J., 2013. *Naked statistics: stripping the dread from the data*. New York [a.o.]: Norton & Company. ISBN 978-0-393-07195-5, 978-0-393-34777-7
- KAHN, Barbara E., 2021. *The Shopping Revolution, Updated and Expanded Edition: How Retailers Succeed in an Era of Endless Disruption Accelerated by COVID-19*. ISBN 978-1613631140
- SCHMARZO, Bill, 2020. *The Economics of Data, Analytics and Digital Transformation: The theorems, laws and empowerments to guide your organization's digital transformation*. Birmingham - Mumbai: Packt Publishing. ISBN 978-1800561410

Entrepreneurial Methods (Master)	
Module abbreviation:	ECV_EM
Curriculum:	Programmes
	Entrepreneuership and Corporate Venturing (ECV-M) - SPO-Nr.: 1
Responsible for module:	Montanaro, Angela
Lecturers:	Montanaro, Angela
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	1.1: Entrepreneurial Methods (ECV_EM)
Lecture types:	S: Seminar
Studien- / Prüfungsleistungen:	
1.1-Entrepreneurial Methods: schrP90 - written exam, 90 minutes (ECV_EM)	
Additional Explanation:	
None	
Recommended prerequisites:	
There are no prerequisites. However, it is recommended that you develop at least a rudimentary understanding of the German startup eco-system before you start the course. For example, you could start by familiarizing yourself with the most current "Deutscher Startup Monitor" report.	
Objectives:	
<i>1 Entrepreneurial Methods:</i> The goal of this course is to develop an understanding of prominent contemporary themes in entrepreneurship. This will provide a common ground for several other courses in the Entrepreneurship and Corporate Ventures master's program. The course will be guided by the following learning goals: • Students are comfortable with discussing entrepreneurship-related theories, models, and ideas. • Students can reflect on what entrepreneurship is and have developed a personal position towards entrepreneurship. • Students are capable of listing different contemporary theories and models of entrepreneurship and can critically differentiate between them. • Students understand different dimensions of entrepreneurial traits, principles, and beliefs and can actively evaluate and develop their own entrepreneurial profile. • Students know about common development stages, business models, and funding sources of startups and can translate their knowledge into actionable guidelines for real startups.	
Content:	
<i>1 Entrepreneurial Methods:</i> This course equips students with a critical understanding of some of the core issues regarding contemporary entrepreneurship. It provides different theories and frameworks that allow students to construct and reflect on their own position towards entrepreneurship. The course is broken up into multiple parts consisting of two to three weeks each. The taught content is used as a starting point for various in-class discussions and exercises as well as small take-home assignments. The following questions provide a rough outline of the course content: Part 1: Entrepreneurship today	

- What is entrepreneurship today and why is it so popular?
- How are startups different than larger established organizations?
- Are there different types of entrepreneurship?
- How does the entrepreneurship landscape in Germany and other places in the world look like?

Part 2: Being an entrepreneur

- What does it mean to be an entrepreneur?
- Are there common personality or character traits, beliefs, principles, or behaviours that distinguish entrepreneurs?
- How do entrepreneurs work together in teams?

Part 3: Theories of entrepreneurship

- How did entrepreneurship theory develop over the last three centuries?
- What is Lean Startup and how did it develop?
- What is effectuation in the context of entrepreneurship?
- What is Design Thinking and how can it be applied to entrepreneurship?
- What is Disciplined Entrepreneurship and how can it be applied to new venture building?

Part 4: Basic concepts of startup development

- What are typical development stages and challenges of startups?
- What types of data-driven business models exist?
- What are different funding sources for startups and what is the role of investors?
- How can you determine the future value of a startup?

Literature:

1 Entrepreneurial Methods (ECV_EM):

Compulsory:

- GEDEON, Steve. *What is entrepreneurship?* [online]. Available via: https://www.academia.edu/35644718/What_is_Entrepreneurship
- SARASVATHY, Saras D. *Causation and Effectuation: Toward a Theoretical Shift from Economic Inevitability to Entrepreneurial Contingency* [online]. Available via: http://entrepreneurscommunicate.pbworks.com/f/2001_Sarasvathy_Causation+adn+effectuation.pdf
- BRANDSTÄTTER, Hermann. *Personality aspects of entrepreneurship: A look at five meta-analyses, Personality and Individual Differences* [online]. Available via: https://www.researchgate.net/publication/232388037_Personality_Aspects_of_Entrepreneurship_A_Look_at_Five_Meta-Analyses
- Without author. *Deutscher Startup Monitor* [online]. Available via: <https://deutscherstartupmonitor.de/>

Recommended:

- Without author. *GEM Global Report* [online]. Available via: <https://www.gemconsortium.org/>
- AULET, Bill and Marius URSACHE, 2013. *Disciplined entrepreneurship: 24 steps to a successful startup*. Hoboken, New Jersey: Wiley. ISBN 978-1-118-69228-8, 1-118-69228-4
- GASSMANN, Oliver, Karolin FRANKENBERGER and Michaela CHOUDURY, 2020. *The business model navigator: the strategies behind the most successful companies*. Harlow, England: Pearson. ISBN 978-1-292-32712-9, 1-292-32712-X
- RIES, Eric, 2011. *The lean startup: how constant innovation creates radically successful businesses*. London [u.a.]: Portfolio Penguin. ISBN 978-0-670-92160-7
- UEBERNICKEL, Falk, JIANG, Li, BRENNER, Walter, PUKALL, Britta, NAEF, Therese, SCHINDLHOLZER, Bernhard, 2020. *Design thinking: the handbook* [online]. Singapore: World Scientific PDF e-Book. ISBN 978-981-120-215-5, 981-120-215-X. Available via: <https://doi.org/10.1142/11329>
- SCHIRMER, Julian, EBER, René, BOURDON, Isabelle. *32 ways to innovate business models through data: Emerging data-driven solution business model patterns from a study of 471 late stage data-driven startups* [online]. Available via: <https://scholarspace.manoa.hawaii.edu/handle/10125/71226>

Global Business and Economics 1 (Master)	
Module abbreviation:	GBU_GBE1
Curriculum:	Programmes
	Global Business (GBU-M) - SPO-Nr.: 1
Responsible for module:	Gallier, Carlo
Lecturers:	Gallier, Carlo
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	1: Global Business and Economics 1 (GBU_GBE1)
Lecture types:	SU/Ü - lecture with integrated exercises
Studien- / Prüfungsleistungen:	
1-Global Business and Economics 1: schrP90 - written exam, 90 minutes (GBU_GBE1)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>1 Global Business and Economics 1:</i> The course has four main objectives: Knowledge competencies 1. Students will learn to apply economic theories to improve strategic decision-making in global business. Methodological competencies 2. Students will leverage this knowledge to develop methodological competencies to analyze competitive environments in global markets. Personal competencies 3. Students will apply their competencies to help themselves and others to make better decisions in complex business situations. Social competencies 4. Students will apply their competencies to collaborate effectively within diverse and multicultural teams, contributing to the effectiveness of global markets.	
Content:	
<i>1 Global Business and Economics 1:</i> We take an application-oriented approach to study global markets, with special emphasis on topics such as: • firm behavior, competition, and efficiency • market power and collusion • market failure and regulation • emerging global challenges, such as climate change and inequality • corporate social responsibility • cross-cultural economics	

- international trade and investments
- and many more if time permits

Literature:

1 Global Business and Economics 1 (GBU_GBE1):

Compulsory:

- MANKIW, N. Gregory and Mark P. TAYLOR, 2023. *Economics*. Hampshire: Cengage.
- ACEMOGLU, Daron, David LAIBSON and John A. LIST, 2018. *Economics*.

Recommended:

- VELASQUEZ, Manuel G., 2013. *Business Ethics: Concepts and Cases*. Harlow: Pearson Education, Limited. ISBN 978-1-292-02281-9, 978-1-292-03601-4
- LÜTGE, Christoph, UHL, Matthias, 2021. *Business Ethics: An Economically Informed Perspective* [online]. Oxford, United Kingdom: Oxford University Press PDF e-Book. ISBN 978-0-19-189685-9. Available via: 20.500.12854/112311.

Global Business Model Design (Master)	
Module abbreviation:	GBU_GBMD
Curriculum:	Programmes
	Global Business (GBU-M) - SPO-Nr.: 3
Responsible for module:	Vogler, Thomas
Lecturers:	Vogler, Thomas
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	3: Global Business Model Design (GBU_GBMD)
Lecture types:	SU/Ü - lecture with integrated exercises
Studien- / Prüfungsleistungen:	
3-Global Business Model Design: seminar paper and presentation (GBU_GBMD)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>3 Global Business Model Design:</i> 1. Knowledge <i>Students learn to...</i> - Understand different business models and how they apply to global markets Students acquire theoretical and practical knowledge of various business models (e.g., franchise, platform, subscription), including how they must be adapted or localized for success in international environments. - Understand the value drivers in the different operative sectors of an international business Students gain insights into what creates value in functions such as production, logistics, HR, finance, and marketing, especially when operating across borders. - Identify sources of competitive advantage in global business Students learn key strategic concepts (e.g., Porter's Five Forces, Resource-Based View) to analyze how international firms build and sustain competitive advantages in diverse markets. 2. Methodology <i>Students learn to....</i> - Design a global value chain that maximizes efficiency and effectiveness Students develop the ability to map and optimize value-creating activities across borders using frameworks like global supply chain management, network configuration, and digital coordination. - Develop global marketing strategies Students learn to conduct international market analysis, segmentation, positioning, and communication planning while considering cultural, economic, and regulatory differences. - Apply their knowledge in a business simulation Students transfer their theoretical understanding into practice through a simulation-based environment where they must make decisions, interpret data, and adapt to changing market conditions.	

3. Personality

Students learn to....

- Apply their knowledge in a business simulation

Through self-directed learning in a dynamic environment, students strengthen their ability to deal with complexity, uncertainty, and decision-making under pressure fostering resilience and reflective judgment.

- Design a global value chain / Develop strategies

Students build confidence in navigating ambiguity and making strategic choices, improving their entrepreneurial mindset and strategic thinking capabilities.

4. Social Competence

Students learn to....

- Work in intercultural groups on this business simulation

Students enhance their ability to collaborate across cultures, deal with communication differences, resolve conflicts, and coordinate tasks key capabilities in global teams.

- Develop global marketing strategies / Apply in simulation

Team-based tasks help students practice listening, persuasion, and leadership in diverse, international group settings.

Content:

3 Global Business Model Design:

- Understanding different business models and how they apply to global markets
- Identifying sources of competitive advantage in global business
- Designing a global value chain that maximizes efficiency and effectiveness
- Developing global marketing strategies
- Understanding the role of technology in global business model design
- Innovating and adapting business models to changing global conditions
- Analyzing the impact of cultural differences on business models
- Identifying and managing risks in global business models
- Balancing local and global needs in business model design
- Business Simulation

Literature:

3 Global Business Model Design (GBU_GBMD):

Compulsory:

None

Recommended:

- HILL, Charles W. L. and G. Tomas M. HULT, 2020. *Global Business Today*. 11. edition. New York, NY: McGraw-Hill Education. ISBN 978-1-260-56581-2
- KEEGAN, Warren J. and Mark C. GREEN, 2020. *Global marketing*. Harlow, England: Pearson. ISBN 978-1-292-30402-1, 1-292-30402-2

Global Supply Chain Management	
Module abbreviation:	IG_GSCM
Curriculum:	Programmes
	International Management Bachelor (IG-B) - SPO-Nr.: 2
Responsible for module:	Sternbeck, Michael
Lecturers:	Sternbeck, Michael
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	2.4: Global Supply Chain Management (IG_GSCM)
Lecture types:	2.4: SU/Ü - lecture with integrated exercises
Studien- / Prüfungsleistungen:	
2.4-Global Supply Chain Management: schrP90 - written exam, 90 minutes (IG_GSCM) Additional Explanation: A deepened study of the relevant literature and the corresponding case studies is required.	
Recommended prerequisites:	
Knowledge beyond the university entrance qualification is not required. An in-depth study of literature is highly recommended.	
Objectives:	
<i>2 Global Supply Chain Management:</i> The students know - and apply concepts, methods and contribution of logistics to the success of international organizations. - about the very critical impact that Supply Chain Management could exert on the profitability of an organization. The students - understand the challenges and opportunities of global supply chains - understand that control of the critical factors is vital for maximizing the returns and staying ahead of competition through lower cost	
Content:	
<i>2 Global Supply Chain Management:</i> - Fundamentals of supply chain and basic terms - Role of purchase management and supply chain management in terms of finance and cost - Origin and concepts of purchase management: profit centre concept, integrated concept, centralization vs. decentralization - Purchase policies and procedures, purchase cycle / ordering systems, make or buy decisions - Legal and economic aspects of purchase, delivery, transport logistic and transfer of risk in a supply chain - Types of inventories, need for inventory control, factors influencing inventory, mechanics of inventory control and systems - Requirement to understand the supply chain from the perspective of a purchase manager - Supply chain performance: achieving strategic fit and scope - Supply chain drivers and metrics	

- Designing distribution networks and applications to e-business
- Network design of supply chain
- Designing global supply chain networks
- Coordination in a supply chain

Literature:

2 Global Supply Chain Management (IG_GSCM):

Compulsory:

- CHOPRA, Sunil, 2019. *Supply Chain Management: Strategy, Planning, and Operation*. Upper Saddle River, N.J.: Pearson.
- STADTLER, Hartmut, Christoph KILGER and Herbert MEYR, 2016. *Supply Chain Management and Advanced Planning: Concepts, Models, Software, and Case Studies*. Berlin, Heidelberg: Springer.

Recommended:

None

HR Management, Organization and Leadership	
Module abbreviation:	GBM_HRMOL
Curriculum:	Programmes
	Global Economics and Business Management (GBM-B) - SPO-Nr.: 1
Responsible for module:	Hackl, Oliver
Lecturers:	Hackl, Oliver
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	1.11: HR Management, Organization and Leadership (GBM_HRMOL)
Lecture types:	Lecture with integrated exercises. The teaching method is a weekly lecture with exercise. The lecture provides an overview and students can apply their skills in the exercises consisting of tasks and case studies. Apart from that, they are required to solve problems by themselves and/or as part of a group in preparation for their next lecture as well as their Seminar paper and presentation.
Studien- / Prüfungsleistungen:	
1.11-HR Management, Organization and Leadership: schrP90 - written exam, 90 minutes (GBM_HRMOL) Additional Explanation: None	
Recommended prerequisites:	
Knowledge beyond the university entrance qualification is not required. An in-depth study of literature is highly recommended.	
Objectives:	
<i>1 HR Management, Organization and Leadership:</i> The students • know about the extraordinary influence of HR in international companies • have a decent overview of HR management and organisation as well as different practices to lead and motivate people The students are able to • master challenges in HR related topics • are able to make decisions for different organisational structures and see the impacts on leadership	
Content:	
<i>1 HR Management, Organization and Leadership:</i> • Basics in HR Management + Strategic HR Management • Globalisation of HR • Aspects of labour law • Functions and tasks within HR management like staffing, development and performance management in the multinational context • Theories of leadership • International HR Management & Culture	

Literature:

1 HR Management, Organization and Leadership (GBM_HRMOL):

Compulsory:

- DOWLING, Peter J., Marion FESTING and Allen D. ENGLE, 2017. *International Human Resource Management*. Andover: Cengage Learning. ISBN 978-1473719026

Recommended:

- BERTHEL, Jürgen and Fred G. BECKER, 2022. *Personal-Management: Grundzüge für Konzeptionen betrieblicher Personalarbeit*. 12. edition. Freiburg: Schäffer-Poeschel Verlag für Wirtschaft Steuern Recht GmbH. ISBN 978-3-7910-5218-2
- DESSLER, Gary, 2017. *Human Resource Management*. 15. edition. Upper Saddle River: Pearson. ISBN 978-1-292-15210-3; 1-292-15210-9
- EISELE, Daniela and Claudia LIESKE, 2022. *Praxisorientierte Personalwirtschaftslehre: Wertschöpfungskette Personal*. Stuttgart: Kohlhammer. ISBN 978-3-17-037784-4
- TORRINGTON, Derek and OTHERS, 2017. *Human Resource Management*. 10. edition. Harlow: Prentice Hall. ISBN 9781292129099

Intercultural Business and Business in China (Master)	
Module abbreviation:	FMC_MgmtElect II_IBBC
Curriculum:	Programmes
	Financial Management und Controlling (FMC-M) - SPO-Nr.: 10
Responsible for module:	Chen, Jing
Lecturers:	Chen, Jing; McDonald, James
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	10: Intercultural Business and Business in China (FMC_MgmtElect II_IBBC)
Lecture types:	SU/Ü - lecture with integrated exercises
Studien- / Prüfungsleistungen:	
10-Intercultural Business and Business in China: LN - seminar paper/presentation (FMC_MgmtElect II_IBBC)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>10 Intercultural Business and Business in China:</i> The students • know about the cultural differences and act accordingly • are able to interact and communicate in a global environment • are prepared to establish a business communication with international partners and are sensitive to their cultural peculiarities	
Content:	
<i>10 Intercultural Business and Business in China:</i> • Importance of intercultural management for companies doing business abroad • Theories of culture • Concepts of intercultural management and communication • Organisation and leadership in international teams	
Literature:	
<i>10 Intercultural Business and Business in China (FMC_MgmtElect II_IBBC):</i> Compulsory: • HOFSTEDE, Geert, 2003. <i>Cultures and organizations: software of the mind; [intercultural cooperation and its importance for survival]</i>. New York [u.a.]: McGraw-Hill. ISBN 0-07-029307-4 • TROMPENAARS, Fons and Charles HAMPDEN-TURNER, 2002. <i>Riding the waves of culture: understanding cultural diversity in business</i>. London: Brealey. ISBN 1-85788-176-1 Recommended:	
None	

International Business Simulation	
Module abbreviation:	IG_TOPSIM
Curriculum:	Programmes
	International Management Bachelor (IG-B) - SPO-Nr.: 2
Responsible for module:	Augsdörfer, Peter
Lecturers:	Augsdörfer, Peter; Sinha, Tanja
Language of instruction:	English
Credit points / SWS:	5 ECTS / 3 SWS
Workload:	Contact hours: 35 h
	Self-study: 90 h
	Total: 125 h
Subjects of the module:	2.13: International Business Simulation (IG_TOPSIM)
Lecture types:	2.13: SU/Ü - lecture with integrated exercises
Studien- / Prüfungsleistungen:	
2.13-International Business Simulation: LN - seminar paper (IG_TOPSIM) Additional Explanation: The course takes place virtually. Method of assessment / Requirements for Credit Points: LN: Game results and presentation of steps and strategies. Full attendance required. The course will be graded. Please note: as the seminar requires a minimum number of participants which is due to technical reasons of the simulation, a revision or reexamination cannot be offered in the summer term.	
Recommended prerequisites:	
None	
Objectives:	
<i>2 International Business Simulation:</i> The students will be able to • understand thoroughly a global value chain process • experience the impact of positioning and strategic management on success • to interpret the factors influencing growth, sales, product development, production and finance • find out how to realize and control international economic connections • read and analyze budgets and reports as well as understand the financial structure of the global company • understand intercultural communication skills, team work, and work delegation	
Content:	
<i>2 International Business Simulation:</i> The business simulation (TOPSIM Going Global) has a global context. It is a sophisticated, computerized business simulation game. Together with fellow players, students simulate a management team, which is responsible for running a business in the washing machine industry. The objective of the game is to train students to acquire general management skills and an overall view of management combined with cultural elements of an imaginary international corporation.	
Literature:	
<i>2 International Business Simulation (IG_TOPSIM):</i> Compulsory:	

- *Simulation Game Handbook (will be provided).*

Recommended:

- *Following literature for further reference will be announced during class.*

Must be accepted by the 10th of October 2025!

International Marketing (Master)	
Module abbreviation:	MVM_IM
Curriculum:	Programmes
	Marketing, Vertrieb, Medien (Master) (MVM-M) - SPO-Nr.: 1
Responsible for module:	Scheed, Bernd
Lecturers:	Scheed, Bernd
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	1: International Marketing (MVM_IM)
Lecture types:	Seminar course with exercises/business simulation
Studien- / Prüfungsleistungen:	
1-International Marketing: schrP90 - written exam, 90 minutes (MVM_IM) Additional Explanation: An extensive Business Simulation on International Marketing (online/cloud-based) is integrated in the course.	
Recommended prerequisites:	
None	
Objectives:	
<i>1 International Marketing:</i> Students acquire application- and practice-oriented in-depth knowledge on managing international marketing and sales environments. They will be able to successfully integrate these competencies with the content of other modules from MVM (in particular the modules M1 "Market research" and V3 "Customer Behaviour and Customer Management") and develop overarching and new approaches from them. Subject Competence The students - are able to analyse key challenges of international marketing environments and assess market attractiveness for B2B and B2C international markets. - can evaluate and design international market entry strategies based on case studies. - apply an extended set of tools and concepts within the international marketing mix, including decisions on product, pricing, brand, distribution, and communication. - understand the strategic implications of global marketing and sales decisions across diverse industries and contexts. Methodological Competence The students - are able to derive strategic recommendations based on real-life business cases and simulations. - develop and apply market models and KPI-based performance measurement systems in the context of international marketing planning. - integrate decision-making across interdependent areas of the international marketing mix within a dynamic simulation environment. - reflect on and apply analytical methods for market selection and performance control. Personal/Self-Competence The students	

- take responsibility for managing complex decision-making processes in dynamic and uncertain international environments.
- develop the ability to think critically and apply international marketing knowledge independently in simulated and real-life business scenarios.
- are capable of continuously updating and improving their marketing strategies based on environmental analysis and internal performance feedback.

Social Competence

The students

- collaborate in teams to create and adjust detailed marketing plans in an international setting.
- effectively communicate strategic marketing decisions and their implications to different stakeholders.
- engage in critical reflection and peer feedback during simulations and group work.

Content:

1 International Marketing:

Introduction to International Marketing

- Globalization and Global markets
- Nature, Motives and Issues in International Marketing
- The Standardization vs. Adaptation Paradigm
- International Management Orientations (Perlmutter Model)
- Evolution of International Marketing

Global Marketing Environment

- Economic Environment and Trade Agreements
 - The World Economy
 - The Role of WTO
 - Nature and Types of Trade Agreements
 - Political Influence on International Marketing
- Social and cultural environments
 - Culture in Marketing
 - Global Consumer Cultures
 - Key Cultural Frameworks (Hall, Hofstede, GLOBE)
 - International Innovation Diffusion

Strategies for Approaching Global Markets

- Segmentation, Targeting and Positioning
 - STP Model in International Marketing
 - Global Market Segmentation
 - Target Market Strategy Options
 - Global Positioning Strategies
- Market selection decisions
 - Market Selection Criteria
 - Market Entry Timing
 - Market Entry Modes
- Importing and Exporting
 - Options for Exporting
 - Export Issues
 - Governmental role in imports/exports
 - Tariff Systems
 - Export Financing
- Licensing, Investment and Strategic Alliances
 - Options for Market Entry Strategies
 - Licensing in international context
 - Franchising in international context

- Joint Ventures in international context
- Foreign Direct Investment (FDI)
- Global Strategic Alliances

Global Marketing Mix

- Global Brand and Product Decisions
 - Product Standardization vs. Adaptation
 - International Branding
 - Product / Brand Mix in international context
 - Country of Origin Approach
 - Global Product Planning
 - Product Counterfeiting & Product Piracy
- Global Pricing Decisions
 - Pricing Standardization vs. Adaptation
 - Global Pricing Strategies
 - Rationale for Gray Market Deals
 - Export Pricing & Incoterms
 - Key influence factors on International Pricing (Currency Fluctuation, Inflation, Government control, Competition)
- Global Distribution Decisions
 - Options for International Sales Channels
 - Selecting Foreign Distributors & Distributor Agreements
 - Global Retailing
- Global Communications Decisions
 - Communications Standardization vs. Adaptation
 - Global Advertising
 - Global Media Decisions
 - Public Relations in international context
 - Sales promotion in international context

Literature:

1 International Marketing (MVM_IM):

Compulsory:

- HOLLENSSEN, Svend, 2020. *Global marketing: a decision-oriented approach*. ISBN 1292251808
- KEEGAN, Warren J. and Mark C. GREEN, 2019. *Global marketing*. Boston, Mass.: Pearson. ISBN 978-1292304021; 1292304022

Recommended:

- BAACK, Daniel, Barbara CZARNECZKA and Donald BAACK, 2018. *International Marketing*. ISBN 978-1506389219
- DOOLE, Isobel, Robin LOWE and Alexandra J. KENYON, 2019. *International marketing strategy: analysis, development and implementation*. Andover, Hampshire: Cengage. ISBN 978-1-4737-5874-2
- GHOURI, Pervez N. and Philip R. CATOORA, 2014. *International marketing*. London [u.a.]: McGraw-Hill. ISBN 978-0-07714815-7, 0-07714815-0
- KOTABE, Masaaki and Kristiaan HELSEN, 2022. *Global marketing management*. Hoboken, NJ: Wiley. ISBN 978-1119888765
- USUNIER, Jean-Claude, Julie Anne LEE and Vasyi TARAS, 2023. *Business & Marketing Across Cultures*. ISBN 978-1529754377

International Management	
Module abbreviation:	GBM_IM
Curriculum:	Programmes
	Global Economics and Business Management (GBM-B) - SPO-Nr.: 1
Responsible for module:	Warrings, Vincent
Lecturers:	Warrings, Vincent
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	1.2: International Management (GBM_IM)
Lecture types:	1.2-International Management: SU/Ü - lecture with integrated exercises (GBM_IM)
Studien- / Prüfungsleistungen:	
1.2-International Management: schrP90 - written exam, 90 minutes (GBM_IM)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>1 International Management:</i> Subject-specific competence: - Students are able to identify, classify, and critically reflect on fundamental concepts, theories, and frameworks of International Management. - Students understand global interrelations and trends of globalization and are able to analyze and assess their impact on society and business. - Students can explain key institutional and legal frameworks relevant to international business. - Students can describe internationalization strategies, organizational structures, and business models, and evaluate their suitability in a global context. Methodological competence: - Students are capable of applying models of trade theory and internationalization to concrete examples. - Students can systematically analyze international case studies, develop solution approaches, and justify their reasoning. Personal competence: - Students develop their own positions on global economic issues and are able to present them in a well-argued manner. - Students reflect on uncertainty and ambiguity in international contexts and consciously engage with conflicting perspectives. Social competence: - Students are capable of further developing their intercultural competencies and purposefully applying them in international contexts. - Students are able to work effectively in intercultural teams and constructively integrate diverse perspectives into shared outcomes.	

Content:*1 International Management:*

- Current world data and trends in globalization
- Benefits and challenges of globalization
- Major trade and capital flow theories
- International business strategies, organizational structures and global operations
- Global institutions and their roles in the international economic system
- Basics intercultural management and communication

Literature:*1 International Management (GBM_IM):*

Compulsory:

- DANIELS, John D., Lee H. RADEBAUGH and Daniel P. SULLIVAN, 2018. *International Business: Environments & Operations, Global Edition*. 16. edition. ISBN 978-1-292-21473-3; 978-1-292-21474-0
- CAVUSGIL, S. Tamer, Gary KNIGHT and John R. RIESENBERGER, 2025. *International Business: The New Realities, Global Edition*. ISBN 978-1-292-30324-6

Recommended:

- BARTLETT, Christopher A., Paul W. BEAMISH and Andrew DELIOS, 2025. *Transnational management: concepts and cases in cross-border management*. Cambridge: Cambridge University Press. ISBN 9781009488556, 1009488554
- WILD, John J. and Kenneth L. WILD, 2023. *International Business: The Challenges of Globalization, Global Edition*. 10. edition. ISBN 978-1-292-45019-3
- O'ROURKE, Kevin H., WILLIAMSON, Jeffrey J. *When did globalisation begin? European Review of Economic History, Volume 6, Issue 1, April 2002, Pages 23–50* [online]. Available via: <https://doi.org/10.1017/S1361491602000023>; <https://www.nber.org/papers/w7632>

International Project	
Module abbreviation:	IG_Proj
Curriculum:	Programmes
	International Management Bachelor (IG-B) - SPO-Nr.: 2
Responsible for module:	Augsdörfer, Peter
Lecturers:	Augsdörfer, Peter
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	2.12: International Project (IG_Proj)
Lecture types:	2.12: Prj - Project
Studien- / Prüfungsleistungen:	
2.12-International Project: seminar paper and presentation (IG_Proj)	
Additional Explanation:	
None	
Recommended prerequisites:	
Knowledge beyond the university entrance qualification is not required. An in-depth study of literature is highly recommended.	
Objectives:	
<i>2 International Project:</i> The students will be able to: • Define and describe common project management terminology • Use general project management tools to coordinate a team and document the progress of a project • Avoid common cultural pitfalls and mistakes in managing projects • Define their role in the global project management process • Present key project data to an international audience This course develops a foundation of concepts and solutions that supports the planning, scheduling, controlling, resource allocation, and performance measurement activities required for successful completion of an international project.	
Content:	
<i>2 International Project:</i> The students work together in an international project. The aim is to learn and apply the following project management aspects and apply them in practice: • Project management tools, methods and techniques • Running and coordinating an interdisciplinary and international project • Planning, scheduling, resource allocation, making decisions • Realisation and controlling • Regulation and performance measurement activities • Visualisation and communication • Conflict management • Case studies	

- Marketing and communications inputs

Literature:

2 International Project (IG_Proj):

Compulsory:

- KOSTER, Kathrin, 2009. *International Project Management*. ISBN 1412946212

Recommended:

- NICHOLAS, John M. and Herman STEYN, 2016. *Project Management for Engineering, Business and Technology*. ISBN 1138937347

Lean Analytics (Master)	
Module abbreviation:	ECV_LA
Curriculum:	Programmes
	Entrepreneuership and Corporate Venturing (ECV-M) - SPO-Nr.: 3
Responsible for module:	Huber, Florian
Lecturers:	Altmayr, Tobias; Huber, Florian
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	3.1: Lean Analytics (ECV_LA)
Lecture types:	SC / E: seminar course with exercises
Studien- / Prüfungsleistungen:	
3.1-Lean Analytics: mdlP - oral exam, 15 minutes (ECV_LA) Additional Explanation: None	
Recommended prerequisites:	
There are no prerequisites. However, this course covers several perspectives and methods in a short time. As a learner, you will be better able to grasp, discuss, and apply these, if you have a basic understanding of the core ideas of Lean Startup (Ries, 2011), Lean Analytics (Croll & Yoskovitz, 2013), as well as prototyping and prototyping (Savoia, 2019). Besides the books mentioned below, there are many online videos and articles available that provide an excellent introduction to each of these themes.	
Objectives:	
<i>3 Lean Analytics:</i> This course aims to equip students with a comprehensive understanding and the corresponding skill set for making data-informed decisions in new business ventures. The course will be guided by several learning goals. Knowledge - Students are familiar with the core concepts of the Lean Startup methodology. - Students understand the role of Lean Analytics in building a new business venture. - Students are familiar with various prototyping strategies and tools. Methodology - Students are capable of creating useful learning metrics and measurement baselines. - Students have the necessary skills to run structured experiments and A/B tests. - Students can make data-informed decisions about a new venture or idea. Personality - Students are confident in designing effective prototypes and testing them.	
Content:	
<i>3 Lean Analytics:</i> In this course, three main themes will be covered. First, we will explore the core concepts and practices of the Lean Startup methodology as the theoretical foundation for this course. Second, we will delve deeper into all aspects of how a Lean Analytics approach can be utilized to make more informed strategic decisions	

while building a new venture. Third, we will expand our toolkit by studying different prototyping and prototyping strategies that allow us to design effective experiments.

Theme 1: Lean Startup

- Which principles guide the Lean Startup methodology?
- How do entrepreneurial and traditional managerial thinking differ?
- How can product development be aligned to maximize early learning opportunities?
- How does the build-measure-learn feedback loop work?

Theme 2: Lean Analytics

- What are the underlying principles of the Lean Analytics approach?
- What are learning metrics and how can they be created?
- How do you systematically collect and analyse data via structured experiments?
- What is the role of baselining and benchmarking in Lean Analytics?
- How do you use Lean Analytics to make data-informed decisions?

Theme 3: Prototyping and Prototyping

- What are prototyping and prototyping?
- What are common prototyping and prototyping strategies and tools?
- Which ethical boundaries should be considered while testing prototypes?
- How can Lean Analytics support prototyping?

Literature:

3 Lean Analytics (ECV_LA):

Compulsory:

- CROLL, Alistair and Benjamin YOSKOVITZ, 2013. *Lean analytics: use data to build a better startup faster*. Beijing [u.a.]: O'Reilly. ISBN 978-1-449-33567-0, 1-449-33567-5

Recommended:

- KONING, Rembrand, HASAN, Sharique, CHATTERJI, Aaron. *Experimentation and startup performance: Evidence from A/B testing (NBER Working Paper Series No. 26278)* [online]. Available via: <http://www.nber.org/papers/w26278>
- SAVOIA, Alberto, 2019. *The right it: why so many ideas fail and how to make sure yours succeed*. New York, NY: HarperOne. ISBN 978-0-06-288465-7, 978-0-06-288466-4
- RIES, Eric, 2019. *The lean startup: how constant innovation creates radically successful businesses*. London [u.a.]: Penguin Business. ISBN 978-0-670-92160-7

Marketing	
Module abbreviation:	BW_Mark
Curriculum:	Programmes
	Betriebswirtschaft Bachelor (BW-B) - SPO-Nr.: 1
Responsible for module:	März, Marco
Lecturers:	März, Marco; Pielhop, Raziye
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	1.13: Marketing (BW_Mark)
Lecture types:	SU - lecture
Studien- / Prüfungsleistungen:	
1.13-Marketing: schrP90 - written exam, 90 minutes (BW_Mark)	
Additional Explanation:	
None	
Recommended prerequisites:	
No knowledge beyond the (Fach-)Abitur is required. An intensive study of literature (see literature references below) is necessary.	
Objectives:	
<i>1 Marketing:</i> The students Subject Competence: - are able to explain the fundamental nature, functions, and basic principles of marketing and sales. - can evaluate and explain positioning and differentiation strategies in market contexts. - are able to identify, describe, and apply the key elements of the marketing mix. - are able to develop and evaluate product strategies and branding concepts. - can design and analyze pricing strategies and programs in various market contexts. - are capable of developing and managing integrated marketing channel strategies. Methodological Competence: - can analyze and describe strategic planning processes in companies with a focus on marketing and sales as a market-driven philosophy. - are capable of applying marketing research processes to analyze both broad and specific marketing environments of companies. - are competent in developing and evaluating strategic marketing and sales concepts, including market analysis, segmentation, and targeting. - can formulate and assess integrated marketing communication strategies and programs. Personal/Self-Competence: - are able to work independently on marketing case studies and best practices. Social Competence: - can analyze and solve complex marketing and sales problems through case study applications. - can communicate marketing strategies to stakeholders.	

Content:

1 Marketing:

- 1** Strategic Marketing and Sales
 - 1.1 Marketing for the 21st Century
 - 1.2 Developing Marketing Strategies and Plans
 - 1.3 Collecting Information and Forecasting Demand
 - 1.4 Competitive Dynamics
 - 1.5 Analyzing Consumer Markets
 - 1.6 Identifying Market Segments and Targets, Positioning
8. Operative Marketing and Sales
 - 2.1 Product Strategy and Branding
 - 2.2 Developing Pricing Strategies and Programs
 - 2.3 Designing and Managing Integrated Marketing Channels
 - 2.4 Developing Communication Strategies and Programs

Literature:

1 Marketing (BW_Mark):

Compulsory:

- KOTLER, Philip, Kevin Lane KELLER and Alexander CHERNEV, 2022. *Marketing management*. 16. edition. Harlow, England: Pearson. ISBN 978-1-292-40481-3

Recommended:

- BECKER, Jochen, 2019. *Marketing-Konzeption: Grundlagen des ziel-strategischen und operativen Marketing-Managements* [online]. München: Verlag Franz Vahlen PDF e-Book. ISBN 978-3-8006-5760-5. Available via: <https://doi.org/10.15358/9783800657605>.
- KOTLER, Philip and others, 2023. *Marketing-Management: Konzepte - Instrumente - Unternehmensfallstudien*. 16. edition. München: Pearson. ISBN 978-3-86894-443-3, 3-86894-443-5

Marketing and Sales	
Module abbreviation:	GBM_M&S
Curriculum:	Programmes
	Global Economics and Business Management (GBM-B) - SPO-Nr.: 1
Responsible for module:	Raab-Kuchenbuch, Andrea
Lecturers:	März, Marco; Pielhop, Raziye
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	1.8: Marketing and Sales (GBM_M&S)
Lecture types:	Lecture with integrated exercises
Studien- / Prüfungsleistungen:	
1.8-Marketing and Sales: schrP90 - written exam, 90 minutes (GBM_M&S)	
Additional Explanation:	
None	
Recommended prerequisites:	
No knowledge beyond the (Fach-)Abitur is required. An intensive study of literature (see literature references below) is necessary.	
Objectives:	
<i>1 Marketing and Sales:</i> The students Subject Competence: - are able to explain the fundamental nature, functions, and basic principles of marketing and sales. - can evaluate and explain positioning and differentiation strategies in market contexts. - are able to identify, describe, and apply the key elements of the marketing mix. - are able to develop and evaluate product strategies and branding concepts. - can design and analyze pricing strategies and programs in various market contexts. - are capable of developing and managing integrated marketing channel strategies. Methodological Competence: - can analyze and describe strategic planning processes in companies with a focus on marketing and sales as a market-driven philosophy. - are capable of applying marketing research processes to analyze both broad and specific marketing environments of companies. - are competent in developing and evaluating strategic marketing and sales concepts, including market analysis, segmentation, and targeting. - can formulate and assess integrated marketing communication strategies and programs. Personal/Self-Competence: - are able to work independently on marketing case studies and best practices. Social Competence: - can analyze and solve complex marketing and sales problems through case study applications. - can communicate marketing strategies to stakeholders.	

Content:*1 Marketing and Sales:*

Strategic Marketing and Sales

- Marketing for the 21st Century
- Developing Marketing Strategies and Plans
- Collecting Information and Forecasting Demand
- Competitive Dynamics
- Analyzing Consumer Markets
- Identifying Market Segments and Targets, Positioning

Operative Marketing and Sales

- Product Strategy and Branding
- Developing Pricing Strategies and Programs
- Designing and Managing Integrated Marketing Channels
- Developing Communication Strategies and Programs

Literature:Compulsory:

- KOTLER, Philip, Kevin Lane KELLER and Alexander CHERNEV, 2022. *Marketing Management, Global Edition*. 16. edition. ISBN 978-1-292-40481-3

Recommended:

- BECKER, Jochen, 2019. *Marketing-Konzeption: Grundlagen des zielstrategischen und operativen Marketing-Managements*. 11. edition. München: Vahlen. ISBN 3800657597, 978-3800657599
- KOTLER, Philip, Kevin Lane KELLER and Marc Oliver OPRESNIK, 2017. *Marketing-Management: Konzepte, Instrumente, Unternehmensfallstudien*. 15. edition. Hallbergmoos: Pearson. ISBN 3868942793; 978-3868942798

Marketing & Sales	
Module abbreviation:	IG_M&S
Curriculum:	Programmes
	International Management Bachelor (IG-B) - SPO-Nr.: 2
Responsible for module:	Fend, Lars
Lecturers:	Fend, Lars; Weiss, Patrick
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	2.1: Marketing & Sales (IG_M&S)
Lecture types:	2.1: SU/Ü - lecture with integrated exercises
Studien- / Prüfungsleistungen:	
2.1-Marketing & Sales: schrP90 - written exam, 90 minutes (IG_M&S) Additional Explanation: None	
Recommended prerequisites:	
The students should have a basic knowledge of mathematics. Knowledge beyond the university entrance qualification is not required. An in-depth study of literature is highly recommended.	
Objectives:	
<i>2 Marketing & Sales:</i> The students will be able to - define the nature, function and basic principles of marketing and sales. - describe the strategic planning processes of a company in order to understand marketing (including sales) as a market driven philosophy. - apply the marketing research process as a framework to analyze broad and task marketing environment of a company. - understand the nature of positioning and differentiation. - describe the concept and key elements of the marketing mix and their application. - solve case studies on realistic marketing and sales problems.	
Content:	
<i>2 Marketing & Sales:</i> 1. Strategic Marketing and Sales 1.1 Marketing for the 21st Century 1.2 Developing Marketing Strategies and Plans 1.3 Collecting Information and Forecasting Demand 1.4 Competitive Dynamics 1.5 Analyzing Consumer Markets 1.6 Identifying Market Segments and Targets, Positioning 2. Operative Marketing and Sales 2.1 Product Strategy and Branding	

2.2 Developing Pricing Strategies and Programs

2.3 Designing and Managing Integrated Marketing Channels

2.4 Developing Communication Strategies and Programs

Literature:

Compulsory:

- KOTLER, Philip, Kevin Lane KELLER and Alexander CHERNEV, 2022. *Marketing management*. 16. edition. Harlow, England: Pearson.
- CHAFFEY, Dave and Fiona ELLIS-CHADWICK, 2022. *Digital marketing*.

Recommended:

- KOTLER, Philip, Hermawan KARTAJAYA and Iwa SETIAWAN, 2017. *Marketing 4.0. Moving from traditional to digital*.

Methods & Instruments of Strategic Controlling	
Module abbreviation:	BW_CF6
Curriculum:	Programmes
	Betriebswirtschaft Bachelor (BW-B) - SPO-Nr.: 2
Responsible for module:	Graap, Torsten
Lecturers:	Graap, Torsten
Language of instruction:	English
Credit points / SWS:	6 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 103 h
	Total: 150 h
Subjects of the module:	2.3: Methods & Instruments of Strategic Controlling (BW_CF6)
Lecture types:	2.3: SU/Ü - lecture with integrated exercises
Studien- / Prüfungsleistungen:	
2.3-Methods & Instruments of Strategic Controlling: LN - written exam, 90 minutes (BW_CF6) Additional Explanation: <i>2 Methods & Instruments of Strategic Controlling:</i> The course will require students to actively prepare themselves for the sessions by studying short prereads of relevant articles which are taken from the recent press. They will be discussed in class.	
Recommended prerequisites:	
An in-depth study of literature is necessary.	
Objectives:	
<i>2 Methods & Instruments of Strategic Controlling:</i> Students: - are able to correctly define and explain the concepts of strategic controlling and its differences to strategic management - detect opportunities and boundaries relating to strategic controlling - can evaluate different instrument and tools of strategic controlling in companies - know different future scenario concepts and are able to creatively develop their own strategic options for companies - are capable to assess the application possibilities of the formentioned instruments in practice The following AOL Learning Objectives are emphasized: - Attitude of Responsibility - Spirit of Creativity and Entrepreneurial Thinking - Business Competence - Application Strength	
Content:	
<i>2 Methods & Instruments of Strategic Controlling:</i> - Definition and distinction of strategic controlling and strategic management as well as operational controlling - Instruments and tools of Strategic Controlling (e.g. SWOT analysis, risk management systems) and their practical relevance - Different future trend scenarios (e.g. megatrend theory, club of Rome, transformation theory)	

- Effects of sustainability and digitalization on companies and their role in controlling

Literature:

2 Methods & Instruments of Strategic Controlling (BW_CF6):

Compulsory:

- DAVID, Fred R., Forest R. DAVID and Meredith E. DAVID, 2023. *Strategic management: concepts and cases: a competitive advantage approach*. Harlow, England: Pearson. ISBN 978-1-292-44140-5, 1-292-44140-2

Recommended:

- BAUM, Heinz-Georg, Alfred COENENBERG and Thomas GÜNTHER, 2013. *Strategisches Controlling*. Stuttgart: Schäffer-Poeschel.
- ALTER, Roland, 2019. *Strategisches Controlling*. München: deGruyter Oldenbourg. ISBN 978-3-11-058444-8

Modern Leadership (Master)	
Module abbreviation:	GBU-ML
Curriculum:	Programmes
	Global Business (GBU-M) - SPO-Nr.: 7
Responsible for module:	Hackl, Oliver
Lecturers:	Hackl, Oliver
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	7: Modern Leadership (GBU-ML)
Lecture types:	SU/Ü - lecture with integrated exercises
Studien- / Prüfungsleistungen:	
7-Modern Leadership: mdIP - oral exam, 15 minutes (GBU-ML)	
Additional Explanation:	
None	
Recommended prerequisites:	
Basic knowledge in HR management and leadership.	
Objectives:	
<i>7 Modern Leadership:</i> At the end of the course, the students Knowledge - understand the changing nature of leadership in the global new normal. Methodology - use advanced negotiation and decision-making models to resolve cross-border business conflicts. - apply advanced leadership frameworks and decision-making models to solve complex challenges in global organizations. Personality - foster adaptability and resilience to navigate leadership challenges in volatile, uncertain, complex, and ambiguous (VUCA) global settings. Social Competence - build, motivate and manage high-performance teams in a fast changing and increasingly digitized world. - correspondingly lead change and innovation in global organizations. - listen actively and adapt communication styles to diverse team dynamics.	
Content:	
<i>7 Modern Leadership:</i> - Introduction to Modern Leadership in the New Normal - Adapting Leadership Styles for the New Normal - Organizational Behavior and Decision Making - Motivating and Engaging High-Performance Teams - Effective Communication & Coaching - Embracing Change and (Digital) Transformation in Leadership	

- Leading in the Midst of Chaos, Crisis and Uncertainty
- Cultivating Diversity, Equity and Inclusion in Leadership
- Ethical and Emotional Leadership in the New Normal
- Nurturing Innovation and Creativity in Leadership
- The Future of Leadership: Trends and Emerging Practices
- Overview of the Oral Exam Format, including the Structure, Duration, and Assessment Criteria

Literature:

7 Modern Leadership (GBU-ML):

Compulsory:

None

Recommended:

- KAHNEMAN, Daniel, 2012. *Thinking, fast and slow*. [London]: Penguin Books. ISBN 978-0-141-03357-0, 0-141-03357-6
- GOLEMAN, Daniel, Richard E. BOYATZIS and Annie MCKEE, 2004. *Primal leadership: learning to lead with emotional intelligence*. Boston, Mass.: Harvard Business School Press. ISBN 978-1-59139-184-5, 1-59139-184-9
- ALSUWAIDI, Faisal and CHATGPT, 2023. *Beyond the Horizon: Uncharted Territories in Modern Leadership*. ISBN 979-8389502468
- CULBERTSON, Lloyd and Michael Scott PARKS, 2023. *Leadership Today. How to Harness The Power Of Modern Leadership Practices*. ISBN 979-8386384081

Research methods for Business (Master)	
Module abbreviation:	GBU_RMB
Curriculum:	Programmes
	Global Business (GBU-M) - SPO-Nr.: 4
Responsible for module:	Fend, Lars
Lecturers:	Fend, Lars
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	4: Research methods for Business (GBU_RMB)
Lecture types:	SU/Ü - lecture with integrated exercises
Studien- / Prüfungsleistungen:	
4-Research methods for Business: Proj - Project work (5-25 pages) with oral presentation (15 minutes) (GBU_RMB) Additional Explanation: None	
Recommended prerequisites:	
None	
Objectives:	
<i>4 Research methods for Business:</i> The aim of the seminar is to prepare students for the researching and writing of high-quality academic papers (from seminar papers to master's thesis). In this context students Knowledge - understand the scientific method and its application to business research. - know the characteristics of scientific research and academic writing to contribute to scientific and practical solutions. - know the general rules and principles of good academic work, as well as the consequences of non-compliance with these rules. Methodology - analyze the limitations and challenges of conducting research in business context. - apply quantitative and qualitative research methods to evaluate business performance and identify market trends. Personality - ensure research ethics and integrity. - demonstrate adaptability and resilience in managing uncertainties and disruptions. - cultivate self-motivation and time management skills to meet academic and professional deadlines. Social Competence - self- and group-organize and work out different topic blocks for milestone dates. - overcome typical challenges in the research and writing process. - collaborate effectively to achieve academic excellence. - present business ideas and strategies persuasively to international audiences.	

Content:
<i>4 Research methods for Business:</i> • Understanding the compositional approaches for designing qualitative, quantitative, and mixed methods research in the social sciences • Deciding on a suitable research method • Literature research (library, databases, Internet, ...) • If necessary, survey of companies (e.g. questionnaire) • Preparation of academic papers and presentations according to academical standards
Literature:
<i>4 Research methods for Business (GBU_RMB):</i> Compulsory: • CRESWELL, John W. and J. David CRESWELL, 2023. <i>Research design: qualitative, quantitative, and mixed methods approaches</i>. Los Angeles; London; New Delhi; Singapore; Washington DC; Melbourne: Sage. ISBN 978-1-07-181794-0 Recommended: • BOOTH, Wayne C. and others, 2016. <i>The craft of research</i>. Chicago; London: The University of Chicago Press. ISBN 978-0-226-23956-9, 978-0-226-23973-6 • MERRIAM, Sharan B. and Elizabeth J. TISDELL, 2016. <i>Qualitative research: a guide to design and implementation</i>. San Francisco, CA: Jossey-Bass. ISBN 978-1-119-00361-8 • LOZANO, Raul A.R., 2022. <i>Quantitative research and scientific publications: Theories, methods and models</i>. London: Our Knowledge Publishing. ISBN 9786205471081

Retail Lab: Consumer Projects and Project Management (Master)	
Module abbreviation:	RCM_CPPM
Curriculum:	Programmes
	Retail und Consumer Management (RCM-M) - SPO-Nr.: 1
Responsible for module:	Knoppe, Marc
Lecturers:	Knoppe, Marc
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	1.1: Retail Lab: Consumer Projects and Project Management (RCM_CPPM)
Lecture types:	SC / E: seminar course with exercises
Studien- / Prüfungsleistungen:	
1.1-Retail Lab: Consumer Projects and Project Management: Presentation, 15 minutes (RCM_CPPM)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>1 Retail Lab: Consumer Projects and Project Management:</i> Students have to be prepared for a world that's changing fast. Students have to know more about disruptive retail and consumer models, about revolution in thinking and creating unexpected solutions. Students will learn how innovations and business models are shaping the future of retailing, shopping and consumer behaviour. Students will analyse disruptive and non-disruptive retail and consumer business models driven by internet of me, augmented reality, digitalisation or basic business. Students will learn how to apply inventive business models that drive retail and consumer business. Students know how to organize and manage a project. Students are prepared to handle specific assignments/projects at work. The students are able to apply techniques and tools they have learned in international real-life projects. At the end of the course, the students Subject competence: - understand disruptive retail business models and their impact on consumer behavior. - have insights into digital transformation processes in retail and consumer industries. Methodological competence: - will be able to demonstrate proficiency in the application of project management techniques for interdisciplinary and international retail projects. - use business intelligence tools and dashboards for reporting project progress and outcomes. Personal/Self-competence: - have an entrepreneurial mindset and resilience in fast-changing environments. - show critical thinking and creativity in developing innovative solutions. Social competence: - collaborate in multicultural and interdisciplinary teams.	

- communicate effectively within project environments and towards external stakeholders.

Content:

1 Retail Lab: Consumer Projects and Project Management:

Students will discuss new technologies, innovations and disruptive business models that are changing the face of retail and enhancing customer experience. Students will learn about new digital business models and non-traditional competitors. Students will explore the key issues of retail and consumer business models. Students will learn to identify ideas, to analyse disruptive and non-disruptive businesses, to create a new strategy.

To be prepared in project management students will have the opportunity to take an extra course in project management:

VHB course:

Prof. Dr. Markus Westner

<https://kurse.vhb.org/VHBPORTAL/kursprogramm/kursprogramm.jsp?kDetail=true>

Literature:

1 Retail Lab: Consumer Projects and Project Management (RCM_CPPM):

Compulsory:

- PINTO, Jeffrey K., 2016. *Project management: achieving competitive advantage*. Harlow: Pearson Education. ISBN 978-1-292-09479-3, 1-292-09479-6
- BERMAN, Barry, Joel R. EVANS and Patrali CHATTERJEE, 2018. *Retail management: a strategic approach*. Harlow, England: Pearson. ISBN 978-1-292-21467-2, 1-292-21467-8

Recommended:

- WANNENWETSCH, Helmut, 2004. *E-Supply-Chain-Management: Grundlagen, Strategien, Praxisanwendungen*. Wiesbaden: Gabler. ISBN 3-409-22015-1
- TAYUR, Sridhar, 2003. *Quantitative models for supply chain management*. Boston [u.a.]: Kluwer Acad. Publ. ISBN 0-7923-8344-3
- WILLIAMS, Luke, 2016. *Disrupt: Think the Unthinkable to Spark Transformation in Your Business*.

Retail Locations and International Retailing (Master)	
Module abbreviation:	RCM_RLIR
Curriculum:	Programmes
	Retail and Consumer Management (RCM-M) - SPO-Nr.: 2
Responsible for module:	Vogler, Thomas
Lecturers:	Vogler, Thomas
Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	2.3: Retail Locations and International Retailing (RCM_RLIR)
Lecture types:	SC / E: seminar course with exercises
Studien- / Prüfungsleistungen:	
2-Retail Locations and International Retailing: mdIP - oral exam, 15-20 minutes (RCM_RLIR)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>2 Retail Locations and International Retailing:</i> The students shall be able to develop solutions in critical situations that can occur in international retailing - they shall get a feeling of the complexity of retailing esp. in different countries and under consideration of real estate issues. They shall be able to understand what is essential in buying real estate with a retail store or buying a retail chain. They should be able to develop their own opinion about future in retail - esp. brick and mortar retail. They shall get an understanding of sustainability esp in real estate for retail. They shall get acquainted with different methods of turnover prediction- their weaknesses and strength. At the end of the course, the students Subject competence: • understand real estate aspects and sustainability issues in international retailing. • have knowledge of turnover estimation methods and trade area analysis. Methodological competence: • can evaluate international retail strategies and location-based decisions. • will apply scenario-based analysis in international expansion planning. Personal/Self-competence: • will demonstrate critical thinking and a future-oriented mindset regarding retail developments. • are able to develop independent, data-driven assessments of retail strategies. Social competence: • will have developed skills in intercultural communication within global retail environments. • can manage expectations of international and local stakeholders.	

Content:

2 Retail Locations and International Retailing:

- Nearly every lesson starts with a role play - students have to discuss and find a solution for a given situation that is real estate and retail related. The different solutions will be discussed.
- Following issues will be presented and discussed:
- Internationalisation and growth- implications for brick and mortar retailer
- WalMart in Germany - why did they fail?
- Real Estate in different legal systems
- Case buying a retail store (real estate with store) with financial implications
- Sustainability in retail- esp for Real Estate
- Trade Areas
- Different Turnover estimation methods
- Future of real estate in retail
- Asset management in retail
- Strategic support of retail by real estate
- The students have to read beside the books down what will be supplied from my side in moodle.

Literature:

2 Retail Locations and International Retailing (RCM_RLIR):

Compulsory:

- LEVY, Michael and Barton WEITZ. *Retailing Management - chapter 7 and 8*. ISBN 987-0-07-122098-9
- ZENTES, J., 2017. *Strategic Retail Management chapter 8*.
- BARKHAM, Richard, 2012. *Real estate and globalisation, chapter 1,2,.5*. Hoboken, N.J.: Wiley-Blackwell. ISBN 978-0-470-65597-9, 978-1-118-35167-3

Recommended:

- THRALL, Grant Ian. *Business Geography and new real estate market analysis chapter 1 and 7*.
- NOZEMAN, Ed F., 2014. *European metropolitan commercial real estate markets: Ed F. Nozeman ... (ed.)* [online]. Berlin [u.a.]: Springer PDF e-Book. ISBN 978-3-642-37851-5, 978-3-642-37852-2. Available via: <https://doi.org/10.1007/978-3-642-37852-2>.
- ELLISON, Louise and Victoria EDWARDS, 2004. *Corporate Property management aligning real estate with business strategy*.
- SQUIRES, Graham. *Routledge Companion to Real Estate Development chapter 5, 8, 14, 15, 17, 18, 20*.
- TOSHIHARA, Ishikawa, 2016. *Dynamic Locational Phases of Economic Activity in the Globalized World Part 1*.

Risk of greenwashing: How to communicate sustainability	
Module abbreviation:	NW_RGW
Curriculum:	Programmes
	Betriebswirtschaft (BW-B) - SPO-Nr.: 2
Responsible for module:	Matthäus, Carsten
Lecturers:	Matthäus, Carsten
Language of instruction:	English
Credit points / SWS:	3 ECTS / 2 SWS
Workload:	Contact hours: 23 h
	Self-study: 52 h
	Total: 75 h
Subjects of the module:	2.7: Risk of greenwashing: How to communicate sustainability (NW_RGW)
Lecture types:	SU/Ü - lecture with integrated exercises
Studien- / Prüfungsleistungen:	
2.7-Risk of greenwashing: How to communicate sustainability: LN - seminar paper (NW_RGW)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>2 Risk of greenwashing: How to communicate sustainability:</i> 1 Understanding Greenwashing and Its Implications: Equip participants with a clear understanding of what constitutes greenwashing, its ethical, legal, and reputational risks, and how it affects stakeholders in the business environment. 9. Effective Sustainability Communication: Teach participants how to craft transparent, authentic, and effective sustainability messages that align with their organization's values and objectives, avoiding misleading claims. 10. Building Risk Awareness inside the Company: Enable participants to communicate internally, how business practices have to be adapted in order to avoid future damages to the company's reputation.	
Content:	
<i>2 Risk of greenwashing: How to communicate sustainability:</i> 1 Fundamentals of Greenwashing, Sustainability and Communication - Definition and types of greenwashing - Case studies of failures and successes - Special requirements of sustainability communication 11. Communicating Sustainability - Planning, creating and substantiating sustainability communication - Assessing the risk of poor or incomplete communication efforts - Understanding research methods of journalists and NGOs 12. Assessing Risks, Dealing with Crises - Developing a risk-radar for future communication challenges - Responding to greenwashing claims - Communicating in periods of crisis	

Literature:

2 Risk of greenwashing: How to communicate sustainability (NW_RGW):

Compulsory:

- N.N. SCHNEIDER ELECTRIC SE, 2025. *Steering Clear of Greenwashing Claims* [online]. PDF e-Book. Available via: *Steering Clear of Greenwashing Claims*.
- WEDER, F., KRAINER, L., KARMASIN, M., 2021. *The Sustainability Communication Reader: a reflective compendium*. [online]. PDF e-Book. Available via: <https://doi.org/10.1007/978-3-658-31883-3>.
- NEMES, N., 2022. *An Integrated Framework to Assess Greenwashing. Sustainability 2022* [online]. PDF e-Book. Available via: <https://doi.org/10.3390/su14084431>.

Recommended:

- HOFFMANN, André, VANHAM, Peter, 2024. *The New Nature of Business: The Path to Prosperity and Sustainability* [online]. PDF e-Book. ISBN 978-1-394-25753-9.

Strategic Management	
Module abbreviation:	BW_StratM and BW_StratM-CS
Curriculum:	Programmes
	Betriebswirtschaft (BW-B) - SPO-Nr.: 2
Responsible for module:	Warrings, Vincent
Lecturers:	Warrings, Vincent; Wittmann, Robert
Language of instruction:	English
Credit points / SWS:	8 ECTS / 6 SWS
Workload:	Contact hours: 70 h Self-study: 130 h Total: 200 h
Subjects of the module:	2.1.1: Strategic Management (BW_StratM) 2.1.2: Strategic Management / Case Studies (BW_StratM-CS)
Lecture types:	2.1.1.: SU - lecture 2.1.2.: Pr - exercise
Studien- / Prüfungsleistungen:	
2.1.1-Strategic Management: schrP90 - written exam, 90 minutes (BW_StratM) 2.1.2-Strategic Management / Case Studies: LN - presentation (15-30 min.) and written composition (10-15 pages) (BW_StratM-CS) Additional Explanation: Both subjects of the module must be attended and passed in order to receive ECTS!!!	
Recommended prerequisites:	
None	
Objectives:	
<i>Strategic Management</i> The students - are able to understand the leadership challenges in today's world - understand the dimensions of Entrepreneurial Spirit - are able to put strategic questions and to apply instruments of strategic leadership and innovation - are ready to create the dimensions of a competitive Business Design <i>Strategic Management/ Case Studies</i> The students - can apply the instruments of strategic and operational management with a clear focus on customer advantage and competitive advantage - know how to develop certain topics of strategic management within a business framework - can apply business cases within certain topics of strategic management - have the competence to apply management tools	
Content:	
<i>Strategic Management</i> - Introduction to Executive Management - The tools of strategy analysis - The analysis of competitive advantage	

- Business strategies in different industry contexts
- Implementing and managing corporate strategies
- Value Based Management

Strategic Management/ Case Studies

- Business Planning
- Business Models
- Business Development
- Strategy Implementation

Literature:

Strategic Management

Compulsory:

- WITTMANN, Robert G. and others, 2019. *Strategy design innovation: how to create business success using a systematic toolbox*. Completely revised 5. edition. Augsburg: ZIEL. ISBN 978-3-96557-077-1, 3-96557-077-3
- GRANT, Robert M., 2010. *Contemporary strategy analysis*. Hoboken, NJ: John Wiley & Sons. ISBN 0-470-74710-2, 978-0-470-74710-0
- HABERBERG, Adrian and Alison RIEPLE, 2008. *Strategic management: theory and application*. Oxford [u.a.]: Oxford Univ. Press. ISBN 978-0-19-921646-8
- HUNGENBERG, Harald, 2008. *Strategisches Management in Unternehmen: Ziele, Prozesse, Verfahren*. Wiesbaden: Gabler. ISBN 978-3-8349-1260-2
- MACHARZINA, Klaus and Joachim WOLF, 2008. *Unternehmensführung: das internationale Managementwissen; Konzepte, Methoden, Praxis*. Wiesbaden: Gabler. ISBN 978-3-8349-1119-3

Recommended:

- WELGE, Martin K. and Andreas AL-LAHAM, 2008. *Strategisches Management: Grundlagen, Prozess, Implementierung*. Wiesbaden: Gabler. ISBN 978-3-8349-0313-6, 3-8349-0313-2
- WHEELLEN, Thomas L. and J. David HUNGER, 2008. *Strategic management and business policy: concepts and cases*. 11. edition. Upper Saddle River, NJ: Prentice Hall. ISBN 978-0-13-606827-3, 0-13-606827-8
- WITTMANN, Robert and Matthias REUTER, 2008. *Strategic planning: how to deliver maximum value through effective business strategy*. London [u.a.]: Kogan Page. ISBN 978-0-7494-5233-9

Strategic Management/ Case Studies

Compulsory:

- WITTMANN, Robert G. and others, 2019. *Strategy design innovation: how to create business success using a systematic toolbox*. Completely revised 5. edition. Augsburg: ZIEL. ISBN 978-3-96557-077-1, 3-96557-077-3
- GRANT, Robert M., 2010. *Contemporary strategy analysis*. Hoboken, NJ: John Wiley & Sons. ISBN 0-470-74710-2, 978-0-470-74710-0
- HABERBERG, Adrian and Alison RIEPLE, 2008. *Strategic management: theory and application*. Oxford [u.a.]: Oxford Univ. Press. ISBN 978-0-19-921646-8
- HUNGENBERG, Harald, 2008. *Strategisches Management in Unternehmen: Ziele, Prozesse, Verfahren*. Wiesbaden: Gabler. ISBN 978-3-8349-1260-2
- MACHARZINA, Klaus and Joachim WOLF, 2008. *Unternehmensführung: das internationale Managementwissen ; Konzepte, Methoden, Praxis*. Wiesbaden: Gabler. ISBN 978-3-8349-1119-3
- WELGE, Martin K. and Andreas AL-LAHAM, 2008. *Strategisches Management: Grundlagen, Prozess, Implementierung*. Wiesbaden: Gabler. ISBN 978-3-8349-0313-6, 3-8349-0313-2
- WHEELLEN, Thomas L. and J. David HUNGER, 2008. *Strategic management and business policy: concepts and cases*. 11. edition. Upper Saddle River, NJ: Prentice Hall. ISBN 978-0-13-606827-3, 0-13-606827-8
- WITTMANN, Robert G. and Matthias REUTER, 2008. *Strategic planning: how to deliver maximum value through effective business strategy*. London [u.a.]: Kogan Page. ISBN 978-0-7494-5233-9

Recommended:

- None

Successful Management in a Global World	
Module abbreviation:	FW_SMGW
Curriculum:	Programmes
	Betriebswirtschaft (BW-B) - SPO-Nr.: 2
Responsible for module:	Hahn, Christoph
Lecturers:	Hahn, Christoph
Language of instruction:	English
Credit points / SWS:	3 ECTS / 2 SWS
Workload:	Contact hours: 24 h
	Self-study: 51 h
	Total: 75 h
Subjects of the module:	2.5: Successful Management in a Global World (FW_SMGW)
Lecture types:	SU/Ü - lecture with integrated exercises
Studien- / Prüfungsleistungen:	
2.5-Successful Management in a Global World: LN - seminar paper (FW_SMGW)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>2 Successful Management in a Global World:</i> Firstly, students will be enabled to recognize culture specific features and peculiarities which are important to establish open-minded relations in business. This is a prerequisite for successfully executing business with customers abroad. Secondly, students will learn about the different management methods and styles which enable them to work abroad either in a foreign company or in a subdivision of their parent company. At the end of the lecture, student will also • have cultural specific knowledge (East-West: USA-Europe-Asia) in relation to international management. • be aware of communication, management and leadership methods in different cultures. • know about culture related techniques and behaviors.	
Content:	
<i>2 Successful Management in a Global World:</i> • Economical facts, historical developments as well as current living conditions of special countries (e.g. East-West: in particular USA, Europe, Asia (Japan, Taiwan, China, Korea, and Singapore). According to particular participant's interest special countries can be focused on • Introduction of cultural dimensions and their influence on management functions in business relations is one of the most important discussion points • Main management functions: Organization, Planning, Human Resources, Leadership, and Controlling. These functions will be discussed in the context of cultural dimensions	
Literature:	
<i>2 Successful Management in a Global World (FW_SMGW):</i> Compulsory: • ENGELEN, Andreas and Eva THOLEN, 2014. <i>Interkulturelles Management</i>. Stuttgart: Schäffer-Poeschel.	

ISBN 978-3-7910-3248-1; 3-7910-3248-8

- TROMPENAARS, Fons. *Website* [online]. Available via: <https://www.crossknowledge.com/de/faculty/fons-trompenaars-biografie-de>
- HOFSTEDE, Geert. *Website* [online]. Available via: <https://geerthofstede.com/>

Recommended:

None

Successful Negotiations in a Global World	
Module abbreviation:	SW_SNGW
Curriculum:	Programmes
	Betriebswirtschaft Bachelor (BW-B) - SPO-Nr.: 2
Responsible for module:	Hahn, Christoph
Lecturers:	Hahn, Christoph
Language of instruction:	English
Credit points / SWS:	3 ECTS / 2 SWS
Workload:	Contact hours: 24 h
	Self-study: 51 h
	Total: 75 h
Subjects of the module:	2.6: Successful Negotiations in a Global World (SW_SNGW)
Lecture types:	SU/Ü - lecture with integrated exercises (SW_SNGW)
Studien- / Prüfungsleistungen:	
2.6successful Negotiations in a Global World: LN - seminar paper (SW_SNGW)	
Additional Explanation:	
None	
Recommended prerequisites:	
None	
Objectives:	
<i>2 Successful Negotiations in a Global World:</i> The students are able: - to apply culture specific knowledge (East-West: USA-Europe-Asia) in negotiations. - to be aware management- and leadership styles. - to apply different negotiation strategies and techniques will be explained and trained in role-plays.	
Content:	
<i>2 Successful Negotiations in a Global World:</i> Economical facts, historical developments as well as current living conditions (East-West: in particular USA, Europe, Asia (Japan, Taiwan, China, Korea, Singapore). The cultural dimensions and their influence on negotiations in business relations will be introduced and discussed. Negotiation strategies and techniques will be a major topic and trained in role plays. The participants should be enabled to perceive culture specific features and peculiarities which is important to establish open-minded relations which again is a prerequisite for successfully negotiate with international business partners.	
Literature:	
<i>2 Successful Negotiations in a Global World (SW_SNGW):</i> Compulsory: - HECHT-EL MINSHAWI, Béatrice, 2008. <i>Interkulturelle Kompetenz: Soft Skills für die internationale Zusammenarbeit; [wichtige Infos in Englisch]</i>. Weinheim [u.a.]: Beltz. ISBN 978-3-407-36469-2 - TROMPENAARS, Fons. <i>Website</i> [online]. Available via: https://www.crossknowledge.com/de/faculty/fons-trompenaars-biografie-de - HOFSTEDE, Geert. <i>Website</i> [online]. Available via: https://geerthofstede.com/	

Recommended:

- MAHBUBANI, Kishore, 2009. *Can Asians think?*. Singapore: Marshall Cavendish. ISBN 978-981-4276-01-6

Supply Chain Management	
Module abbreviation:	BW_OM4
Curriculum:	Programmes
	Betriebswirtschaft (BW-B) - SPO-Nr.: 2
Responsible for module:	Sternbeck, Michael
Lecturers:	Sternbeck, Michael
Language of instruction:	English
Credit points / SWS:	6 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 103 h
	Total: 150 h
Subjects of the module:	2.3: Supply Chain Management (BW_OM4)
Lecture types:	SU/Ü - lecture with integrated exercises
Studien- / Prüfungsleistungen:	
2.3-Supply Chain Management: LN - written exam, 90 minutes (BW_OM4)	
Additional Explanation:	
None	
Recommended prerequisites:	
An in-depth study of literature is necessary.	
Objectives:	
<i>2 Supply Chain Management:</i> Students are familiar with the objectives, tasks, elements and challenges of supply chain management as well as relevant technologies and sustainability aspects. They know methods, instruments and measures for designing and optimizing processes along the value chain in order to align them effectively, efficiently, robustly and responsibly.	
Content:	
<i>2 Supply Chain Management:</i> The following content will be developed through seminar-style teaching, supplemented by group work and practical presentations and discussion: • Supply chain design and strategic value chain management • Planning and management of supply chains (strategic, tactical, operational; tools, methods) • Identification of key sustainability aspects along the supply/value chain • Processes and planning in and across value creation stages (inter-organisational planning, procurement, materials management, production, distribution: inventory management) • Supply chain controlling (determination of strategic, tactical and operational parameters of supply chains) • Practical examples and case studies for analysing and designing effective, efficient and sustainable supply chain management.	
Literature:	
<i>2 Supply Chain Management (BW_OM4):</i> Compulsory: • SUCKY, Eric, 2021. <i>Supply Chain Management</i>. Stuttgart: Kohlhammer. ISBN 978-3-17-030979-1 • STADTLER, Hartmut, Christoph KILGER and Herbert MEYR, 2015. <i>Supply Chain Management and</i>	

Advanced Planning. Heidelberg Berlin: Springer.

Recommended:

None

Sustainability and CSR Management	
Module abbreviation:	BW_HR4
Curriculum:	Programmes
	Betriebswirtschaft Bachelor (BW-B) - SPO-Nr.: 2
Responsible for module:	Loza Adai, Cristian Rolando
Lecturers:	Loza Adai, Cristian Rolando
Language of instruction:	English
Credit points / SWS:	6 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 103 h
	Total: 150 h
Subjects of the module:	2.3: Sustainability and CSR Management (BW_HR4)
Lecture types:	2.3-Sustainability and CSR Management: SU/Ü - lecture with integrated exercises (BW_HR4)
Studien- / Prüfungsleistungen:	
2.3-Sustainability and CSR Management: LN - seminar paper (BW_HR4) Additional Explanation: <i>2 Sustainability and CSR Management:</i> The final grade of the seminar consists of a presentation that includes a theoretical part and a case study presentation (35%), a seminar paper (35%), and feedback and evaluation of other participants' presentations (35%).	
Recommended prerequisites:	
None	
Objectives:	
<i>2 Sustainability and CSR Management:</i> The students know about the current discussion on corporate social responsibility and sustainability management with a special focus on the role of human resource management. They have comprehensive knowledge about tools and instruments available for the effective management of people with dedicated attention to the challenges of shaping sustainable and socially responsible organizations.	
Content:	
<i>2 Sustainability and CSR Management:</i> The course will examine business actions at the intersection between sustainability, CSR and human resource management. - Students analyse the role of corporate sustainability and CSR for the human resource management practice. - Students reflect and evaluate the different theoretical approaches that explain the interdependencies between sustainability, CSR, and human resource management. - Students develop and produce a research paper that explains a particular issue or phenomenon of the discussion on sustainability, CSR, and human resource management. - Based on a 360 degrees approach to skills development, students will be actively involved in the development and evaluation of presentation skills. They will provide feedback on their colleague's presentations after every session and will reflect and evaluate the outcome of their presentation using a self-assessment instrument.	

Literature:

2 Sustainability and CSR Management (BW_HR4):

Compulsory:

- HASKI-LEVENTHAL, D., L. ROZA and S. BRAMMER, 2020. *Employee Engagement in Corporate Social Responsibility*. London: SAGE Publications. ISBN 978-1526496508
- RASCHE, A., M. MORSING and J. MOON, 2017. *Corporate Social Responsibility: Strategy, Communication, Governance*. ISBN 978-1107535398
- HAHN, R., 2022. *Sustainability Management: Global Perspectives on Concepts, Instruments, and Stakeholders*. Fellbach: Rüdiger Hahn. ISBN 978-3982321103
- COHEN, E., 2010. *CSR for HR: A Necessary Partnership for Advancing Responsible Business Practices*. Sheeffield: Greenleaf Publishing. ISBN 978-1906093464
- MEISSNER, Ulrike Emma, 2022. *Nachhaltiges Human Resources Management*. Berlin: Peter Lang GmbH, Internationaler Verlag Der Wissenschaften. ISBN 978-3-631-86728-0
- WIRTZ, Kim, 2021. *Nachhaltiges Personalmanagement – ein zukunftsfähiges Konzept oder konzeptlos in die Zukunft?*. Augsburg, München: Rainer Hampp Verlag. ISBN 978-3-95710-385-7

Recommended:

- MOOSMAYER, D.C and others, 2020. *The Sage Handbook of Responsible Management Learning and Education*. ISBN 978-1526460707
- SCHNEIDER, A. and R. SCHMIDPETER, 2015. *Corporate Social Responsibility: Verantwortungsvolle Unternehmensführung in Theorie und Praxis*. ISBN 978-3662434826
- AUST, Ina, 2014. *Sustainability and human resource management: developing sustainable business organizations* [online]. Berlin [u.a.]: Springer PDF e-Book. ISBN 3-642-37523-5, 978-3-642-37524-8. Available via: <https://doi.org/10.1007/978-3-642-37524-8>.
- DOH, Jonathan P., STUMPF, Stephen A., c2005. *Handbook on responsible leadership and governance in global business* [online]. Cheltenham, U.K; Northampton, Mass: E. Elgar PDF e-Book. ISBN 978-1-84542-556-2. Available via: <https://doi.org/10.4337/9781845425562>.



Course Descriptions

Language Centre

International Office

Wintersemester 2025/26

As per: 01.09.2025

This program and course description becomes effective on 01.10.2025. It supplements the program and examination regulations and secures the offerings in courses. Additionally, it contains detailed information about courses, contents, assessments and examination

Sprachenangebot des Sprachenzentrums

Subject	SWS	ECTS
German A1.1	4	5

German A1.1	
Module abbreviation:	SZ_GERM_A1_1
Curriculum:	Programmes
	Sprachenangebot des Sprachenzentrums (SZ-Sprachen)
Responsible for module:	Reicherstorfer, Anja
Lecturers:	Kraus, Dorothea
Language of instruction:	Deutsch
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h
	Self-study: 78 h
	Total: 125 h
Subjects of the module:	German A1.1
Lecture types:	: SU/Ü - seminaristischer Unterricht/Übung
Studien- / Prüfungsleistungen:	
LN - schriftliche Prüfung, 90 Minuten Additional Explanation: Keine	
Recommended prerequisites:	
Keine	
Objectives:	
Students are able to build simple sentences about themselves, their families and their immediate surroundings, understand simple questions and conversations and talk about everyday topics.	
Content:	
Introductions, ask questions and talk about home countries and professions, name and describe things, talk about and understand prices of things. Talk about food and drinks, visiting a restaurant and the cafeteria - understand the menu. Talk about leisure time activities, make appointments and talk about daily routines. Ask questions and talk about the past. Grammar: Present and past tense. Negation using "nicht/kein/keine", definite and indefinite articles, possessive pronouns. Singular and plural verb and noun forms. Temporal prepositions, modal verbs, nominative and accusative case. Verbs with separable prefixes.	
Literature:	
• EVANS, Sandra, Sabine GLAS-PETERS und Sabine SCHLÜTER, . <i>Menschen A1.1: Deutsch als Fremdsprache</i>. Ismaning: Hueber Verlag. ISBN 978-3-19-301901-1 • GLAS-PETERS, Sabine, Angela PUDE und Monika REIMANN, . <i>Arbeitsbuch: Menschen A 1.1, Deutsch als Fremdsprache</i>. Ismaning: Hueber. ISBN 978-3-19-311901-8	