Catalogue of courses offered in English - SoSe 2026

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Dear exchange students,

The Ohm offers various courses conducted in English. Many of these courses are only open to students enrolled in the degree programme in which they are offered. To find the courses open for you, you should check the course catalogue of your degree programme at the Ohm which will usually be published online in February (website or on Faculty intranet page). For example, if you are enrolled in the International Business programme, you can select courses from the International Business Course Catalogue.

This *Course Catalogue for Exchange Students* contains courses conducted in English at the Ohm in summer semester 2026 that are open to all exchange students in any degree programme at the Ohm.

It includes electives (course names are red) that are open to all students at the Ohm. Attending these courses, you can not only develop your academic knowledge but also gain experience in a truly diverse environment.

The catalogue also includes courses from regular degree programme curriculums (course names are blue) that have been opened for exchange students regardless of the degree programme they are enrolled in at the Ohm. You can participate in any course you are interested in as long as you meet the prerequisites.

Besides the courses from your degree programme at the Ohm and courses listed in this *Course Catalogue for Exchange Students,* you can also participate in courses offered by our Language Center.

We hope you find some interesting options for this semester in Nuremberg. Have a look - it's worth your while! If you have any questions about the courses offered within the *Course Catalogue for Exchange Students*, please contact the coordinator, Rebecca Ehrig, at rebecca.ehrig@th-nuernberg.de.

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Applied Cyber Defense: From Intrusion Analysis to Incident Response

Course name	**Applied Cyber Defense: From Intrusion Analysis to Incident Response**
Learning objectives	After completing this course, students will be able to: • Describe the major stages of cyber intrusions using established analytical frameworks such as the Diamond Model, Cyber Kill Chain, and attacker Tactics, Techniques, and Procedures (TTPs). • Classify attacker behaviour and indicators of compromise based on incident data to assess adversary objectives and capabilities. • Interpret and evaluate different threat intelligence sources (e.g. internal logs, threat reports) and justify their application in specific phases of incident response. • Apply intelligence-driven incident response models to structure security incidents in written reports and practical exercises. • Detect early warning signs of malicious activity and distinguish them from benign events. • Develop defensive response strategies to disrupt and mitigate attacker actions across different stages of an intrusion.
Content	The course introduces an intelligence-driven approach to modern incident response, focusing on understanding attacker behaviour and translating insights into effective defensive actions. Students will learn how security teams analyse and respond to real-world cyber incidents and how early detection and proactive defence can prevent escalation. Key topics include: • Cyber Kill Chain • Threat intelligence techniques • Attacker tactics, techniques, and procedures (TTPs) • Analysis of complex intrusions • Intelligence-driven incident response workflows Analytical frameworks such as the Diamond Model and Kill Chain are used to decompose attacks from initial reconnaissance to final objectives.
Other requirements/information	Fundamental knowledge of computer science, particularly network technologies and operating systems, is required. The course takes place as part of the Ohm International Summer School 2026 (20–31 July 2026), including a preparatory online session.
Course format	Seminar-style lecture with project-based components
Credits (ECTS)	3

Lecture hours per week (LVS)	3
Type of assessment	Group project and presentation

Climate and Climate Change

Course name	**Climate and Climate Change**
Learning objectives	The aim of this course is to give you an understanding of the different components of the climate system, the processes that govern their variability, the interactions between them, and which drivers and factors lead to climatic changes. The course will familiarise you with key scientific concepts that are necessary for understanding climate and climate changes. At the end of the course you will be able to explain how drivers like the concentration of greenhouse gases are changing and which impacts this has on the climate, also in the context of historic climatic changes. The course will give you a foundation for evaluating statements about climate change that you might hear in the media or from friends and relatives and discuss them critically based on our solid scientific knowledge of the climate system.
Content	The course will cover: ○ Components of the climate system: what are the key climate features of the atmosphere, the oceans, the land surface, and the biosphere? ○ Drivers, forcings, feedbacks, and mechanisms in the climate system: what drives the internal variability of the climate and which external forcings, like anthropogenic greenhouse gases, influence it? ○ Measuring and monitoring the climate: how do we quantify climate and how do we create comprehensive data sets from measurements? ○ Past climatic changes: what can we learn about the past from important climate proxies like ice cores or tree ring data? ○ Climate modelling: How do climate models work, and how do we make sure that they indeed work? ○ Attribution of past and present climatic changes: how do we find out what caused those past and present climatic changes that we have observed? ○ Future climate projections and their implications: what are the assumptions and different scenarios that are used for future climate projections?

Other requirements/information	The course is suitable for students from all subject areas and does not require any specific prior knowledge beyond basic school science.
Course format	Seminar-style lecture
Credits (ECTS)	2
Lecture hours per week (LVS)	2
Type of assessment	Written examination (90 minutes)

Computer-Aided Music Production for Electronic Music Genres

Course name	**Computer-Aided Music Production for Electronic Music Genres**
Learning objectives	○ Knowledge of genre determining songs ○ Knowledge of different synthesis technologies and their typical sound characteristics ○ Knowledge of sonic impact of digital effects, dynamic processors, equalizers and their different parameters ○ Ability to work with Digital Audio Workstations (DAWs)
Content	○ History of electronic music genres ○ Electronic sound synthesis (subtractive synthesis, additive synthesis, FM-synthesis) ○ Structure and functionality of Digital Audio Workstations (DAWs) ○ Digital effects (chorus, phaser, flanger, distortion, tremolo) ○ Dynamic processors (compressor, limiter) ○ Equalizers ○ Beatmaking ○ Song arrangement
Other requirements/information	This course is being offered by the Faculty of Electrical Engineering, Precision Engineering, Information Technology. No specific prerequisites are necessary.
Course format	Workshop
Credits (ECTS)	2.5
Lecture hours per week (LVS)	2
Type of assessment	Practical course assignment/s

Community Practice

Course name	**Community Practice**
Learning objectives	In this course, students are expected to achieve the following objectives: o become familiar with concepts of social work with and within the community and assign these to socio-historical contexts and subject-specific orientations o acquire knowledge of support structures in everyday life in a socio-spatial context o understand the complex interrelationships between socio-spatial segregation and social exclusion o gain a differentiated perspective of processes of segregation o become familiar with methods of socio-spatial analysis
Content	o Definition, objectives, and historical background o Community work as a working principle o Concepts of integrated urban development, neighbourhood management o Social support structures, social networks o Significance and consequences of social exclusion processes o Analysis of structures in the social sphere; methods of social space analysis
Other requirements/information	This course is from the Social Work (B.A.) curriculum. It is designed for social work students as well as students with an interest in questions of local communities, spatial inclusion and exclusion processes, and spatial research processes. Students should be generally prepared to participate in a small research project in one of the neighbourhoods of Nürnberg (fieldwork in small groups). Students must be prepared/able to read literature in English. Central literature has to be read in English.
Course format	Seminar-style lecture
Credits (ECTS)	5
Lecture hours per week (LVS)	3
Type of assessment	Written examination; presentation; paper

Confident and Effective Communication

Course name	**Confident and Effective Communication**
Learning objectives	After completing this course, students will be able to: ○ Use voice and body language consciously and effectively in presentation and communication settings. ○ Apply rhetorical techniques to communicate messages clearly and with impact. ○ Remain physically present and linguistically precise in stressful or demanding situations. ○ Understand and manage conflict situations using communication strategies and emotional intelligence. ○ Give and receive constructive feedback and practise active listening.
Content	The course combines practical training with theoretical foundations to strengthen students' communication and presentation skills. Practical exercises include individual and group work focusing on: ○ Body and voice training ○ Presentation techniques, free speech, and impulse speech ○ Dealing with nervousness ○ Conscious use of body language ○ Working in front of the camera ○ Giving and receiving feedback ○ Active listening ○ Role play and interview situations ○ Elevator pitch practice The theoretical part covers: ○ Structure of effective presentations ○ Rhetorical tools ○ Principles of emotional intelligence ○ Communication archetypes for conflict management ○ Interview techniques
Other requirements/information	Participants should demonstrate curiosity and willingness to expand their linguistic and rhetorical repertoire. The course takes place as part of the Ohm International Summer School 2026 (20–31 July 2026), including a preparatory online session.
Course format	Seminar-style workshop
Credits (ECTS)	3

Lecture hours per week (LVS)	3
Type of assessment	Presentation

Control Engineering

Course name	**Control Engineering**
Learning objectives	After completing this course, students will be able to: • Explain fundamental concepts of automation and control systems and their practical applications. • Identify and describe key components of control and regulation systems. • Determine parameters of controlled systems and design simple control loops. • Analyse control systems in both the frequency domain and state space. • Design basic control systems and independently solve control engineering problems in mechanical engineering, particularly controller selection and tuning. • Communicate and present technical results effectively in a team.
Content	The course introduces fundamental methods and applications of control engineering. Key topics include: • Representation methods in control engineering • Determination of controlled system parameters • Setup and adjustment of simple control loops • Control in the frequency domain and state space • Design of control systems
Other requirements/information	Recommended prerequisites include Engineering Mathematics I + II, Physics, and Electrical Engineering. The course is from the Mechanical Engineering (B.Eng.) curriculum.
Course format	Lecture and exercises

Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Written examination (90 minutes)

Economics of Global Environmental Challenges

Course name	**Economics of Global Environmental Challenges**
Learning objectives	Students are able to take an economic perspective on global environmental problems like global warming, the loss of biodiversity, marine pollution, and others. They know and can reflect on the current empirical state of such issues. They can apply fundamental economic tools and models to analyse environmental issues. Students can use economic tools to assess important environmental regulatory policies. They can compare different institutional approaches to environmental policy (regulation, market based, taxes, etc.). They are able to critically reflect on methods of estimating the social value of environmental resources. They are aware of the particularities of global environmental challenges and the specific problems of responding to them. Students gain a comprehensive knowledge about correct application of subject-specific terminologies and vocabulary in English.
Content	The course starts with an assessment of the empirical status quo with respect to biodiversity and global warming. An introduction into economic analysis will be provided and the conditions under which markets fail to generate socially benevolent results will be identified. The problems of public goods and common pool resources will be highlighted, and it will be discussed how different economic policy tools (taxes, emission trading, emission ceilings) can or cannot deal with them. Different cases of global environmental challenges will regularly be discussed. Finally, the issue of global climate change and biodiversity loss will be tackled. The structure of integrated assessment models will be discussed and the question of why policy recommendations based on those come up with such varying results will be analysed.
Other requirements/information	The course is being offered by the Faculty of Business Administration. It is designed for bachelor students ideally in business and economics, however, will also be digestible for students of other subjects.
Course format	Seminar-style lecture
Credits (ECTS)	6

Lecture hours per week (LVS)	4
Type of assessment	Written examination (90 minutes)

Electronic Music Production

Course name	**Electronic Music Production**
Learning objectives	After completing this course, students will be able to: • Explain the technological foundations of electronic music production. • Describe major electronic music genres and their stylistic characteristics. • Apply different sound synthesis techniques in digital audio production. • Use Digital Audio Workstations (DAWs) to create, edit, and arrange music. • Produce an original electronic music track independently.
Content	The course introduces the technological and creative foundations of electronic music production. Key topics include: • History of electronic music genres • Electronic sound synthesis (subtractive synthesis, additive synthesis, FM synthesis) • Structure and functionality of Digital Audio Workstations (DAWs) • Digital effects (chorus, phaser, flanger, distortion, tremolo) • Dynamic processors (compressor, limiter) • Equalizers • Beat making • Song arrangement Students develop their own electronic music production project during the course.
Other requirements/information	No specific prerequisites are required. The course takes place as part of the Ohm International Summer School 2026 (20–31 July 2026), including a preparatory online session.

Course format	Workshop with practical exercises
Credits (ECTS)	3
Lecture hours per week (LVS)	3
Type of assessment	Practical work: self-produced electronic music track

Engineering Mathematics II

Course name	**Engineering Mathematics II**
Learning objectives	Sound knowledge and in-depth understanding of the mathematical concepts, laws, approaches, and methods specifically relevant to mechanical engineering.
Content	○ Curves (parameterisation of curves, curve discussion of parameterised curves) ○ Multivariable functions (representation and visualisation; continuity; multidimensional differential calculus with applications such as error calculation and extremum problems) ○ Single real variable integration and its applications ○ Integral calculus in several real variables (plane and spatial domain integrals, integration over normal domains, transformation formula (especially polar, cylindrical, and spherical coordinates)) and their applications (calculation of area, volume and centres of gravity of curvilinearly bounded areas in two and three spatial dimensions)) ○ Curve integrals (integrals of vector fields or scalar fields along curves, calculation of curve lengths, calculation and use of potential functions) ○ Ordinary differential equations (linear and non-linear differential equations of the first order, linear differential equations of the second and higher order, linear systems of differential equations)
Other requirements/information	The course is part of the Mechanical Engineering (B.Eng.) curriculum. Basic university-level knowledge in mathematics is required.
Course format	Seminar-style lecture
Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Written examination (90 minutes)

Engineering Mechanics II

Course name	**Engineering Mechanics II**
Learning objectives	Application of basic mechanical laws to elastostatic systems subjected to multiaxial loads, skills for determining mechanical stresses and deformations under multiaxial loads, acquisition of skills for analysing and dimensioning components under static and oscillating loads with regard to safety and economic efficiency.
Content	○ Multiaxial loading: stress and distortion tensor - generalised Hooke's law - tensor transformation - Mohr's stress circle - strength hypotheses - strength verification under static loading. ○ Deformation in tension/compression, bending, torsion and shear: differential equations of the beam and the bending line - analysis of statically indeterminate systems. ○ Strength verification for vibrating loads: stress determination - strength parameters - fatigue strength verification for uniaxial and multiaxial loads.
Other requirements/information	The course is part of the Mechanical Engineering (B.Eng.) curriculum. Basic knowledge in technical mechanics and material sciences is required.
Course format	Seminar-style lecture
Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Written examination (90 minutes)

Ethical Challenges in Global Business and Technology

Course name	**Ethical Challenges in Global Business and Technology**
Learning objectives	By the end of this course, students will be able to: ○ Identify and critically evaluate ethical principles, theories, and frameworks relevant to high-technology industries ○ Analyse ethical challenges in emerging technologies, such as artificial intelligence, data privacy, and biotechnology, and assess their implications for business decision-making ○ Understand the influence of cultural norms and values on ethical reasoning and decision-making in global business settings

	○ Develop and defend ethical positions through structured arguments and presentations ○ Develop critical thinking and problem-solving skills ○ Communicate complex ethical analyses effectively in written academic English
Content	This course explores the intersection of ethics, intercultural communication, business, and technology in a global context. The course equips participants with the analytical skills needed to navigate ethical challenges in high-technology business environments. Through case studies, discussions, and academic writing tasks, students will examine ethical principles, evaluate decision-making processes, and apply ethical frameworks to real-world scenarios. Content Overview: 1. Foundations of Ethics in Business and Technology ○ Introduction to ethical theories and principles: utilitarianism, deontology, virtue ethics, and others ○ Concepts of morality, values, and cultural relativism ○ Ethical decision-making in diverse cultural and business contexts 2. Intercultural Communication and Ethical Challenges ○ Exploring the role of cultural norms and upbringing in shaping ethical perspectives. ○ Managing ethical dilemmas in global and cross-cultural teams. ○ Case studies of intercultural business ethics in practice. 3. Emerging Technologies and Ethical Implications ○ Ethical considerations in artificial intelligence, machine learning, and data privacy ○ The impact of biotechnology, automation, and digital transformation on society and businesses ○ Environmental ethics and sustainability in technology-driven industries 4. Practical Applications and Skill Development ○ Strategies for ethical leadership and corporate responsibility

	○ Debates on contemporary ethical dilemmas ○ Case study analyses to foster critical thinking and problem-solving skills ○ Academic writing workshops focusing on clarity, argumentation, and citation practices
Other requirements/information	The course is offered within the Industrial Engineering and Management (M.Eng.) curriculum. Only master's students can participate in this course. Completion of assigned readings and assignments for each session and active participation in class discussions are required.
Course format	Seminar-style lecture
Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Written examination, oral presentation, final paper

Impact Entrepreneurship – Developing Social and Ecological Innovations

Course name	**Impact Entrepreneurship – Developing Social and Ecological Innovations**
Learning objectives	The aim is to connect students from all Faculties and to enable them to jointly develop interdisciplinary solutions for social and/or ecological problems using innovative methods. Examples of these are acute and global challenges such as biodiversity loss, climate change, environmentally friendly production/additive manufacturing, nutrition, and smart cities. By taking the course, sustainable, impact-oriented action can be experienced and solutions to global problems are developed. Through this course, you will not only learn a range of methods to address global challenges, but also develop a deeper understanding of these challenges, which is especially enhanced through interdisciplinary collaboration.
Content	Students will acquire advanced knowledge in the field of impact entrepreneurship (i.e., solving social and/or ecological problems through innovative methods). Furthermore, they will learn how to develop their own sustainable solutions for social and/or ecological challenges. In addition to obtaining a foundation of scientifically based content on impact entrepreneurship, participants will learn the necessary tools and their application in practice-oriented workshops

	and will also be personally advised in a team by the interdisciplinary lecturers. Schedule: 1. Kick-off event (topic/problem presentation) 2. Interactive workshops (development of ideas/solutions, business models) 3. Independent development of the project 4. Personal coaching (individual team advice) 5. Final presentations 6. Submission of the concept
Other requirements/information	The course is open to all students. No prerequisites. The course is offered in cooperation with the University of Bayreuth and will take place in Bayreuth.
Course format	Seminar-style lecture
Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Oral presentation; paper

International Social Work

Course name	**International Social Work**
Learning objectives	After completing the module, students can o justify the usefulness and necessity of an international comparative perspective in social work o understand the demands on and changes in social work in Germany as a result of global processes o identify special features and intersections of social work in selected European and non-European countries o identify problems of selected minorities in Europe and outside Europe with a view to historical and political constellation

	conditions and usefully apply the information for German social work
Content	○ Globalisation processes and social impacts ○ Social work in countries within and outside Europe (exemplary) ○ Experiencing and reflecting on foreignness ○ Politics against minorities in selected countries
Other requirements/information	The course is part of the Social Work (B.A.) curriculum. It is designed for students of social work. Students from other fields of study with a strong interest in questions of international development and cooperation and a basic background in social sciences are welcome.
Course format	Seminar-style lecture, excursion
Credits (ECTS)	6
Lecture hours per week (LVS)	4
Type of assessment	Paper

Introduction to Bionic Computation in Business

Course name	**Introduction to Bionic Computation in Business**
Learning objectives	Course Goals: • Introduction to algorithms which mimic biological systems in nature • Practical application of bionic computation algorithms using analytical information systems to optimise business processes in enterprises Key Outcomes: • Analysis and modelling of business case studies • Application of analytical information systems to optimize business processes • Ability to present project results in oral and written form in English
Content	Theoretical foundations: • Evolutionary Computation • Neural Networks • Swarm Intelligence (e.g. Ant Colony, Particle Swarm) • Sentiment Analysis Practical exercises:

	• Modelling and analysis of business cases to identify problems • Application of bionic computation algorithms to solve the problems identified in the business cases
Other requirements/information	This course is offered by the Faculty of Computer Science as part of the bachelor's degree programmes in Computer Science. The course is designed for bachelor's students who have experience in computer programming and an understanding of statistics.
Course format	Seminar-style lecture
Credits (ECTS)	5
Lecture hours (LVS)	4
Type of assessment	Project presentation (30 minutes) and project documentation (10 pages)

Introduction to Excel and VBA in Science and Engineering

Course name	**Introduction to Excel and VBA in Science and Engineering**
Learning objectives	In this course, students will be enabled to phrase mathematic formulations from scientific or technical problems, define an approach for a solution as an algorithm, and solve the algorithm with help of Excel and the VBA programming language. After successful completion of the course, students are expected to achieve the following objectives: ○ use Excel spreadsheets efficiently to solve scientific and engineering problems ○ use VBA to extend the features of Excel according the requirements of typical scientific and engineering tasks ○ use VBA to improve efficiency and re-usability of spreadsheets for solutions in their own fields of study ○ analyse quantitative measurement data with appropriate numerical methods, find appropriate mathematic models, and evaluate the models ○ solve non-linear equations numerically with help of Excel and/or VBA
Content	○ Spreadsheet calculation with Excel ○ Relative and absolute cell references ○ Scientific diagrams ○ General mathematic and statistic Excel functions

	○ User-defined functions in VBA ○ Linear regression ○ Non-linear regression ○ Modifying Excel spreadsheets with VBA ○ Solving non-linear equations with numerical methods in Excel and/or VBA
Other requirements/information	The course is designed for students in natural science and engineering fields.
Course format	Seminar-style lecture
Credits (ECTS)	2
Lecture hours per week (LVS)	2
Type of assessment	Written examination (60 minutes)

Introduction to R: Statistical Data Analysis with R for Beginners

Course name	**Introduction to R: Statistical Data Analysis with R for Beginners**
Learning objectives	In this course, students are expected to carry out univariate, bivariate, and multivariate statistical analysis using the R program and R-Studio. The cycle is focused on the implementation of the regression and variance analysis in line with graphical representations for cross-sectional studies.
Content	○ Working with R: functions ("q", "sum", "c" etc.), objects and object types (definition and connection of objects, vectors, factors, data frames, saving and loading of objects) as well as arguments (e.g. "digits" etc.) ○ Working with data sets: data entry, import of data sets, joining data sets, selecting, labelling, recoding, calculating new variables ("dplyr" package) ○ Univariate statistics: frequency tables, indicators (mean values, variance etc.) ○ Bivariate and multivariate statistics: contingency measures, correlation coefficients, bivariate and multiple regression, one-way analysis of variance, tests and confidence intervals for cross-sectional studies

	○ Graphics: charts ("ggplot2" package), plot functions, editing of graphics ○ Brief introduction to "Markdowns" The content is conveyed in an application-oriented manner using exercises. Students will create their own script in R based on the processing of the tasks. At the end of the course they will be able to carry out regression and variance analysis with R independently.
Other requirements/information	The course is designed for students of all disciplines who are interested in statistical evaluations. Basic statistical knowledge is necessary. The course is conducted online.
Course format	Seminar-style lecture (online)
Credits (ECTS)	2
Lecture hours per week (LVS)	2
Type of assessment	Written assignments

Introduction to SAP ERP

Course name	**Introduction to SAP ERP**
Learning objectives	In this course, students learn the basic technical-organisational concepts of an integrated enterprise resource planning system (ERP system) using the example of SAP ERP based on SAP HANA. This will enable them to understand and evaluate the possible uses and development of such systems in a business context. After completing this course, students will be able to name and explain the basic principles and significance of the in-memory database SAP HANA for companies.
Content	• SAP history • Introduction to SAP ERP • SOA technology and SAP NetWeaver • SAP business suite • SAP user interface • SAP NetWeaver application server with ABAP and Java • SAP components • SAP system administration • SAP workflow and document management • ABAP/4 programming environment

	• SAP HANA as an in-memory database platform • SAP S/4 HANA based on the SAP HANA platform as a next-generation real-time ERP business suite (digital transformation) Based on the learning objectives, students will: • Learn the basic technology and architecture of the SAP ERP system. • Learn the functionality of SAP HANA. • Understand the technical-organisational relationships between the basic system and the subject-specific application modules. • Plan and implement practical tasks within the scope of system administration. • Be able to demonstrate current development of SAP ERP systems
Other requirements/information	The course is designed for students of all disciplines interested in the use of enterprise software SAP ERP. No prior knowledge is necessary.
Course format	Seminar-style lecture
Credits (ECTS)	2
Lecture hours (LVS)	2
Type of assessment	Oral examination

Health Information System Engineering

Course name	**Health Information System Engineering**
Learning objectives	○ Students acquire and develop their knowledge and methods for taking on tasks in application development and information management (development, enhancement, and adaptation based on requirements of sociotechnical information systems). ○ Students experience the software development cycle from the idea to implementation and understand key factors for successful implementation in the healthcare setting. ○ Students design a solution in the context of healthcare according to patient data protection (privacy by design) and information security (security by design).
Content	○ The course starts with an introduction to information technology application in healthcare environment and deepens knowledge about the development phases of information systems including the specification of requirements.

	○ Students then design and program their own application in teams. ○ Students integrate data exchange with a provided database into their application. ○ Students integrate data exchange via HL7 FHIR interface of their application to a provided platform.
Other requirements/information	The course is offered within the bachelor's programme in Health Information Management and is also open as an elective to all students. Knowledge of programming and database management systems is recommended.
Course format	Seminar-style lecture
Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Paper

Heat Transfer

Course name	**Heat Transfer**
Learning objectives	After completing this course, students will be able to: ○ Explain the fundamental laws and mechanisms of heat transfer. ○ Apply empirical and analytical heat transfer equations within their validity limits. ○ Select appropriate calculation methods based on given boundary conditions. ○ Perform practical thermal calculations for technical systems and apparatus. ○ Design and evaluate heat exchangers using engineering calculation methods. ○ Research, calculate, and interpret material data and dimensionless numbers. ○ Critically analyse calculation results and adapt them if necessary. ○ Define system parameters to achieve economical and reliable thermal designs.
Content	The course introduces the theoretical and practical foundations of heat transfer in engineering applications. Key topics include: ○ Laws and mechanisms of heat transfer

	○ Heat conduction (single- and multi-layer systems; flat, cylindrical, and spherical geometries) ○ Convective heat transfer (empirical correlations, dimensionless numbers, influencing variables such as geometry and flow conditions) ○ Thermal radiation (physical principles, emission factors, geometrical aspects) ○ Heat transfer through solid walls, fluid boundary layers, and gases ○ Application of heat transfer laws using technical examples ○ Types and design of heat exchangers; thermal calculations ○ Use of material property tables and thermophysical data ○ Process optimisation for heat utilisation
Other requirements/information	Recommended prerequisites include Engineering Mathematics I–II, Thermodynamics, and Fluid Mechanics. The course is a from the Mechanical Engineering (B.Eng.) curriculum.
Course format	Lecture and exercises
Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Written examination (90 minutes)

Hydrogen and Sustainability

Course name	**Hydrogen & Sustainability**
Learning objectives	After successfully completing the module, students should be able to: ○ Understand and explain the role of hydrogen in an energy system ○ Understand and explain the role of hydrogen in the sustainable production of steel ○ Understand and explain the role of hydrogen in the sustainable chemical industry ○ Understand and explain the role of hydrogen in sustainable mobility ○ Assess the sustainability of hydrogen production and utilisation pathways ○ Economically evaluate the use of hydrogen in industry and mobility

Content	○ Hydrogen in a sustainable energy system • Hydrogen production from renewable energy • Hydrogen utilisation in sustainable energy • Sustainability in energy systems & life cycle assessment • Techno-economic assessment ○ Hydrogen in sustainable industry • Hydrogen in the steel industry • Steel production using renewable hydrogen • Sustainability & life cycle assessment • Techno-economic assessment ○ Hydrogen in the chemical industry • Methanol synthesis from CO2 and renewable hydrogen • Ammonia synthesis • Storage and transportation infrastructure • Sustainability & life cycle assessment • Techno-economic assessment ○ Hydrogen for industrial heating • Heat production using hydrogen • Sustainability & life cycle assessment • Techno-economic assessment ○ Hydrogen in sustainable transportation • Fuel cells • Hydrogen combustion engines • Methanation & E-Fuels • Sustainability & life cycle assessment • Techno-economic assessment
Other requirements/information	Basic knowledge in the areas: ○ Energy technology ○ Thermodynamics ○ Chemistry and materials science

Course format	Seminar-style lecture
Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Presentation, written examination (90 minutes)

Manufacturing Technology

Course name	**Manufacturing Technology**
Learning objectives	After completing this course, students will be able to: o Describe the dominant chipless and machining manufacturing processes. o Explain production-oriented engineering design of workpieces and process chains. o Select economical manufacturing methods based on technical and economic criteria. o Understand fundamentals of chip formation and machining mechanics. o Analyse cutting forces, tool wear, and tool life. o Choose appropriate cutting materials and coating processes. o Optimise machining processes and operating conditions from both technical and economic perspectives.
Content	The course provides an overview of manufacturing processes with and without chip removal. Key topics include: Chipless production: o Casting technology o Sintering technology o Rapid prototyping processes o Forming technology o Fundamentals of plastic moulding o Selected forming and cutting technologies o Production of semi-finished products, standard parts, and automotive components Machining production: o Basics of chip formation o Cutting edge geometry o Measurement and calculation of cutting forces o Tool wear and tool life o Cutting materials and coating processes

	○ Selected machining technologies
Other requirements/information	Recommended prerequisites include Materials Science I, Physics, and Machine Elements I. The course is from the Mechanical Engineering (B.Eng.) curriculum.
Course format	Lecture
Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Written examination (90 minutes)

Materials Science II

Course name	**Materials Science II**
Learning objectives	○ Explain the relationships between polymer structure and material properties. ○ Describe the most important polymers, their processing methods, and key technical application areas. ○ Select suitable polymers and manufacturing processes based on application requirements. ○ Understand the properties and applications of composite materials. ○ Apply methods for describing the mechanical behaviour of materials and composites.
Content	The course focuses on polymer materials and composite systems, covering both structure–property relationships and processing technologies. Key topics include: ○ Structure of plastics: macromolecules, bonding forces, chain structure, effect of additives, thermoplastics, elastomers, duromers, and plastic composites ○ Properties of polymers: thermal, physical, chemical, mechanical, and electrical properties and their testing methods ○ Mechanical behaviour of materials and composites and its description ○ Production and processing of polymers: polycondensation, polyaddition, polymerisation, injection moulding, extrusion, thermoforming, laminating of composite materials, and production-oriented design of plastic components

Other requirements/information	Recommended prerequisite: Materials Science I. The course is a compulsory module within the Mechanical Engineering (B.Eng.) curriculum.
Course format	Lecture and exercises
Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Written examination (90 minutes)

Mathematics II

Course name	**Mathematics II**
Learning objectives	○ Demonstrate knowledge and understanding of multivariable calculus, ordinary differential equations, and Fourier series ○ Explain, choose as well as apply fundamental mathematical techniques to solve problems related to economics and natural science ○ Recognise (or relate) the power of mathematical modelling, analysis, and numerics to application problems ○ Make appropriate assumptions to simplify and thus model economical and engineering problems ○ Analyse models using mathematical techniques including basic numerical techniques ○ Interpret mathematical results and their implications in their economical and engineering context ○ Get comprehensive knowledge about correct application of subject-specific terminologies and vocabulary in English
Content	○ Multivariable functions ○ Partial derivatives (for functions with more than one independent variable) ○ Multiple integrals (double and triple integrals) ○ Differential equations (including method using the Laplace transform) ○ Fourier series
Other requirements/information	The course is part of the International Business and Technology bachelor's programme and designed for students who want to study in the following fields: mechanical engineering, electrical engineering,

	and natural sciences. Understanding the basics of secondary school mathematics is necessary.
Course format	Lecture
Credits (ECTS)	7
Lecture hours per week (LVS)	6 (+2)
Type of assessment	Written examination (90 minutes)

Numerical Methods

Course name	**Numerical Methods**
Learning objectives	• Apply numerical methods to solve engineering problems. • Perform numerical integration and solve ordinary differential equations and systems. • Solve linear and non-linear systems of equations numerically. • Use MATLAB for basic programming, computation, and graphical visualisation. • Implement simple numerical algorithms independently. • Understand the programme-supported application of numerical methods in engineering practice.
Content	The course introduces fundamental numerical techniques and their application in engineering. Key topics include: • Numerical solution of ordinary differential equations and systems • Numerical integration methods • Solving linear and non-linear systems of equations • Introduction to the MATLAB software environment • Basics of programming and graphics in MATLAB • User-oriented programming tasks
Other requirements/information	Recommended prerequisites include Engineering Mathematics I–II and Computer Science. The course is from the Mechanical Engineering (B.Eng.) curriculum.
Course format	Lecture and exercises
Credits (ECTS)	5

Lecture hours per week (LVS)	4
Type of assessment	Written examination (90 minutes)

Power-to-X: Technologies and Processes

Course name	**Power-to-X: Technologies and Processes**
Learning objectives	• Conceptualise Power-to-X energy systems. • Apply key design principles of Power-to-X technologies. • Understand real-world application scenarios of hydrogen as an energy carrier and chemical feedstock. • Analyse technological and economic performance of Power-to-X systems. • Perform energy and mass balance calculations. • Apply optimisation approaches for Power-to-X systems, including renewable and thermal integration. • Evaluate economic aspects such as CAPEX, OPEX, and levelised costs.
Content	The course introduces Power-to-X technologies within the context of future energy systems, combining theoretical foundations with practical applications. Key topics include: • Role of Power-to-X and hydrogen in future energy systems • Hydrogen as energy carrier and chemical precursor • Sector coupling and integration with renewable electricity (wind, photovoltaics) • Hydrogen infrastructure: production, storage, distribution, and utilisation • Power-to-X technologies and system concepts • Applications in chemical industry, energy sector, transportation, and heavy industry • Real-world Power-to-X systems: production, storage, distribution, and utilisation • Design and layout of selected Power-to-X systems • Energy and mass balances • Economic analysis (CAPEX, OPEX, levelised costs) • Sensitivity analysis (scale, efficiency, cost factors)

	• Optimisation approaches • Renewable and thermal integration • Regulatory and policy aspects Laboratory sessions and an excursion cover: • Power-to-chemicals • Power-to-power • Power-to-heat • Power-to-gas
Other requirements/information	Recommended prerequisites include Thermodynamics, Hydrogen Technology, and Energy Storage Systems. The course consists of seminar-style lectures with exercises, laboratory sessions, and an excursion. This course is designed exclusively for master's students.
Course format	Seminar-style lecture, exercises, laboratory practical, excursion
Credits (ECTS)	5
Lecture hours per week (LVS)	4 lecture/exercise + 1 laboratory/excursion
Type of assessment	According to current study regulations

Research Software Engineering

Course name	**Research Software Engineering**
Learning objectives	○ Understand the role and impact of software in modern research. ○ Design and implement small research software components in a structured and reproducible manner. ○ Apply Git for version control and collaborative development. ○ Write simple tests and use continuous integration for quality assurance. ○ Build reproducible workflows using appropriate tools for environments and dependency management. ○ Document and communicate research methods and results transparently. ○ Create scientific visualisations for analysis and communication. ○ Develop and present a small reproducible research software project independently.

Content	The course introduces best practices for developing high-quality, reproducible research software. Key topics include: • Role of software in the research process • Principles of software quality: clarity, structure, readability, maintainability, testability • Characteristics of high-quality research software • Version control with Git (commits, branching, pull requests, reviews) • Design and organisation of research software projects • Testing research software and introduction to continuous integration • Reproducible workflows (environment management, dependencies, seeds, logging, automation) • Documentation practices (README, API documentation, changelogs) • Transparent reporting of research methods and results • Scientific visualisation for communicating findings • Ethical, sustainable, and open-science principles • Development of a small reproducible software project
Other requirements/information	No formal prerequisites. Basic programming experience (preferably in Python) is recommended.
Course format	Seminar-style lecture
Credits (ECTS)	2
Lecture hours per week (LVS)	2
Type of assessment	Oral examination (15 minutes)

Scientific Presentation

Course name	**Scientific Presentation**
Learning objectives	In this course, students are expected to achieve the following objectives: o Learn how to design and present scientific posters

	○ Learn how to create and give oral presentations on scientific topics in English
Content	Students will learn about the structure of scientific presentations. The lecture series includes lots of exercises on listening to scientific presentations and analysing these presentations. Furthermore, students will discuss advantages and disadvantages of various presentation methods, their strength and weaknesses. The course also covers a wide range of exercises on creating and presenting scientific posters. A Poster, as a final work, can be created as part of the exercises during the lecture series. Poster presentations will be graded at the end of the course.
Other requirements/information	The course is part of the Applied Chemistry master's programme and open for all master's students of natural sciences. The lectures are presented only in English. Therefore, English level B2 proficiency is necessary.
Course format	Seminar-style lecture, practical exercises
Credits (ECTS)	2
Lecture hours per week (LVS)	2
Type of assessment	Oral examination, poster

Speaking with Body, Voice, and Language

Course name	**Speaking with Body, Voice, and Language – Communication and Impact on Stage, in Everyday Life, and Professional Contexts**
Learning objectives	After completing this course, students will be able to: ○ Use body language, voice, and spatial behaviour consciously and effectively. ○ Strengthen personal presence and self-awareness in performative and professional contexts. ○ Recognise and apply nonverbal communication strategies in everyday and work-related situations. ○ Manage uncertainty and act confidently in challenging presentation or role-playing scenarios. ○ Develop goal-oriented communication strategies for professional and social environments. ○ Reflect on and transfer artistic and performative experiences to their own fields of study or work.

Content	The seminar combines practical theatre-based exercises with reflective analysis of communication processes. Key topics include: • Body language, physical presence, and spatial behaviour • Nonverbal communication and social dynamics • Role analysis and performative interaction • Theatre-based methods and role-playing exercises • Strategies for confident behaviour in presentation and performance situations • Artistic self-understanding and embodiment • Transfer of performative insights to professional and everyday contexts Participants engage in practical theatre exercises to explore different forms of human presence and communication. These experiences are analysed and connected to theoretical perspectives from aesthetic education and social pedagogy.
Other requirements/information	No prior experience is required. Participants with and without theatre background are welcome. The seminar is taught in German and English; knowledge of one of these languages is sufficient.
Course format	Seminar-style lecture and practical workshop
Credits (ECTS)	2
Lecture hours per week (LVS)	2
Type of assessment	Active participation; practical examination; written assignments

Stochastic Processes

Course name	**Stochastic Processes**
Learning objectives	After completing this course, students will be able to: o Explain fundamental concepts of stochastic systems and probabilistic modelling. o Apply Markov chains, time series analysis, and discrete-event simulation. o Use data mining and machine learning methods for clustering and classification tasks.

	○ Apply decision-theoretic models under certainty, risk, and uncertainty. ○ Analyse healthcare-related datasets using applied biostatistical methods. ○ Design appropriate study and analysis strategies for clinical and healthcare data. ○ Implement computational methods using standard software tools. ○ Interpret, evaluate, and communicate analytical results critically.
Content	The course integrates stochastic modelling with applications in data mining, decision intelligence, and applied biostatistics, with a particular focus on healthcare analytics. Key topics include: Stochastic systems: • Fundamentals of stochastic processes • Markov chains • Discrete-event simulation • Time series analysis • Healthcare-related application scenarios Data mining and machine learning: • Introduction to data mining • Clustering and classification methods • Practical implementation using standard software • Interpretation of model results Decision intelligence: • Fundamentals of decision theory • Decision-making under certainty, risk, and uncertainty • Overview of additional decision scenarios • Introduction to game theory Applied biostatistics: • Planning, monitoring, and analysis of clinical studies • Experimental design • Derivation of cause-and-effect relationships from data • Special medical data types and their analysis • Fundamentals of epidemiology

	• Group-based analysis of real clinical studies
Other requirements/information	Recommended prerequisites include basic programming skills and fundamental knowledge of mathematics and statistics. The course is part of the Master's programme Digital Health Analytics. Only master's students can participate in this course.
Course format	Seminar-style lecture
Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Written examination (90 minutes)

Twin Transformation in Business

Course name	**Twin Transformation in Business: Digitalization and Sustainable Management in the Circular Economy**
Learning objectives	After completing this course, students will be able to: ○ Analyse sustainability-oriented transformation processes in companies with a focus on digitalisation and circular economy. ○ Evaluate current business approaches to sustainable management and corporate responsibility. ○ Develop innovative solution concepts for circular economy challenges in production and product innovation. ○ Apply theoretical concepts of sustainable management to real-world business cases. ○ Analyse data readiness and data management strategies for sustainability across value chains. ○ Reflect on their own strategic, cooperative, and professional competencies in group-based projects. ○ Present complex sustainability concepts clearly and in a target-group-oriented manner.
Content	The course focuses on the "twin transformation" of companies: digital transformation combined with sustainable management strategies aimed at achieving circular economy goals. Key topics include: • Sustainable management in an era of transparency and accountability • Innovation management and challenges of the circular economy

	• Data readiness and sustainability-related data management from company to value-chain level • Digital solutions supporting circular economy models • Technological tools for due diligence processes (e.g. blockchain, digital platforms) • Analysis of corporate sustainability strategies and development of improvement options The course combines lectures with group exercises, case studies, and company visits to connect theory with practical application.
Other requirements/information	No formal prerequisites. The course is offered as an interdisciplinary elective. The course takes place as part of the Ohm International Summer School 2026 (20–31 July 2026), including a preparatory online session.
Course format	Seminar-style lecture with project-based elements and company visits
Credits (ECTS)	3
Lecture hours per week (LVS)	3
Type of assessment	Final presentation of a case study (joint evaluation and classification of developed solution options)

Urban Gardening

Course name	**Urban Gardening**
Learning objectives	After completing this course, students will be able to: ○ Understand and implement concepts of social spatial design, sustainable gardening, and irrigation. ○ Develop interdisciplinary projects across faculty boundaries. ○ Apply forward-thinking, networked, and critical thinking skills. ○ Cooperate effectively in group-based project work. ○ Act responsibly in public spaces and contribute to community welfare. ○ Apply practical gardening skills in real-world contexts.
Content	The course introduces the principles and practices of urban gardening, combining theoretical foundations with hands-on implementation. Key topics include:

	• Background and concepts of urban gardening • Models of participation and community engagement • Responsibility in public spaces and its impact on quality of life • Sustainable gardening and irrigation methods • Interdisciplinary project development Students apply their knowledge in practice through project-based work in the K campus courtyard environment, integrating design, sustainability, and social responsibility. Teaching formats include: • Seminar-based instruction • Hands-on workshops • Group work and project development • Practical outdoor design activities
Other requirements/information	No specific prerequisites.
Course format	Block event (students choose one of three block options)
Credits (ECTS)	2
Lecture hours per week (LVS)	2
Type of assessment	Paper and group work (graded)

Web Design Basics

Course name	**Web Design Basics**
Learning objectives	After completing this course, students will be able to: ○ Understand the basic structure of web pages and implement them using HTML. ○ Design simple responsive layouts and styles with CSS. ○ Apply fundamental usability and web design principles. ○ Plan, develop, and publish a small functional and accessible website.
Content	The course introduces the technical and design foundations of modern web development, combining theory with practical implementation.

	Key topics include: • Introduction to web design • History, structure, and operating principles of the web (client, server, browser) • Structure and planning of simple websites HTML basics: • Basic tags • Semantic document structure • Links, images, lists, forms CSS basics: • Selectors • Box model • Colours and fonts • Simple layouts (Flexbox, Grid) • Introduction to responsive design Usability and design: • Principles of appealing web design • Accessibility and user orientation Students develop a small responsive website as part of a project-based assignment.
Other requirements/information	No formal prerequisites. The course is offered as a general interdisciplinary elective.
Course format	Seminar-style lecture, project work, and exercises
Credits (ECTS)	2
Lecture hours per week (LVS)	2
Type of assessment	Project work: planning and implementation of a responsive website using HTML and CSS

Web Design Microinteractions

Course name	**Web Design Microinteractions**
Learning objectives	After completing this course, students will be able to: ○ Explain fundamental principles of user interfaces (UI), user experience (UX), and microinteractions. ○ Use HTML, CSS, and selected JavaScript frameworks to design interactive digital user interfaces. ○ Plan, design, and implement webpage microinteractions. ○ Apply CSS animations, transitions, pseudo-classes, and keyframe animations effectively. ○ Enhance user experience without compromising performance or accessibility.
Content	The course builds upon basic web design knowledge and focuses on interactive elements and microinteractions in modern web interfaces. Key topics include: Introduction to webpage microinteractions: • Concepts, benefits, and practical examples • Analysis of existing websites HTML for interactions: • Structure of buttons, forms, and menus • Semantic HTML and accessibility basics CSS for interactions: • Layouts using Flexbox and Grid • Styling, pseudo-classes, and simple animations Animations and feedback: • Keyframe animations • Timing, delays, and transitions • Microinteractions for buttons, forms, and menus Microinteractions in detail: • Types: trigger, feedback, loop, mode • Storyboarding and design patterns Performance and accessibility: • Optimisation of animations

	• Accessible microinteractions and testing across devices Students develop an interactive responsive website with multiple microinteractions as part of a project-based assignment.
Other requirements/information	Knowledge of HTML and CSS is required. Self-assessment quizzes (e.g. HTML and CSS tests) are recommended to evaluate prior knowledge, for example: HTML quiz: https://www.w3schools.com/quiztest/quiztest.asp?qtest=HTML (Getting at least 27 out of 40 questions right is advisable for participation.) CSS quiz: https://www.w3schools.com/quiztest/quiztest.asp?qtest=CSS (Getting at least 17 out of 25 questions right is advisable for participation.)
Course format	Seminar-style lecture, project work, and exercises
Credits (ECTS)	2
Lecture hours per week (LVS)	2
Type of assessment	Project work: planning and implementation of a responsive website using HTML, CSS, and JavaScript frameworks including multiple microinteractions

"What's the fuss about Gender?"- Introduction to Gender Studies

Course name	**"What's the fuss about Gender?"- Introduction to Gender Studies**
Learning objectives	Despite the fuss about it in (social) media and politics, many of us do not necessarily know if we feel concern about gender, and consequently, we know little about how to frame and approach new and ongoing debates. In this course, we will take first steps toward understanding and exploring how gender shapes our world.
Content	This course serves as an introduction to gender itself —as a social/cultural construct, as a mode of expression (performativity), and as a critical lens through which we can better understand the world around us. During the semester, we will get acquainted with the field of gender studies as practiced across a range of academic disciplines. We will consider the ways in which gender is produced and performed at the intersection of culture, politics, and the body, always in tandem with other categories of difference such as race, sexuality, and economic class. We will ask how institutions like the government, the workplace, and the family interact with gender. We

	will contemplate the ways in which ideology (systems of ideas and knowledge) and representation (portrayals in media, political discourse, and everyday life) shape our understanding of gender and how it is produced and reproduced by taking up current (public) debates and conversations (e.g., #metoo movement, abortion rights, LGBTQ+). Rather than assuming that binaries like masculine/feminine, queer/straight, or transgender/cisgender are stable or static concepts, we will work toward understanding how their meanings change over time and space, and how they relate to the broader context of gender in the world today.
Other requirements/information	There are no prerequisites to taking part in this course. Students from all academic disciplines are explicitly encouraged to attend this course. We will discuss some politically and perhaps emotionally charged topics during the semester. Thus, we are called upon to approach these discussions with maturity, intellectual curiosity, emotional care, and an open mind. Basic expectation: read. Give yourself time to think about and process the readings. Take notes. Attend lecture and discussion sections. Participate. Think and process more. Assignments: Regular attendance in class, reading the assigned texts, sharing your responses to course material and ideas in class, oral presentation of chosen topic.
Course format	Seminar-style lecture
Credits (ECTS)	3
Lecture hours (LVS)	2
Type of assessment	Reading the texts, participation, presentation