Catalogue of courses offered in English - WiSe 2025/26

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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 September (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 winter semester 2025/26 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.

Last updated on: 30 September 2025

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Area Studies – Doing Business in China (3 ECTS)

Course name	**Area Studies - Doing Business in China (3 ECTS)**
Learning objectives	In the past few decades China has developed into one of the most powerful national economies in the world and has thus expanded its social and political influence not only in Asia, but also worldwide. For Europe, China is one of the most important cooperation partners in many areas, but at the same time it is also a serious competitor and rival in other areas. Knowing and understanding China is therefore becoming a crucial competence for all responsible actors in our society. This course will equip students with foundational knowledge about the history and culture as well as the recent political and economic development in China. One of the focus areas will be the changing role of China in the world economy during the globalization/deglobalization process. Another focus area is to gain insight into different business and inter-cultural aspects when doing business in and with China. Group discussions will help the students apply their new knowledge in order to efficiently develop their competence. After successful participation in this course students will: o know the historical background and the current political and economic system of the country o understand the international positioning of the country in a globalized business environment o be able to assess country-specific opportunities and risks for international and local companies when doing business in and with the country o be able to demonstrate how regional culture impacts business and management practice o be able to work or conduct business with local people both in the country/region and internationally o be able to correctly apply subject-specific English terminology/vocabulary
Content	o Introduction and historical background of the country o The current political system and recent societal development o National/regional economy and its international positioning o Economic relationship between the region and EU / Germany o How international companies operate in (e.g.) China o Strategic positioning and uniqueness of local companies

	○ Regional culture and its influences on companies' strategic ○ management frameworks and intercultural communication ○ Geographical scheme of the regional/country/area
Other requirements/information	Basic knowledge of business administration is required. There is a 3 ECTS and a 5 ECTS version of this course. Students can only take one of them.
Course format	Seminar-style lecture
Credits (ECTS)	3
Lecture hours per week (LVS)	4
Type of assessment	Written examination (90 minutes)

Area Studies – Doing Business in China (5 ECTS)

Course name	**Area Studies - Doing Business in China (5 ECTS)**
Learning objectives	In the past few decades China has developed into one of the most powerful national economies in the world and has thus expanded its social and political influence not only in Asia, but also worldwide. For Europe, China is one of the most important cooperation partners in many areas, but at the same time it is also a serious competitor and rival in other areas. Knowing and understanding China is therefore becoming a crucial competence for all responsible actors in our society. This course will equip students with foundational knowledge about the history and culture as well as the recent political and economic development in China. One of the focus areas will be the changing role of China in the world economy during the globalization/deglobalization process. Another focus area is to gain insight into different business and inter-cultural aspects when doing business in and with China. Group discussions will help the students apply their new knowledge in order to efficiently develop their competence. After successful participation in this course students will: ○ know the historical background and the current political and economic system of the country ○ understand the international positioning of the country in a globalized business environment

	○ be able to assess country-specific opportunities and risks for international and local companies when doing business in and with the country ○ be able to demonstrate how regional culture impacts business and management practice ○ be able to work or conduct business with local people both in the country/region and internationally ○ be able to correctly apply subject-specific English terminology/vocabulary
Content	○ Introduction and historical background of the country ○ The current political system and recent societal development ○ National/regional economy and its international positioning ○ Economic relationship between the region and EU / Germany ○ How international companies operate in (e.g.) China ○ Strategic positioning and uniqueness of local companies ○ Regional culture and its influences on companies' strategic ○ management frameworks and intercultural communication ○ Geographical scheme of the regional/country/area
Other requirements/information	Basic knowledge of business administration is required. There is a 3 ECTS and a 5 ECTS version of this course. Students can only take one of them.
Course format	Seminar-style lecture
Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Written examination (90 minutes); case study presentation

Computer Science

Course name	**Computer Science**
Learning objectives	○ Basic understanding of algorithms and software engineering ○ Knowledge about the formalism and utilisation of a high-level computer language ○ Ability in programming distinct tasks ○ Ability to analyse, understand, and modify simple given computer programs ○ Knowledge of English computer science terminology
Content	○ Algorithms in computer science ○ Numeral systems and information coding ○ The program development process, problem analysis, algorithm development, and implementation in a computer language ○ Programming Python, computing platforms, and Python's development environment ○ The principle structure of Python programs, variables, operators, key words, expressions, functions and procedures, modules, errors, and debugging ○ Object-oriented programming, classes, and methods ○ Programming event-driven flows of operation ○ Practical work with the computer
Other requirements/information	The course is designed for engineering students. Previous knowledge is not necessary.
Course format	Seminar-style lecture
Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Written examination (90 minutes)

Community Practice

Course name	**Community Practice**
Learning objectives	In this course, students are expected to achieve the following objectives: ○ become familiar with concepts of social work with and within the community and assign these to socio-historical contexts and subject-specific orientations ○ acquire knowledge of support structures in everyday life in a socio-spatial context ○ understand the complex interrelationships between socio-spatial segregation and social exclusion ○ gain a differentiated perspective of processes of segregation ○ become familiar with methods of socio-spatial analysis
Content	○ Definition, objectives, and historical background ○ Community work as a working principle ○ Concepts of integrated urban development, neighbourhood management ○ Social support structures, social networks ○ Significance and consequences of social exclusion processes ○ 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

Constructive Conflict Transformation

Course name	**Constructive Conflict Transformation**
Learning objectives	In this seminar, we will analyse models of constructive conflict transformation (i.e., mediation, power-model, value-based models, etc.) to discuss challenges in approaching conflicts constructively. After completing the module, you will be able to critically evaluate and develop conflict transformation models by applying social and psychological perspectives. During the seminar you will acquire an understanding of the elements of conflicts (e.g. personal patterns, values, culture, structural aspects). In addition, you will be able to critically evaluate what constitutes a successful conflict transformation model. Finally, you will acquire the skills to apply the discussed models in your professional and personal environment.
Content	The character of the seminar is based on intensive interaction between participants through interactive dialogue and critical discussions. The content of the seminar will be the analysis of social and psychological oriented conflict models, mediation, patterns based on needs and fears, value-based conflicts, and structural aspects of organizational challenges. The seminar is structured in two aspects: (1) interactive introduction to the analysis of conflict models, (2) analysis of personal and structural conflicts by the students.
Other requirements/information	The methodological emphasis of the course is on practical exercises and interactive dialogue. Therefore, the successful completion of the course requires active participation in all sessions.
Course format	Seminar-style lecture
Credits (ECTS)	3
Lecture hours per week (LVS)	3
Type of assessment	Paper

Electrical Engineering

Course name	**Electrical Engineering**
Learning objectives	○ Basic understanding of the physics of electrical components ○ Ability to apply the basic laws of electrical engineering to simple problems ○ Basic understanding of the physics and application of magnetism in power machines ○ Basic skills for describing AC and three-phase systems
Content	○ Electrical engineering components ○ Direct current circuits ○ Magnetic field ○ Alternating current and three-phase current
Other requirements/information	The course is part of the Mechanical Engineering (B.Eng.) curriculum. Recommended prerequisites: Engineering Mathematics, Physics.
Course format	Seminar-style lecture
Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Written examination (90 minutes)

Entrepreneurship and Business Development

Course name	**Entrepreneurships and Business Development**
Learning objectives	In this course, students will develop both the analytical and practical skills required to understand, evaluate, and build innovative business ventures across global markets. The course places a strong emphasis on business development and entrepreneurship, drawing on real-world success and failure cases to help students gain insights into the dynamic nature of launching and managing businesses in cross-border environments. By the end of the semester, students will be able to: ○ **Understand and develop Business Models and Business Plans for new Business Ideas:** - Create and evaluate business models and plans for start-ups, focusing on value propositions, customer segments, resources, and cost/revenue structures in global contexts - Understand cultural, regulatory, and economic challenges in crossborder innovation ○ **Apply Advanced Business Analysis Tools**: - Use the Intellectual Capital Statement (Europe) and Wissensbilanz (Germany) to assess intangible assets (human, structural, relational capital) - Apply financial controlling via Betriebswirtschaftliche Auswertung (BWA) to evaluate business viability - Use European Innovation Council (EIC) criteria to assess innovation potential in IT and Energy sectors ○ **Evaluate and Learn from Business Cases:** - Study successful and failed international ventures to extract key lessons and apply insights to new concepts ○ **Build and Pitch a Scalable International Business Concept:** - Develop a scalable, cross-border business plan, integrating financial, operational, and innovation components - Practice pitching to stakeholders ○ **Strengthen Entrepreneurial Mindsets and Interdisciplinary Thinking:** - Cultivate creativity, resilience, and strategic thinking - Collaborate in diverse, international teams

	- Address ethical and sustainability considerations in global entrepreneurship
Content	○ **Module 1: Foundations of Business Plans and Business Development in Entrepreneurship and Innovation:** - Explore the history of entrepreneurship and innovation in a global context - Understand the challenges and opportunities of launching and scaling ventures across borders - Introduction to global future business market dynamics, and innovation ecosystems - Set up of Business ideas and Start ups - Investment/Start Up/Business Development calculations Key Outcomes: understand international entrepreneurship fundamentals, regional innovation differences, and create a business/investment plan with cash flow planning ○ **Module 2: Business Model Development and Strategic Design**: - Learn to design and evaluate international business models using the Business Model Canvas - Explore value creation, delivery, and capture in multicultural and global markets - Examine the role of scalability, digitalization, and innovation in business model design - Use KPI's for Business development and Start Up's Key Outcomes: build adaptable business models for global growth, perform investment calculations, and identify competitive KPIs ○ **Module 3: Intellectual Capital and Knowledge-Based Value Creation:** - Introduction to Intellectual Capital Statements – Made in Europe and Wissensbilanz – Made in Germany - Assess the value of intangible assets such as human, structural, and relational capital in global SME Key Outcomes: analyze knowledge assets' role in innovation and competitiveness, and document intellectual capital ○ **Module 4: Financial Evaluation and Classical Controlling Tools:** - Learn financial controlling techniques for start-ups and SMEs using the BWA (Betriebswirtschaftliche Auswertung)

	- Understand profitability, liquidity, and cost structures in entrepreneurial ventures - Integrate financial insights into strategic decision-making Key Outcomes: interpret BWA reports and link financial data to strategy and scalability o **Module 5: European Innovation Council (EIC) Model and Business Plan Evaluation:** - Explore the EIC framework for evaluating and funding innovations in IT and Energy sectors - Learn the structure and standards of EU-compliant business plans - Practice evaluating innovation potential, risk, and commercial viability Key Outcomes: apply EIC criteria to assess business concepts and understand EU funding requirements o **Module 6: Case Study Analysis and International Venture Creation:** - Study real successful and failed business cases to extract best practices and critical lessons - Work in international teams to develop and pitch a new venture concept - Integrate all tools and frameworks into a final business plan and presentation Key Outcomes: gain strategic insights from cases, create and present a viable cross-border business plan
Other requirements/information	This course includes useful interfaces with International Financial Management, International Accounting and Taxation, Business Ethics, Strategic Management, International Management with Cases and Sales. This course has no prerequisites.
Course format	Seminar-style lecture
Credits (ECTS)	6
Lecture hours per week (LVS)	4
Type of assessment	Written examination (90 minutes); analysis of a business case in written format and/or group presentation

Fluid Mechanics

Course name	**Fluid Mechanics**
Learning objectives	○ Knowledge of the laws of physics to describe fluids at rest and flowing fluids ○ Ability to apply this knowledge to the practical calculation of mechanical engineering elements and systems ○ Knowledge of determining pressure and velocity distribution in simple pipework networks ○ Ability to determine flow-induced forces and take them into account when dimensioning components ○ Ability to apply the laws of fluid mechanics to general fluid mechanics problems ○ Recognizing flow problems with a three-dimensional character or with flows with very high velocities (gas dynamics)
Content	Terminology of fluid mechanics, concept of pressure, hydrostatics, aerostatics, atmosphere, compressibility of fluids, surface tension (force effect), calculation of the load on vessel walls, steady frictionless flow, streamlines, one- and multidimensional flow, Euler equations, Bernoulli equation, outflow from vessels of different configurations, conservation of mass, momentum theorem, application of the momentum theorem to calculate forces and power, laminar and turbulent flows with internal and external flows, pressure loss calculations, pressure and velocity distributions in simple pipe systems, concept of drag and calculation of flow resistance, air forces on finite and infinitely wide aero foils.
Other requirements/information	The course is part of the Mechanical Engineering (B.Eng.) curriculum. Recommended prerequisites: Engineering Mathematics, Physics, Thermodynamics.
Course format	Seminar-style lecture
Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Written examination (90 minutes)

Global Software Engineering

Course name	**Global Software Engineering**
Learning objectives	The learning objective of this course is integration of programming, software engineering, and project management with intercultural skills to plan, analyse, design, and develop a global software project.
Content	Students will work together with project partners from a university in another country on a real-time simulation of a global software engineering project.
Other requirements/information	Master's level for information systems, computer science, media computer science is required. Prerequisites: English, programming skills, software engineering skills, project management skills.
Course format	Seminar-style lecture
Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Project presentation; written report

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

Improv Theatre and Spontaneity

Course name	**Improv Theatre and Spontaneity**
Learning objectives	Participants will be encouraged to embrace role-playing exercises, including those relevant to professional contexts, fostering a more dynamic approach to various scenarios. Enabling students to take to the stage with enthusiasm is one of the goals of the course. Strategies will be developed specifically to help people view the phrase, ‘We need volunteers’, as an opportunity to leave their comfort zone, overcome perceived limitations, and embrace possible failure. **Outcomes:** • develop and use your own spontaneity and creativity, react productively to the unexpected • courage in role-playing - even in professional contexts • experience stage fright positively and use it in other performance contexts (job interviews, presentations, etc.) • ability to adopt unfamiliar perspectives through a playful approach, sharpen self-perception and perception of others, and facilitate aesthetic experiences
Content	Improvisational theatre is a dynamic form of performed art in which scenes are developed spontaneously without a script. It promotes creativity, spontaneity, and teamwork, valuable skills that are transferable to other contexts. The course includes a variety of practical elements such as theatre exercises, performance practice, and reflection sessions. Students will engage in both group work and individual tasks. A special focus is placed on storytelling, body language, speech, and spontaneity exercises aimed at improving expression and quick thinking. Participants will have the opportunity to improvise scenes with given elements as well as "free scenes" to apply and deepen their newly acquired skills in practice. Through the course, students will refine their skills in spontaneous thinking and effective collaboration.

Other requirements/information	The seminar languages are German and English. Knowledge of one of these languages is sufficient. No prior experience is required. Participants with and without theatre experience are welcome, and the formation of a diverse group is desirable. Initially, the seminar will focus on forms, exercises, and games that facilitate access to storytelling improvisation for beginners while also helping those with prior experience enhance their skills.
Course format	Seminar-style lecture
Credits (ECTS)	2
Lecture hours (LVS)	2
Type of assessment	Active participation; practical exam; written assignments

International Social Work – Social Work and Drug Consumption from a Global Perspective

Course name	**International Social Work – Social Work and Drug Consumption from a Global Perspective**
Learning objectives	After the course, students can: ○ justify the usefulness and necessity of an international comparative perspective in social work ○ apply an international comparative view on drug-related social work practices and approaches ○ identify the correlation between general social policies and drug policies in selected countries ○ understand the demand on and changes in social work in Germany as a result of global processes
Content	○ General concepts, processes, and institutions related to international social work ○ Comparative review of practice experience of social workers in the field of drug consumption from different global regions ○ Drug-related policies and social work approaches in selected countries
Other requirements/information	The course is designed for social work students. Students from other fields/backgrounds 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
Credits (ECTS)	6
Lecture hours per week (LVS)	4
Type of assessment	Paper; oral and written examination

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: o use Excel spreadsheets efficiently to solve scientific and engineering problems o use VBA to extend the features of Excel according the requirements of typical scientific and engineering tasks o use VBA to improve efficiency and re-usability of spreadsheets for solutions in their own fields of study o analyse quantitative measurement data with appropriate numerical methods, find appropriate mathematic models, and evaluate the models o solve non-linear equations numerically with help of Excel and/or VBA
Content	o Spreadsheet calculation with Excel o Relative and absolute cell references o Scientific diagrams o General mathematic and statistic Excel functions o User-defined functions in VBA o Linear regression o 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

Mathematics I

Course name	**Mathematics I**
Learning objectives	After successful participation in this course students will: ○ recall and be able to apply basic mathematical notions, methods and tools ○ classify and extend mathematical problems in single variable calculus and linear algebra (vectors and matrices) ○ demonstrate knowledge and understanding of basic ○ differential and integral calculus, complex numbers, vectors and matrices and some more advanced techniques of calculus ○ explain and choose as well as apply fundamental ○ mathematical techniques to solve problems related to economics and natural science ○ get comprehensive knowledge about correct application of subject-specific terminologies and Vocabulary in English
Content	The course includes the following topics: ○ Functions (single variable) ○ Complex numbers ○ Vectors

	○ Linear algebra ○ Differentiation of single variable functions ○ Integrals of single variable functions ○ Sequences, Taylor and power series
Other requirements/information	Course is designed for engineering students. Students should be able to understand the basics of secondary school mathematics (algebra, calculus).
Course format	Seminar-style lecture
Credits (ECTS)	7
Lecture hours per week (LVS)	6 (+2)
Type of assessment	Written examination (90 minutes)

Mathematics III

Course name	**Mathematics III**
Learning objectives	After successful participation in this course students will be able to: ○ apply descriptive statistical methods to prepare, illustrate, and analyse data ○ understand the basic concepts of probability theory ○ apply theoretical results to compute probabilities and other statistics in practical settings ○ understand the key concepts of inferential statistics ○ construct confidence intervals and carry out hypothesis tests in specific settings
Content	The course includes the following topics: ○ **Descriptive statistics** - graphical illustration of data samples using histograms, box plots, or scatter plots - sample statistics such as sample mean, sample variance, sample covariance, quantiles - linear regression

	○ **Basics of probability theory** - events, probabilities, conditional probabilities, independence - random variables, probability distributions, cumulative distribution function, probability mass function, probability density function - expectation, median, variance, covariance, quantiles - specific probability distributions: binomial, Poisson, geometric, uniform, exponential, and normal distribution - law of large numbers and central limit theorem ○ **Inferential statistics** - parameter estimation: method of moments, maximum likelihood estimation - confidence intervals for the mean of a distribution - hypothesis tests for the mean of a distribution
Other requirements/information	The course gives a short introduction into statistics and is intended for undergraduate students. Knowledge of fundamentals of mathematics, particularly in analysis, is required.
Course format	Seminar-style lecture
Credits (ECTS)	3
Lecture hours per week (LVS)	2
Type of assessment	Written examination (90 minutes)

Medical Data Science

Course name	**Medical Data Science**
Learning objectives	○ Students apply mathematical and statistical methods and concepts to healthcare datasets. ○ Students design and assess the application of the results of their analyses in everyday clinical practice. ○ Students utilise concepts and standards of scientific work. ○ Students are familiar with data science methods and their application in the healthcare context and can critically reflect on the results. ○ Students are able to prepare and present their results in a team according to scientific standards.
Content	○ Mathematical-statistical, medical, informatics, and regulatory fundamentals applied in example healthcare use cases ○ Data science methods applied to the given healthcare use case using appropriate software
Other requirements/information	Recommended prior knowledge in fundamentals of mathematics, introduction to computer science, applied statistics, process and data management, and AI in healthcare.
Course format	Seminar-style lecture
Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Student research project as part of group work and presentation (30 minutes)

Foundations of Quantum Technologies: Principles, Applications, and Enabling Innovations

Course name	**Foundations of Quantum Technologies: Principles, Applications, and Enabling Innovations**
Learning objectives	Driven by the advancements of the second quantum revolution, quantum technologies are on the verge of practical implementation in quantum computers, quantum sensors, and quantum-cryptography systems. Quantum systems hold the potential to surpass classical technologies in computing power, precision, and security across diverse applications. This course aims to provide students with: ○ An understanding of the fundamental principles underlying quantum computers, sensors, and cryptographic systems. ○ The knowledge of the enabling electronic, optical, and photonic technologies essential for quantum systems. ○ Insights into processes and methodologies for the design, development, construction, and operation of quantum technologies. ○ The ability to evaluate the complexity of quantum systems and the advanced technologies required to realize them. ○ The course equips students with the foundational expertise to navigate and contribute to the rapidly evolving field of quantum technologies.
Content	To provide a solid foundation for understanding quantum technologies, this course introduces the following core concepts: ○ Fundamentals of Quantum Physics - The essential principles underlying quantum phenomena ○ Enabling Technologies in Optics, Electronics, and Photonics, including: - The generation of single and entangled photons - Coherent control of individual atoms using lasers - The creation and manipulation of artificial atoms, such as spin qubits Students will acquire a foundational understanding of the operating principles behind: ○ Quantum Computers ○ Quantum Sensors

	○ Quantum Cryptography This knowledge will prepare students to engage with the cutting-edge advancements in quantum technologies.
Other requirements/information	The course is being offered by the Faculty of Electrical Engineering, Precision Engineering, Information Technology. A basic understanding of linear algebra, physics, electrical engineering, and computer science is required. Familiarity with optics, photonics, and laser technology is advantageous.
Course format	Seminar-style lecture
Credits (ECTS)	2,5
Lecture hours per week (LVS)	2
Type of assessment	Written examination (90 minutes)

Thermodynamics

Course name	**Thermodynamics**
Learning objectives	After participating in the module course, students will be able to ○ name the basic thermodynamic concepts and independently formulate practical problems in the basic thermodynamic variables. ○ assess energy conversions in technical processes thermodynamically. You will be able to define and determine system and balance spaces and limits. ○ define and determine the efficiency of processes and components. They can also distinguish between reversible and irreversible processes ○ apply thermodynamic state diagrams to visualise processes with humid air. They can describe equations of state and vapour tables and calculate thermodynamic state variables. ○ define and describe thermodynamic cycle processes in mechanical engineering machines and systems using state diagrams.

	○ design left-hand and right-hand circular processes. They can formulate conservation laws for individual changes of state and for complete cyclic processes. You will be able to identify and determine material data and state variables and use these to calculate cyclic processes. ○ interpret and evaluate results on the basis of theoretical comparative values. They can modify input values, size or working medium to solve an energy-related problem.
Content	○ State variables of gases and vapors in systems and machines ○ Equations of state, state diagrams, vapor tables ○ Main laws of thermodynamics ○ Changes in the state of humid air ○ Presentation and consideration of circular processes: - Gas cycle processes and vapor cycle processes - Left-hand and right-hand processes ○ Calculations on changes of state and selected cyclical processes with typical working media
Other requirements/information	Recommended prerequisites: basic mathematical knowledge
Course format	Seminar-style lecture
Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Written examination (90 minutes)

Wind and Geothermal Energy

Course name	**Wind and Geothermal Energy**
Learning objectives	Upon completion of the course, students should be able to: ○ apply the relevant methods of wind energy resource assessment ○ describe the types and operation of wind turbine generators ○ evaluate the economic viability and environmental compatibility of wind plants and wind farms ○ take the necessary steps for the location assessment or site selection for a wind energy plant ○ report and discuss technological foundations and present them orally as related to specialist and societal problems ○ describe exploration as well as types and operation of systems for the utilisation of geothermal energy ○ identify possible applications and select suitable processes and components for the utilisation of geothermal energy ○ apply the acquired fundamentals for the basic design of geothermal power plants ○ report and discuss technological foundations of geothermal power, present them orally, and assess and judge practical problems
Content	○ Energy scenarios, report and discuss technological foundations of geothermal power, present them orally, and assess and judge practical problems. renewables, wind as a resource for energy production, ○ Basic atmospheric concepts, evolution in time, variability and turbulence, wind speed distribution, wind rose, and wind profile ○ Wind resource measurement, site selection, meteorological instruments, quality and validation of wind resource measurements, representation, and analysis of wind data ○ Wind turbine generators (WTG): parts of a turbine, classification, power curve, basic concepts of wind turbine aerodynamics, control, grid integration and coupling ○ Wind farm design, micrositing, plant selection, yield prediction and cost efficiency of WTG, logistics of project implementation, onshore and offshore, environmental impact, future trends ○ Introduction to geothermal energy, fundamental terms, potential, classification of geothermal fields, technical applications ○ Basics of exploration (drilling) and hauling

	○ Geothermal power plants, thermodynamic fundamentals, components, design criteria ○ Parameters influencing the realisation of geothermal projects, mining law, licensing, financing, market situation, damage scenarios ○ Visit to a geothermal power plant
Other requirements/information	Physics or engineering students, who have completed at least 10 credits of thermodynamics, 5 credits of heat transfer, and 5 credits of fluid mechanics. Basic knowledge of materials science and about energy engineering instruments is also sensible.
Course format	Seminar-style lecture; exercises
Credits (ECTS)	5
Lecture hours per week (LVS)	4
Type of assessment	Written examination (90 minutes)