UAS Technikum Wien

COURSE GUIDE SS2021

COURSES OFFERED IN ENGLISH

Please note:
Incoming students have the possibility to combine courses from different study programs. The number of places available for Incoming students in each course may vary or be limited to a certain number.
Please be aware, that incoming students are obliged to generate at least 9 ECTS from the Campus International.

At the beginning of each semester an Orientation Week is held for all Incoming students as well as for all Double Degree students.
The Orientation Week takes usually place in the 2nd week of September resp. 2nd week of February and is mandatory for Incomings to attend.
Please take into consideration that this course guide may be subject to change!
Last update: 09.10.20

OVERVIEW OF COURSES OFFERED ENTIRELY IN ENGLISH

Inhaltsverzeichnis

GLOSSARY AND ABBREVIATIONS

Term	Abbreviation	Description
Laboratory	LAB	Application and practical exercises in small groups.
Seminar	SE	High extent of interactivity in teaching and by a sequence of theoretical inputs, case studies, exercises and discussions in small groups.
Integrated Teaching	ILV	Instruction is given by a sequence of theoretical teaching and practical exercises in (small) groups.
Distance Learning	FUV/FL/DL	The courses are devided into the on-campus phase and distance/online learning. During the on-campus phase the presence of the students is obligatory. During these phase the students have the introduction courses, attend the examinations or give their presentations in front of the class. During the online-phase the students have to work on the course contents via moodle courses, where they have to hand in assignments, take part in forum discussions and/or read study letters and literature. During the online-phase the students do not have to be presence at the university.
Lecture	VO	Mediation of new knowledge by the means of frontal teaching.
Exercise	UE	Reduced transfer of new knowledge and practical strengthening in (small) groups.

Study Program	Abbreviation (in German)
Bachelor	
Biomedical Engineering	BBE
Urban Renewable Energy Technologies	BEE
Electronic Engineering	BEL
Electronics and Business	BEW
Information and Communication Systems and Services	BIC
Computer Science	BIF
International Business & Engineering	BIW
Mechanical Engineering	BMB
Mechatronics/Robotics	BMR
Smart Homes and Assistive Technologies	BSA
Human Factors and Sports	BHF

Business Informatics	BWI
Master	
Medical Engineering & eHealth	MME
Renewable Urban Energy Systems	MEE
Embedded Systems	MES
Health Care and Rehabilitation Technology	MGR
Game Engineering and Simulation Technology	MGS
Information Management and IT Security	MIC
Power Electronics	MLE
International Business and Engineering	MIW
Mechanical Engineering	MMB
Mechatronics/Robotics	MMR
Integrative Urban Development – Smart City	MSC
Software Engineering	MSE
Sports Equipment Technology	MST
Tissues Engineering and Regenerative Medicine	MTE
Telecommunications and Internet Technologies	MTI
Innovation and Technology Management	MTM
Environmental Management and Ecotoxicology	MUT
Information Systems Management	MWI

Campus International (ECI)

CI_Scientific Writing

Degree programme	ECI
Semester	2
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	This hands-on-course dives deep into the praxis of scientific writing. Theory and basics of scientific writing are subjects of online learning, while the meetings are used to practice, analyse und discuss your own scientific writing.
Teaching methods	Exercises, peer-learning, talks, discussions, online-tasks
Learning outcome	After passing this course successfully students are able to ... - Define, describe, identify and evaluate academic resources - Describe and apply the common structure of a scientific paper - Discuss the different kinds of research questions and apply them to their field or research - Describe and discuss the common structure of a Bachelor's Thesis or Master's thesis - Write text according to common standards of academic writing
Course contents	- How is academic writing done? Where to find resources and references? What kind of scientific writing is adequate for which purpose? How are scientific papers structured? How to cite correctly? Which style of language is adequate?
Prerequisites	Basic knowledge of scientific keyterms and principles.
Assessment Methods	- Course immanent assessment method and end exam
Recommended Reading and Material	- Leedy, Ormrod: Practical Research. Planning and Design. Pearson - Skern: Writing Scientific English. Facultas wuv UTB
Attendance	Attendance is partly mandatory in this course. You can attend every class, and should at least participate in two sessions (50%) after the Kick-off.
Comments	

CI_German Language & Austrian Culture B2

Degree programme	ECI
Semester	2
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	Repetition, perfection and exercises of relevant grammatical structures • Vocabulary and useful phrases for B2 • Economy / career / work • New technology • Modern life / society
Teaching methods	Normal class with presence (15 UE): Discussions, work in large and small groups and presentation of your results you have prepared in form of a short text. AND E-learning with Moodle (15 UE): Single work with deadline for interim reports, exercises on reading, grammatical issues and vocabulary, writing 3 short texts (400 words each) and revision of the 3 texts.
Learning outcome	After passing this course successfully students are able to ... - understand grammatically complex texts which are rich in vocabulary on the level B2 - write a summary and comment the main topics of a text. Furthermore you have developed and enlarged your knowledge of German for the purpose of your studies - You have improved and clarified your writing skills as well as you can refer to phrases of argumentation. - describe and comment graphics and you can take a critical point of view in the context of a text. - write a request, a letter of complaint with the appropriate register
Course contents	- Reading of press articles and exercises in global and close reading as well as training of vocabulary and grammar - Writing summaries and expressing your point of view with the right expressions - Expressing advantages or disadvantages - Writing a letter of complaint or a request with the right expressions - Reporting about texts, describing and commenting graphics in the context of an article - Making an interview in the context of your studies and writing about your learning outcome

Prerequisites	Only for students with a good knowledge of German who are interested in improving their writing skills
Assessment Methods	- 1) 3 texts Option A Writing a summary and a comment on 3 long newspaper articles (1 with graphics) in the amount of about 400 words. OR Option B: Writing a summary and comment on 2 long newspaper articles (1 with graphics) in the amount of about 400 words and make a study-specific interview with a person of your interest, write a transcription/summary and reflect about your learning outcome. (50 points) - 2) Exercises on Moodle (25 points) - 3) Active participation (25 points)
Recommended Reading and Material	- Texts and exercises on Moodle and handouts of the regular class.
Attendance	Compulsary
Comments	

CI_German Language & Austrian Culture A1

Degree programme	ECI
Semester	2
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	Starting from a very basic level of German (A1 of the Common European Framework of Reference for Languages), we aim at developing students for situations required for personal and social interaction in Austria on a basic level. The focus of the course is the development of oral communication skills within an intercultural context.
Teaching methods	discussions, integrative grammer work, role games, songs, group work and presentations
Learning outcome	After passing this course successfully students are able to ... - ask questions about personal details - talk about themselves and others in terms of hobbies, preferences, dislikes

	- understand and write short e-mails, using an appropriate level of formality - understand and formulate simple questions and orders - understand and use numbers in various contexts as well as to ask for prices, such as in the furniture store, in the restaurant, at the Christmas market - give the time of day and make appointments - understand and use the phrases required for shopping and eating out as well in daily situations - talk about living circumstances as well as the weather and ask questions - talk and write about the past
Course contents	- personal topics - vocabulary and situations in terms of eating and drinking - vocabulary and situations in terms of living circumstances - weather - oral and written situations in the past (past perfect tense) - integrative grammar: articles in nominative and accusative, possessive pronouns in nominative and accusative, past perfect tense, prepositions, imperative, modal verbs
Prerequisites	Basic knowledge in German language (GERS A1) such as ABC, numbers, conjugation of the verbs, articles, forms of negation, basic vocabulary is advantageous
Assessment Methods	- 20% personal language development; 30% tests during the semester; 50% final exam (written exam and presentation)
Recommended Reading and Material	- Scriptum and online-exercices
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% of the class you lose the first try in the exam.
Comments	

CI_Audio Engineering

Degree programme	ECI
Semester	2
Course methods	ILV
Language	English

ECTS Credits	3.00
Incoming places	Limited

Course description	This integrated course provides students the opportunity to familiarise themselves with the basics of acoustics and audio engineering, including perception of sound, microphones, amplifiers, loudspeakers, audio processing, etc.
Teaching methods	The Lecturer will explain some basic concepts. The students will compete tasks in the computer using Matlab.
Learning outcome	After passing this course successfully students are able to ... - Understand the signal chain in a typical audio application, and be able to recognise and avoid distortions in all stages - understand how humans perceive sound, - record sounds using the appropriate equipment, - measure different attributes of sound and understand how they correlate to human perception, - analyse and interpret recorded sounds - synthesise sounds with specific attributes - perform audio processing on recordings - understand how audio compression works
Course contents	- Sound and sound attributes - Human perception of sound - Signal chain in audio engineering - Microphones and amplifiers - Analog vs digital signals - Fourier Analysis, Spectrum, Spectrogram - Synthesis of sounds - Filters - Audio compression - Lourspeakers09
Prerequisites	Basic programming skills. Matlab knowledge advantageous.
Assessment Methods	- The students will be assessed according to how far they completed the task at hand
Recommended Reading and Material	- Script provided by the lecture
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% of the class you lose the first try in the exam.

Comments	

CI_Building Climate Engineering

Degree programme	ECI
Semester	2
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	Theoretical and practical basics of Building Energy Design: energy efficient constructions, building physics, heating, ventilation and air conditioning of energy efficient buildings in Austria and internationally.
Teaching methods	Lectures combined with practical teaching on the construction site of an energy efficient building.
Learning outcome	After passing this course successfully students are able to ... - analyze different building construction components, facades and window concerning their energy efficiency, comfort and building physics - design preliminary concepts of energy efficient projects, - overview possibilities of ventilation, heating and cooling - compare different construction techniques concerning energy efficiency, building quality and comfort, especially related to their home country.
Course contents	- Basics of building physics, heat, humidity and sound protection - Building construction components from the view point of building physics and energy efficiency, comparison on international basis - Heating, cooling and ventilation possibilities - Energy benchmark levels, calculating of the energy demand of buildings
Prerequisites	Basic knowledge at least in one or two of the following topics: - Building construction - Building physics - Heating, ventilation and air conditioning - Energy planning of buildings
Assessment Methods	- Combined written and oral exam, written exam in 2-3 examples 40% Cooperation, attendance 20% - Project including energy layout and a short planning example of

	heating, ventilation and/or cooling 40%
Recommended Reading and Material	- Gerhard Hausladen, Saldanha, Liedl, 2013: Climate Skin Building Skin Concepts that can do more with less energy, ISBN978-3-0346-0727-8, Birkhäuser Verlag Basel
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% of the class you lose the first try in the exam
Comments	

CI_Electronic Laboratory

Degree programme	ECI
Semester	2
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	This integrated course provides students the opportunity to calculate and build electronic circuits, as well as measuring their characteristics with modern measuring devices
Teaching methods	The Lecturer will explain briefly the basic concepts students need to know to perform the experiment at hand. The students will work in groups to perform the experiment. The Lecturer will be available to assist the students in building and measuring their experiment, as well as to clarify any questions and solve any problems that may arise in the process.
Learning outcome	After passing this course successfully students are able to ... - measure voltages and currents with a DMM and oscilloscope correctly - produce signals with the Function Generator - calculate electronic circuits, build them and measure their outputs and characteristics - measure the output of circuits involving resistors, capacitors, diodes and OpAmps with the oscilloscope
Course contents	- Oscilloscope and Function Generator - Kirchhoff laws

	- Diode and Zener Diode - DC Power supply design and implementation - OpAmp circuits - RC Circuit: DC and AC analysis - Transistor Amplifiers - Project: Audio Equaliser
Prerequisites	Students should have basic knowledge of electronics and electronic circuits.
Assessment Methods	- The students will be assessed according to how far they completed the experiment at hand.
Recommended Reading and Material	- Maxfield et al., “Electrical Engineering know it all”, Newnes & Elsevier, 2008 - Scripts and materials provided by the lecturer.
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% of the class you lose the first try in the exam
Comments	

CI_Renewable Energy Laboratory

Degree programme	ECI
Semester	2
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	Experimental setup of different means of measuring methods to evaluate the performance of renewable energy technologies and systems.
Teaching methods	Laboratory exercises in small groups of typically 8-12 students
Learning outcome	After passing this course successfully students are able to ... - measure and analyze the energetic performance of components of energy conversion systems and measure and interpret the power quality of energy networks - measure and analyze the energetic performance of heat pumps, - measure and analyze the energetic performance of thermal solar

	plants and photovoltaic plants, - measure certain parameters of ventilation and hydraulic systems and interpret it.
Course contents	- Measurements and analysis of the energetic performance of energy conversion systems, - analysis of the power quality of electrical networks, - measurement and analysis of the efficiency of heat pump systems, - measurements and performance tests of solar thermal and photovoltaic plants, - performance tests of ventilation and hydraulic systems
Prerequisites	Basics in: - Electrical machines - Mechanical engineering - Thermodynamics - Instrumentation
Assessment Methods	- Laboratory notes - Laboratory reports - Grading of practical session - Laboratory reports Attendance
Recommended Reading and Material	- Scripts of the lecturers
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% of the class you lose the first try in the exam.
Comments	

CI_German Language & Austrian Culture A2

Degree programme	ECI
Semester	2
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	This course teaches grammar for level A2 and vocabulary of everyday life in form of teamwork and role-playing games on topics like travelling, new media, health, education, family and hobbies.
Teaching methods	Communicative methods for teaching grammar and vocabulary as well as exercises in partner- and teamwork
Learning outcome	After passing this course successfully students are able to ...

	- You are able to write and speak simple dialogues of everyday life and to apply grammatical structures corresponding to level A2. Furthermore, you can write simple e-mails, report on your personal situation and express your interests.
Course contents	- Vocabulary and dialogues about work, description of a person, living, travelling, arranging appointments, giving advice, talking about your education and health, eating and ordering in a restaurant, media in everyday life - Speaking simple dialogues and express your opinion - Writing e-mails, personal descriptions and short texts about your personal experience - Grammar: perfect / past tense / subjunctive II, reflexive verbs and modal verbs, declination of adjectives, subordinate clauses and prepositions
Prerequisites	Common European Framework of Reference for Language Level A1+, A2
Assessment Methods	- Active participation in class and a written final exam
Recommended Reading and Material	- Handouts, texts and exercises of the class
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% of the class you lose the first try in the exam.
Comments	

Service and object-oriented Algorithms in Robotics

Degree programme	CI Campus International in the Framework of the project IoCEST (Internationalization of the Curricula in Engineering, Environmental, Smart Cities and Sport Technologies)
Semester	2
Course methods	ILV
Language	English
ECTS Credits	6.00
Incoming places	Limited

Course description	The discusses main concepts of robot programming including different concepts for software development. This includes

	programming, concepts and methods, in particular ROS (robot operating system as a stadnardized framework for personal robots).
Teaching methods	This course is based on theory and exercises with mobile robot simulations/ robots. - Lecture (theory, methods, math and algorithms) - Exercises in small groups: problem solving with robot simulation/ real robots
Learning outcome	After passing this course successfully students are able to ... - explain components and operating modes of robots - define and differentiate between navigation with plans, localisation and trajectory planning - control mobile robots by applying behaviour methods for direct sensor-actor coupling - explain principles and applications of machine vision - clarify concepts of probabilistic robotics and apply respective algorithms - explain and design machine learning applications for object detection
Course contents	- Short outline of basic robot programming conceptsmased on a robot's kinematics, actors sensors and control concepts - µC Programming (Arduino) - C++ - ROS
Prerequisites	Mandatory: - Sensor technology - Basic programming skills, in particular in C - Sensor technology
Assessment Methods	- 15% Arduino Exercises - 15% C ++ Exercises - 20% ROS Exercises - 50% ROS Project
Recommended Reading and Material	- http://wiki.ros.org/ROS/Tutorials - Bishop, C.M.; Pattern Recognition and Machine Learning, 2006
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% of the class you lose the first try in the exam.
Comments	Gradings:1: >= 88%2: >= 75% and < 88%3: >= 63% and < 75%4: >= 50% and < 63%5: <50%

Data Ethics and Open Data

Degree programme	CI Campus International in the Framework of the project IoCEST

	(Internationalization of the Curricula in Engineering, Environmental, Smart Cities and Sport Technologies)
Semester	2
Course methods	ILV
Language	English
ECTS Credits	6.00
Incoming places	Limited

Course description	Open data is accessible public data that people, companies and organisations can use and process. The benefit of Open Data is not only the publication itself, but especially its duplication and reuse as new applications and solutions can increase transparency, promote innovation and encourage community engagement. The extensive use of increasingly more data in general also requires the consideration of complex moral and ethical subjects related to data to support good solutions and responsible handling.The course will be divided into two subject areas: Lectures on Data Ethics will provide the opportunity to learn about the ethical impacts of data and related topics (privacy, transparency, surveillance etc.).In lectures on Open Data students will learn about Open Data from a technical viewpoint and work on an Open Data application.
Teaching methods	The course consists of- lectures combined with discussions- project work and exercises
Learning outcome	After passing this course successfully students are able to ... - analyse and work with Open Data - determine different fields of Open Data applications - assess the quality of different Open Data sources - valuate the importance of responsible handling of data in different areas of application - discuss domain-related data ethics - analyse and describe the challenges and risks of an intelligent machine learning system (AI)
Course contents	- Open Data applications in different fields: Healthcare, finance, Smart Cities etc. - Open Data formats - Open Data policies - Project: analysing and processing open data - Data Ethics

	- Data Privacy, Transparency
Prerequisites	Basic Knowledge in Web Technologies, Database Systems, and Data Management
Assessment Methods	- Participation in discussions and presentation (Data Ethics) - Project results and project presentation (Open Data)
Recommended Reading and Material	- Ethics Advisory Group (2018): Ethics Advisory Group Report 2018 - European Union (2017): Open Data Maturity in Europe 2017 - Specific papers related to domains - Open data Web sites and catalogues (e.g. https://open.wien.gv.at)
Attendance	Attendance is mandatory
Comments	Course details will be provided in Moodle

Mobile Robotics

Degree programme	CI Campus International in the Framework of the project IoCEST (Internationalization of the Curricula in Engineering, Environmental, Smart Cities and Sport Technologies)
Semester	2
Course methods	ILV
Language	English
ECTS Credits	6.00
Incoming places	Limited

Course description	The course provides an introduction to the basics in mobile robotics with regard to the main components of mobile robots. The students achieve a basic understanding of methods to control mobile robots and behaviour as well as of methods for direct sensor-actor coupling. Also principles and application scenarios for machine vision algorithms are discussed. A further focus is on concepts of probabilistic robotics based on data processing and movement modelling.
Teaching methods	This course is based on theory and exercises with mobile robot simulations/ robots.- Lecture (theory, methods, math and algorithms)- problem solving with robot simulation/ real robots
Learning outcome	After passing this course successfully students are able to ... - explain components and operating modes of robots - define and differentiate between navigation with plans, localisation

	and trajectory planning - control mobile robots by applying behaviour methods for direct sensor-actor coupling - explain principles and applications of machine vision - clarify concepts of probabilistic robotics and apply respective algorithms
Course contents	- Short outline of basic concepts for mobile robotics, computer vision and machine learning, in particular kinematics, actors, odometrie and control concepts (classical/ with behaviours, fusion of behaviours) - Navigation: trajectory planning, types of plans and localisation, cognitive navigation - Perception and object recognition
Prerequisites	Mandatory:- Linux, CMake, Basics in ROS- Sensor technology (imaging)- C++Recommended: Computer Vision (basics)
Assessment Methods	- 50% final exam - 40% exercises - 10% Moodle Quizzes - Final exam and Exercises must to be positive (>60%)
Recommended Reading and Material	- Jean-Claude Latombe: Robot Motion Planning, Springer Verlag - Thrun, S.; Burgard, W.; Fox, D.; Probabilistic Robotics, 2006 - Szeliski, R., (2010), Computer Vision: Algorithms and Applications, Springer - Russel, S., Norvig, R.; Artificial Intelligence: A Modern Approach, 2nd edition, 2004 - Bishop, C.M.; Pattern Recognition and Machine Learning, 2006 - Goodfellow, I.; Deep Learning (Adaptive Computation and Machine Learning series), 2016 - Jason M. O' Kane: A Gentle Introduction to ROS - Roland Siegwart, Illah R. Nourbakhsh: Introduction to Autonomous Mobile Robots
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% of the class you lose the first try in the exam.
Comments	

Data Acquisition and Analysis in Biomechanics Ergonomics and Sports

Degree programme	CI Campus International in the Framework of the project IoCEST (Internationalization of the Curricula in Engineering, Environmental, Smart Cities and Sport Technologies)

Semester	2
Course methods	ILV
Language	English
ECTS Credits	6.00
Incoming places	Limited

Course description	Biomechanical measurements are a widespread method to assess human motion in sports, healthcare and rehabilitation. Different methods for the analysis of kinematics and kinetics are used in clinical and industrial setups to evaluate effects of different parameters. Engineers have to present the results in a clear and concise way to facilitate decision processes. In this course students will not only learn to work with the most common measurement systems in biomechanics but also how to evaluate, interpret and present the results.
Teaching methods	Self-study, laboratory work, problem-based learning, lecture
Learning outcome	After passing this course successfully students are able to ... - Use different methods to assess human motion (force plate, plantar pressure measurement, 2D video analysis) - Explain changes in ground reaction forces due to different walking speeds - Calculate plantar pressure distribution in walking and running - Calculate joint angles and velocities based on 2D motion analysis data - Explain the eight phases of a human gait cycle - Analyse and display measurement data
Course contents	- Force plates (technical background, application, conclusion) - Pressure insoles (technical background, application, conclusion) - 2D motion analysis (setup, calibration, marker tracking) - Data analysis and parameter extraction - Data presentation (diagrams, boxplots, tables)
Prerequisites	Basic mathematics, basic mechanics, programming (Matlab, Octave, Python or similar) is a plus
Assessment Methods	- Lab reports (30%) Written final examination (70%)
Recommended Reading and Material	- Selected chapters from: Levine, David, Jim Richards, and Michael W. Whittle (Eds.). Whittle's Gait Analysis. Elsevier Health Sciences, 2012. - Selected videos from the MMU YouTube channel:

	https://www.youtube.com/results?search_query=biomechanics+mmu
Attendance	compulsory
Comments	All details will be provided in a moodle course

Building and Solar Energy

Degree programme	CI Campus International in the Framework of the project IoCEST (Internationalization of the Curricula in Engineering, Environmental, Smart Cities and Sport Technologies)
Semester	2
Course methods	ILV
Language	English
ECTS Credits	6.00
Incoming places	Limited

Course description	Design of a solar system for a housing complex including technical parameter, contribution to the local electricity system including heating and mobility needs; economic calculation, ecologic impact.
Teaching methods	Project-Based Learning method. Combined with lectures and practical teaching on the remote laboratories. Supported by virtual learning environment and simulation.
Learning outcome	After passing this course successfully students are able to ... - Design preliminary concepts and design of energy efficient building supported by solar energy - Simulation of a solar energy system - Possibilities of building integrated photovoltaics and construction design - Overview of the market, drivers, stakeholders for integration of affordable renewable energy systems
Course contents	- Energy characterization and energy planning of solar building - Designing a building-integrated photovoltaic installation by software tools - Measurement and analysis of solar systems in the lab - Best practice of solar design (Excursion) - Overview of the market, legislative and drivers for solar energy and buildings
Prerequisites	Basic knowledge at least in one or two of the following topics: -

	Building construction - Solar energy system - Energy planning of buildings
Assessment Methods	- Lecture notes - Grading of practical session - Project reports
Recommended Reading and Material	- Designing with Solar Power: Source book for Building Integrated Photovoltaics. D. Prassad, M. Snow Routledge - Cost Optimal and Nearly Zero-Energy Buildings (nZEB) Definitions, Calculation Principles and Case Studies, Editors: Kurnitski, Jarek (Ed.) - Modeling, Design, and Optimization of Net-Zero Energy Buildings Athienitis (Ed.), W.O'Brien (Ed.), ISBN: 978-3-433-03083-7, February 2015 - Building integrated photovoltaics: A handbook S. Roberts and N. Guariento, Editors: Springer
Attendance	Attendance is mandatory in this course, only 20% of absence is accepted.
Comments	Mixed: Incoming students in collaboration with FHTW Master students - Project-based learning on real city development project from city of Vienna (MA20) or the city of Korneuburg - Integration in the curricula of the Master program of renewable energy

International Marketing

Degree programme	CI Campus International in the Framework of the project IoCEST (Internationalization of the Curricula in Engineering, Environmental, Smart Cities and Sport Technologies)
Semester	2
Course methods	SO
Language	English
ECTS Credits	6.00
Incoming places	Limited

Course description	The decision whether to internationalize: Understanding internationalization motives, barriers and risks; value net analysis of international competitiveness; Deciding which markets to enter: Global market research; market selection process; environmental analysis; Market entry strategy: transaction cost approach; export,

	intermediate, hierarchical entry modes; international buyer-seller relation; Designing of the global Marketing program: Green marketing strategies; cross boarder pricing challenges, channels decisions, international advertising strategies; Global Brand Management: customer based brand equity, brand association map, brand extension and diversification in a global context brand elements;
Teaching methods	Self-study, lecture, distance learning, case studies, group projects
Learning outcome	After passing this course successfully students are able to ... - discuss motives and triggers why firms go international - evaluate the factors influencing a firm's international competitiveness - define international market selection and identify the problems related with it - evaluate the factors to consider when choosing a market entry strategy - design global marketing programs - contribute to strategic marketing decisions - understand and contribute to marketing mix decisions
Course contents	- Internationalization process - Market segmentation - Creating competitive advantage - Global marketing communication - Market selection process - Brand building - Marketing Mix decisions
Prerequisites	None
Assessment Methods	- Written examination (70%) - Group Assingment (30%)
Recommended Reading and Material	- Global Marketing, Hollensen, 2016 - International Marketing, Czinkota , Ronkainen 2012 - Strategic Brand Management, Keller 2013
Attendance	Attendance is compulsory.
Comments	Detailed information regarding the course is provided via Moodle.

Orientation Week

Degree Program	Campus International

Semester	**Note:** The Orientation Week is taking place in the first week of each semester and contains following events and courses, which are recommended for Incoming Students:
	• Introduction to UAS Technikum Wien
	  ○ Center for International Relations
	  ○ Students Union
	  ○ IT-Department
	• Meet & Greet
	• Course: Cross-Cultural Competences – Dealing with the Austrian Culture
	• Introduction to the Library
	• Vienna City Tour

Course Methods	-
ECTS	-
Incoming Places	Open
Prerequisites	None
Attendance	Mandatory

Description	For all Incoming-students, the UAS Technikum Wien offers the Orientation Week, which takes place at the beginning of each semester and is compulsory for all Incoming students. During the Orientation Week, incoming students are provided with information about UAS Technikum Wien, which is necessary to be able to orient oneself in the new study environment. Furthermore incoming students will get their student ID and other usefull information about their stay in Vienna/Austria.
Assessment	none

Introduction to UAS Technikum Wien

Degree programme	CI Campus International
Lecturer	Mag. Florian Ellinger, Gerald Raab, Student's Union
Course methods	-
Language	English
ECTS Credits	-

Course Description	Students get a general introduction to UAS Technikum Wien. They will also get necessary informations about the students union, the Campus Information System (CIS), Center for International Relations etc.

Meet & Greet

Degree programme	CI Campus International
Course methods	-
ECTS Credits	-

Course Description	During the Meet & Greet Breakfast Incoming Students will come together for the first time and will also get in contact with the Erasmus Student Network (ESN), that will inform the incoming students about their activities and events.

Cross Cultural Competences – Dealing with Austrian Culture

Degree programme	CI Campus International
Course methods	-
Language	English
ECTS Credits	-

Course Description	This lecture will familiarize the students with inter-cultural culture dimensions and help them analyze these by presenting case examples, which further helps avoid conflicts in various communication situations. Furthermore, reasons for culture shock, its process and avoidance strategies will be discussed. Incoming students will also get to know the Austrian Culture.

Vienna City Tour

Degree programme	CI Campus International
Course methods	-
Language	English
ECTS Credits	-

Course Description	Vienna City Tour with Eugene Quinn http://spaceandplace.at/BestCityTour

BACHELOR DEGREE PROGRAMS

Mechanical Engineering (BMB)

Business English

Degree programme	BMB
Semester	2
Course methods	UE
Language	German
ECTS Credits	3.00
Incoming places	Limited

Course description	In this Business English course, students will learn how to write clear, compelling, professional text, as well as, expanding their language toolkit to enable them to record and apply business vocabulary and terminology in the context of future trends in Business and Engineering. These trends would include, amongst others, diversity and inclusion, the globalization of the economy and, also, the internationalization of finance. Moreover, students will advance their verbal and written English language skills by applying critical thinking tools in the creation of impact analyses specifically for technical business audiences of the global community.
Teaching methods	small and medium tasks and activities; open class inputs and discussion; individual task completion settings; peer review and discussion
Learning outcome	Nach erfolgreichem Abschluss sind die Studierenden in der Lage, ... - record and employ vocabulary for business in technology - create a business technology impact analysis - articulate both orally and in written form the different ways in which technology impacts business - use specific vocabulary and terminology in, for example, leading a meeting
Course contents	- Business in Technology (for example finance and investment, the global economy, digital marketing and sales, international teams, and diversity and inclusion) - Impact Analyses for Business and Technology - Business English Talk

Prerequisites	B2 level English
Assessment Methods	- 30% Business Impact Analysis Group Task - 30% Business Impact Analysis Language Task - 40% in-class writing
Recommended Reading and Material	- Murphy, R. (2019). English Grammar in Use, 5th Edition. Klett Verlag.
Attendance	Obligatory
Comments	

Electronic Engineering (BEL)

Business English

Degree programme	BEL
Semester	2
Course methods	UE
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	In this Business English course, students will learn how to write clear, compelling, professional text, as well as, expanding their language toolkit to enable them to record and apply business vocabulary and terminology in the context of future trends in Business and Engineering. These trends would include, amongst others, diversity and inclusion, the globalization of the economy and, also, the internationalization of finance. Moreover, students will advance their verbal and written English language skills by applying critical thinking tools in the creation of impact analyses specifically for technical business audiences of the global community.
Teaching methods	small and medium tasks and activities; open class inputs and discussion; individual task completion settings; peer review and discussion
Learning outcome	After passing this course successfully students are able to ... - record and employ vocabulary for business in technology - create a business technology impact analysis - articulate both orally and in written form the different ways in which

	technology impacts business - use specific vocabulary and terminology in, for example, leading a meeting
Course contents	- Business in Technology (for example finance and investment, the global economy, digital marketing and sales, international teams, and diversity and inclusion) - Impact Analyses for Business and Technology - Business English Talk
Prerequisites	B2 level English
Assessment Methods	- 30% Business Impact Analysis Group Task - 30% Business Impact Analysis Language Task - 40% in-class writing
Recommended Reading and Material	- Murphy, R. (2019). English Grammar in Use, 5th Edition. Klett Verlag.
Attendance	Obligatory
Comments	

Scientific Writing

Degree programme	BEL
Semester	4
Course methods	SE
Language	English
ECTS Credits	2.00
Incoming places	Limited

Course description	This seminar discusses language-related and formal criteria required for short scientific papers, together with the discussion of ethics concepts in the professional sphere and the analysis of real-life case studies.
Teaching methods	Writing examples and in-class assignments will be used in the classroom. Students will have the opportunity to choose a technical subject and present it to the class as well as research and present case studies concerning engineering ethics (learning by doing). Feedback and opportunities for group evaluation will follow.
Learning outcome	After passing this course successfully students are able to ... - cite/reference other authors' work in compliance with paper

	guidelines - structure and write short scientific papers according to the language-related and formal criteria given - formulate and justify a rationally defendable position on basic ethical problems - analyze ethical dilemmas in case studies - apply and adhere to scientific rules and forms for the creation and analysis of scientific texts and be able to distinguish them from non-scientific ones - explain and present the contents and results of a scientific publication
Course contents	- Structuring a scientific paper - Correct citation of other authors' findings - Language-related peculiarities of a scientific paper - Principles of ethical judgement - Different approaches to ethics - Case studies
Prerequisites	Common European Framework of Reference for Languages Level B2 Completion of previous semester course
Assessment Methods	- active participation in class activities and timely completion of assignments
Recommended Reading and Material	- Lecture notes
Attendance	Attendance is compulsory
Comments	

Smart Homes and Assistive Technologies (BSA)

Microcontroller Technology

Degree programme	BSA
Semester	2
Course methods	LAB
Language	English
ECTS Credits	5.00
Incoming places	Limited

Course description	
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - Design and analyze bare-metal embedded systems software architectures (polling, fore-/background) - To realize structured and encapsulated embedded systems software to control various peripheral units (typ. Port I/O, Timer, ADC/DAC, UART, SPI, I2C) of microcontrollers. - To use embedded build systems (cross-development and remote debugging) efficiently. - to connect periphery to a microcontroller with suitable hardware circuitry and software control and to put it into operation. - to develop embedded software using the example of course-specific projects.
Course contents	- CPU architectures of modern microcontrollers - Modularization and encapsulation of embedded software and decoupling of control and data flow - Functionality of numerous peripheral units (I/O, timer, ADC/DAC, UART, SPI, I2C etc.) - Implementation of exercises for the control of peripheral units like Port I/O, ADC, DAC, Timer, UART, SPI, I2C ... incl. external circuitry - Implementation of course-specific projects
Prerequisites	
Assessment Methods	
Recommended Reading and Material	
Attendance	
Comments	

Assistive Technologies Basics

Degree programme	BSA
Semester	2
Course methods	ILV
Language	German
ECTS Credits	3.00
Incoming places	Limited

Course description	This course is an introduction to Disability and Assistive Technologies. You will learn types of disabilities and related medical basics. You will get to know the daily challenges of people with disabilities and how to face them with Assistive Technologies.
Teaching methods	
Learning outcome	After successful completion, students are able to ... - explain different types of disabilities and their physiological and anatomical background - Explain interaction processes between man and machine and develop corresponding user experiences - to list current technical devices to support people with disabilities and to select suitable technologies for specific applications - to distinguish between different methods of supported communication (e.g. Braille keyboard) for people with disabilities and to apply them according to their needs
Course contents	- Anatomical and physiological basics - Causes and characteristics of motor, visual, auditory and cognitive disabilities - Communication technology and rehabilitation technology: available devices, technical solutions and their application (Braille technologies, screen readers, biosignal-based systems, ...) - methods of alternative communication (scanning methods & on-screen keyboards, symbol communication, ...) - Basics of accessible design (design-for-all) - Fundamentals of human-machine interaction and user experience
Prerequisites	none
Assessment Methods	Assignments, Final Exam
Recommended Reading and Material	
Attendance	
Comments	

Business English

Degree programme	BSA
Semester	2
Course methods	UE

Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	In this Business English course, students will learn how to write clear, compelling, professional text, as well as, expanding their language toolkit to enable them to record and apply business vocabulary and terminology in the context of future trends in Business and Engineering. These trends would include, amongst others, diversity and inclusion, the globalization of the economy and, also, the internationalization of finance. Moreover, students will advance their verbal and written English language skills by applying critical thinking tools in the creation of impact analyses specifically for technical business audiences of the global community.
Teaching methods	small and medium tasks and activities; open class inputs and discussion; individual task completion settings; peer review and discussion
Learning outcome	After passing this course successfully students are able to ... - record and employ vocabulary for business in technology - create a business technology impact analysis - articulate both orally and in written form the different ways in which technology impacts business - use specific vocabulary and terminology in, for example, leading a meeting
Course contents	- Business in Technology (for example finance and investment, the global economy, digital marketing and sales, international teams, and diversity and inclusion) - Impact Analyses for Business and Technology - Business English Talk
Prerequisites	B2 level English
Assessment Methods	- 30% Business Impact Analysis Group Task - 30% Business Impact Analysis Language Task - 40% in-class writing
Recommended Reading and Material	- Murphy, R. (2019). English Grammar in Use, 5th Edition. Klett Verlag.
Attendance	Obligatory
Comments	

Scientific Writing

Degree programme	BSA
Semester	4
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	We aim at conveying the language-related and formal criteria required for short scientific papers
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - cite other authors' work in compliance with paper guidelines - structure and write abstracts and/or short scientific papers according to the language-related and formal criteria given
Course contents	- Structuring a scientific paper - Correct citation of other authors' findings - Language-related peculiarities of a scientific paper - The three phases of writing - Abstract vs. Executive Summary
Prerequisites	Completion of previous semester courses
Assessment Methods	- Course immanent assessment method, i.e. active participation in class activities and timely completion of assignments
Recommended Reading and Material	- Göschka, M. et al (2014) Guidelines for Scientific Writing, Skriptum - Additional current handouts and audio-visual support
Attendance	Attendance is compulsory
Comments	

Urban Renewable Energy Technologies (BEE)

Please Note:
The courses 'Renewable Energy Laboratory' and 'Building Climate Engineering' correspond thematically with the BEE English program, 'Specialisation 1 - Smart Cities' and 'Specialization 1- Building-Energy-Design'.
If you choose one of the 'Specialisation 1 Courses', please attend the Renewable Energy Lab and Building Climate Engineering. We also offer Bachelor Thesis within these courses.

They take place on Tuesday and fit with the time table. Special prerequisites in Building Science, Mechanical or Electrical Engineering are welcome.

Specialization 1 - Smart Cities

Degree programme	BEE
Semester	4
Course methods	PRJ
Language	English
ECTS Credits	6.00
Incoming places	Limited

Course description	The main focus of the specialization ‚Smart Cities' follows the integrated design of urban projects under consideration of technological options (energy, buildings, networks), design options (architecture in urban areas) and user behaviour (diversity). Through the integration of interdisciplinary teams the project gains additional benefit.
Learning outcome	After passing this course successfully students are able to ... - solve integrated planning, design, construction and development procedures in a small regional area in the context of a smart city - discuss and evaluate the interdisciplinary aspects of energy supply and demand, architecture and city planning for a singular building in the context of a smart city area - analyse and integrate gender and diversity aspects in the context of a smart city project - integrate measures and data analysis of reference projects in the own project
Course contents	- Team work of an integrated planning process of a small SMC project, for instance a building refurbishment in urban areas. - Consequent procedure of characteristic project phases, requirement specifications, project plan, design concepts, variants, documentation and presentation. - Integration of diversity aspects in the smart city context. - Usage of specific simulation software.
Prerequisites	Basics in building construction, energy design and solar architecture
Assessment Methods	- Course immanent assessment method with a final presentation in front of a commission

Recommended Reading and Material	- Smart City Wien Rahmenstrategie (2014), Magistrat der Stadt Wien - Transform, Transformation Agenda for Low Carbon Cities, 2013, http://urbantransform.eu - Pauser, Norbert; Wondrak, Manfred (2011), Praxisbuch Diversity Management, Wien: Facultas
Attendance	Compulsory

Specialization 1- Building-Energy-Design

Degree programme	BEE
Semester	4
Course methods	PRJ
Language	English
ECTS Credits	6.00
Incoming places	Limited

Course description	The main focus of the specialization ‚Building Energy Design' lies in the field of building services (HVAC) and building physics, complemented with topics out of architectural design in context to energy planning and integration of heating, cooling and ventilation equipment.
Learning outcome	After passing this course successfully students are able to ... - apply know-how of planning, designing and developing for a buildings energy design - design a building energy concept integrated in a planning team according to project management rules - specialise in a main field of building energy design (building physics, electrical planning, thermal simulation, HVAC heating-ventilation-air conditioning,…) and apply detailed know how in this field - co-create planning processes and the interactions between different special planning disciplines especially related to the topics energy efficiency, sustainability and comfort
Course contents	- Integration of the aspects energy, sustainability and comfort of buildings in the complexity of a planning process of a small, medium size project. Core items could be the development of an energy efficient façade, variants of the building services of a passiv house construction site, or design concepts of a plus energy building

	construction.
Prerequisites	Lectures about building construction, building physics, heating, ventilation and cooling, project management
Assessment Methods	- Course immanent assessment method with final presentation in front of a commission
Recommended Reading and Material	- Projektspezifisch/project specific
Attendance	Compulsory

Scientific writing

Degree programme	BEE
Semester	4
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	The students acquire the language skills necessary to critically analyze formal aspects of scientific texts and apply given formal language-related features of technical and scientific texts
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - dentify given formal and language-related features of technical and scientific texts - apply given formal and language-related features of technical and scientific texts - write abstracts in compliance with given formal and language-related guidelines
Course contents	- Formal and language-related aspects of technical and scientific texts - avoiding common mistakes - Abstract writing - The scientific writing process
Prerequisites	Common European Framework of Reference for Languages Level B2 Completion of previous semester course

Assessment Methods	- Course immanent assessment method, i.e. active participation in class activities and timely completion of assignments
Recommended Reading and Material	- Maderdonner, O. / et al (2014): Abstract Writing, Skriptum - Connolly, P. / Kingsbury, P. et al. (2014): eSNACK, Lernplattform - Additional current handouts and audio-visual support
Attendance	mandatory
Comments	

Human Factors and Sports Engineering (BHF)

Materials and Technology for Performance Apparel

Degree programme	BHF
Semester	4
Course methods	ILV
Language	English
ECTS Credits	5.00
Incoming places	Limited

Course description	Materials and Technology for Performance Apparel
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - recognize different functional materials and to derive their production technology. - describe the connection between structure and functionality of high-tech materials in the sportswear sector. - analyze requirements for sports garments and to select appropriate materials and production technologies. - conceive ergonomic designs for specific target groups - select appropriate test methods for the evaluation of material properties. - critically assess sustainability in the life cycle of high-tech materials.
Course contents	- Materials science: Fibers & Membranes - Manufacturing technologies - Material testing of fibers & membranes - Physiology (thermoregulation)
Prerequisites	

Assessment Methods	
Recommended Reading and Material	- Hayes, S. & Venkatraman, P., (Eds.) (2016). Materials and Technology for Sportswear and Performance Apparel, CRC Press. - Shishoo, R. (Ed.). (2015). Textiles for Sportswear. Elsevier. - Subic, A.; Alam, F., Troynikov, O. & Brownlie, L. (2013). Sports Apparel. In Routledge Handbook of Sports Technology and Engineering (pp. 233-251). Routledge.
Attendance	
Comments	

International Business Engineering (BIW)

Scientific Writing & Publishing

Degree programme	BIW
Semester	4
Course methods	SE
Language	English
ECTS Credits	2.00
Incoming places	Limited

Course description	This course will examine the structure and aspects of scientific writing. The aim of the course is to increase the students' awareness of definable features and functions of technical writing and to provide opportunities in which to exercise these skills.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - demonstrate their qualifications in the job application process - cite other authors' work in compliance with paper guidelines; - structure and write abstracts and/or short scientific papers according to the language-related and formal criteria given
Course contents	- Structuring a scientific paper - Correct citation of other authors' findings - Language-related peculiarities of a scientific paper - The three phases of writing - Abstract writing
Prerequisites	- Professional and technical communication 1 + 2- English for

	Business and Engineering
Assessment Methods	- Course immanent assessment method
Recommended Reading and Material	
Attendance	Yes
Comments	

Advanced Communication for Business and Engineering 2

Degree programme	BIW
Semester	6
Course methods	SE, FL
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	This course consists of 2 parts. The first part is concerned with basic economic theory (background, principles and application). Particular emphasis will be placed on the relevancy these theories have today. Business ethics and crisis management are also examined within the context of business practices.The second part is dedicated to preparing students for their final presentations in English. Students will do a trial run of their final presentations and will receive feedback, including strategies for improvement, in a class Forum.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - explain connections between economic theories and forms of government - explain complex theories to non-experts
Course contents	- Economic concepts and theories - Historical development of economic theory - Presentations
Prerequisites	Advanced Communication for Business and Engineering 1
Assessment Methods	- Course immanent assessment and final written
Recommended Reading and Material	

Attendance	Yes
Comments	

Business English

Degree programme	BIW
Semester	2
Course methods	UE
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	In this Business English course, students will learn how to write clear, compelling, professional text, as well as, expanding their language toolkit to enable them to record and apply business vocabulary and terminology in the context of future trends in Business and Engineering. These trends would include, amongst others, diversity and inclusion, the globalization of the economy and, also, the internationalization of finance. Moreover, students will advance their verbal and written English language skills by applying critical thinking tools in the creation of impact analyses specifically for technical business audiences of the global community.
Teaching methods	small and medium tasks and activities; open class inputs and discussion; individual task completion settings; peer review and discussion
Learning outcome	After passing this course successfully students are able to ... - record and employ vocabulary for business in technology - create a business technology impact analysis - articulate both orally and in written form the different ways in which technology impacts business - use specific vocabulary and terminology in, for example, leading a meeting
Course contents	- Business in Technology (for example finance and investment, the global economy, digital marketing and sales, international teams, and diversity and inclusion) - Impact Analyses for Business and Technology - Business English Talk
Prerequisites	B2 level English

Assessment Methods	- 30% Business Impact Analysis Group Task - 30% Business Impact Analysis Language Task - 40% in-class writing
Recommended Reading and Material	- Murphy, R. (2019). English Grammar in Use, 5th Edition. Klett Verlag.
Attendance	Obligatory
Comments	

Computer Science (BIF)

Innovation Lab 2

Degree programme	BIF
Semester	4
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	Project Based Learning in Computer Science. The course intented to combine acquired isolated knowledge of various lectures and to put it to practical use.
Teaching methods	Project work
Learning outcome	After passing this course successfully students are able to ... - apply learning outcomes of courses from previous semesters in a chosen project - aquire needed knowledge and skills under guidance - complete the project sucessfully
Course contents	- Practical application of the content of other courses in a project
Prerequisites	All courses of previous semesters
Assessment Methods	- Project results
Recommended Reading and Material	- depending on project
Attendance	patrly
Comments	The supervision is done on an individual basis in synchronous or

	asynchronous settings and is supported by modern communication tools. The course is not displayed or partially displayed in the timetable and no attendance records are kept.

Business Communication for Engineers

Degree programme	BIF
Semester	4
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	Starting from the Common European Framework of Reference for Languages B2, students acquire relevant terms, concepts and language skills necessary to be competitive in the job market and business world.
Teaching methods	Interactive, communicative approach
Learning outcome	After passing this course successfully students are able to ... - write CVs and cover letters for the current job market - perform effectively in a job interview - participate in and chair business meetings - writing business correspondence using appropriate register - present an innovative business concept
Course contents	- Writing CVs and covering letters - Interviewing for a job - Conducting business meetings - Writing business emails - Presenting a business concept
Prerequisites	Completion of previous course, “Economics, Technology and Society” (Sem 3)
Assessment Methods	- Active participation in class activities - Timely and successful completion of assignments - Language competence
Recommended Reading and Material	- Available on Moodle and/or CIS
Attendance	Compulsory

Comments	

Biomedical Engineering (BBE)

Medical Application of Embedded Systems

Degree programme	BBE
Semester	4
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	- Basics of microcontroller programming and embedded systems software design - Project work in the sector of biomedical applications
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - name important microcontrollers components. - implement register-level programming in C. - debug C-programs for microcontrollers.
Course contents	- bit manipulation - special function registers - using peripheral units of a microcontroller: GPIO, UART, ADC
Prerequisites	Object-oriented programming in biomedical engineering
Assessment Methods	- Course immanent assessment method and end exam (exam, project outcome and participation during the course)
Recommended Reading and Material	- Richard H. Barnett, Sarah Cox, Larry O'Cull: Embedded C Programming and the Atmel AVR Paperback – June 5, 2006 2nd edition, ISBN-13: 978-1418039592 ISBN-10: 1418039594
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% you lose the first attempt in the exam.
Comments	

Safety and Communication in Medical Data Engineering

Degree programme	BBE
Semester	4
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	Fundamentals of medical software engineering and quality assurance
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - apply the standardised methods of software development. - plan and implement basic tasks of software testing. - transfer knowledge about ISO/IEC 62304, ISO 13485, IEEE 829 from theory to practical use. - explain the communication chain according to the Continua Health Alliance. - implement a client/server communication using the TCP/IP.
Course contents	- Fundametal test process - V-model - Standards for medical software developement - Standards for software testing - Basics of data communication - IDE features (debugging, unit testing, etc.)
Prerequisites	Structured Programming in Biomedical EngineeringObject-oriented programming in biomedical engineering
Assessment Methods	- Course immanent assessment method (active repetition of course contents, software project and documentation) and end exam
Recommended Reading and Material	- Standards (ISO/IEC 62304, ISO 13485, IEEE 829)
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% you lose the first attempt in the exam.
Comments	This course is coordinated with the course Medical Data Engineering in order to reach a high level of synergies for the students participation.

Molecular Genetics

Degree programme	BBE
Semester	4
Course methods	SE
Language	English
ECTS Credits	2.50
Incoming places	Limited

Course description	Lecture explaining the basics of genetics with focus on molecular genetics and gene technology, including selected advanced topics like genome research.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - specify and to compare general molecular mechanisms in pro- and eukaryotic cells. - describe the fundamental biological processes of replication, transcription and translation on a molecular genetic level. - recapitulate the different biological properties of proteins, RNA and DNA. - describe the molecular interactions which drive the expression of genes.
Course contents	- Introduction and Basics - Cell Cycle and Mitosis/Replication - Sexual Reproduction and Meiosis/Recombination - Transcription - Translation - Bacterial genetics (Parasexuality) - Gene Regulation - DNA analysis (methods)
Prerequisites	Biochemistry and molecular biology
Assessment Methods	- Written end exam
Recommended Reading and Material	- Molecular Biology of the CellBruce Alberts et al.5th Edition (2008)Garland ScienceISBN 978-0815341116 - Genetik - Allgemeine Genetik - Molekulare Genetik - Entwicklungsgenetik Wilfried Janning; Elisabeth KnustAuflage: 1. (2004)Thieme VerlagISBN 3131287713 - Molekulare GenetikRolf KnippersAuflage: 9. (2006)Thieme VerlagISBN: 3134770091

Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% you lose the first attempt in the exam.
Comments	

Pharmacokinetics and Toxicology

Degree programme	BBE
Semester	4
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	Basics of Pharmacokinetics
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - explain the essential parameters in pharmacodynamics and all categories of pharmacokinetics and outline the essential steps of the production of a pharmaceutical. - perform simple calculations of pharmacokinetic parameters (e.g., plasma concentration, apparent volume of distribution). - distinguish acute from chronic toxicity, explain the different types of toxic responses and dose-response curves and give examples for toxicity testing and the different types of toxins. - compare efficacy, pharmacokinetic limitations and toxicities of traditional and personalized treatment options in oncology. - apply and adhere to scientific rules and forms for the creation and analysis of scientific texts and be able to distinguish them from non-scientific ones
Course contents	
Prerequisites	Biochemistry & molecular biologyfunctional anatomy and physiologypathophysiology
Assessment Methods	- Written exam (80%) and participation (20%)
Recommended Reading and Material	- Katzung: Pharmacology & ToxicologyGoodman & Gilman's: Manual of Pharmacology and Therapeutics
Attendance	Attendance is mandatory in this course, only 20% of absence is

	tolerated. In case you miss more than 20% you lose the first attempt in the exam.
Comments	

Telemedicine & eHealth

Degree programme	BBE
Semester	4
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	In this course you will acquire basic knowledge about the application of information and communications technologies (ICT) in the healthcare system (= eHealth) in general and for medicine at a distance (= telemedicine) in particular.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - classify existing and future healthcare ICT systems according to a variety of schemes. - name the core properties of different system elements (health records, networks) and analyse their critical performance criteria. - understand the different levels of interoperability and choose proper standards and integration profiles for different application fields. - address and balance risks and opportunities of healthcare ICT applications.
Course contents	- Introduction to the field and definition of terms: eHealth, mHealth, pHealth, telemedicine - Challenges in the healthcare system and proposed eHealth solutions - Core technologies (networks, mobile and wireless) - Legal and political framework - Interoperability and standards - The electronic health record / ELGA - Patient centred health care (home-, health- and telemonitoring) - Information and communications technologies in biomedical research

	- Future aspects and resources for further studies
Prerequisites	Information management in medicine
Assessment Methods	- Course immanent assessment method and end exam
Recommended Reading and Material	- handouts based on the lecturer's presentation - handouts from the student's presentations
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% you lose the first attempt in the exam.
Comments	Parts of the course will take place via eLearning an Teleteaching.

Biological Signals and Medical Sensors 1

Degree programme	BBE
Semester	4
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	In the course "Biological and Medical signal sensor 1" the knowledge acquired in the field of physics, electronics and instrumentation are responsible for the implementation and practical. The result is a circuit design, which is then built up in the following course "Biological and Medical Sensors 2" and put into operation.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - simulate and design electronic circuits for biological processing. - design and experimental set-up basic electronic circuits and validate and characterize them with modern measuring instruments. - construct prototypes with CAD / CAM tools based on concrete tasks.
Course contents	- project work
Prerequisites	- Medical Electronics - Medicine Electronics Laboratory - Medical Physics - Fundamentals of Medical Measurement - Technology
Assessment Methods	- Course immanent assessment method

Recommended Reading and Material	- Tietze-Schenk (2012): Halbleiter- Schaltungstechnik, Springer Verlag
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% an additional exam must be performed.
Comments	

Radiation Physics

Degree programme	BBE
Semester	4
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	Basics of atomic and nuclear physics, radiation physics and technology in nuclear medicine
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - describe examples of atomic and nuclear physics as well as radiation physics relevant for biomedical engineering. - outline the basic interactions between ionizing radiation and electron hull. - reproduce the fundamental models of nuclear physics and radioactivity. - explain the principles of signal processing in nuclear medicine technology. - apply basic knowledge on radiopharmaceuticals in a practical context. - participate in projects on technology related to nuclear medicine.
Course contents	- Historical overview and development of atomic physics - Elementary charge, Bohr model - X-ray, auger effect - Wave-particle duality - Photoelectric effect, Compton scattering, pair production - Quantum numbers - Periodic table

	- Heisenberg uncertainty principle, Schrödinger equation - Historical overview and development of nuclear physics - Nuclear models - Radioactivity and nuclear reactions - Research and applications in nuclear physics - Basics of nuclear medicine - Radiation detectors, Gamma camera - Scintigraphy, PET, SPECT, Multi-modality imaging - Radiopharmaceuticals and their production - Dosimetry in Nuclear Medicine
Prerequisites	Medical physics
Assessment Methods	- Oral end exam
Recommended Reading and Material	- Christopher J. Foot, Atomic Physics, Oxford University Press ISBN-10: 0198506961 - W. N. Cottingham, D. A. Greenwood, An Introduction to Nuclear Physics, Cambridge University Press, ISBN-10: 0521657334 - Simon R. Cherry, R. W. Blowey, Michael E. Phelps, Physics in Nuclear Medicine, Saunders, ISBN-10: 072168341X - Michael E. Phelps, PET: Physics, Instrumentation, and Scanners, Springer New York, ISBN-10: 1441921834 The power point slides will be available for the students.
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% you lose the first attempt in the exam.
Comments	

Cell Culture Techniques

Degree programme	BBE
Semester	4
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	Cell Culture Techniques - Introduction
Teaching methods	

Learning outcome	After passing this course successfully students are able to ... - explain standard techniques for aseptic cultivation of eukaryotic cells in detail, to highlight possibilities to recognize contaminations and to suggest necessary actions to prevent further spreading - explain construction and function of instruments used in cell culture and to pinpoint possible malfunctions - calculate concentrations of reagent solutions, to suggest sufficient labeling of containers in cell culture, and to enumerate legal requirements handling of waste - evaluate critically the replacement of animal testing by cell culture methods and to discuss pro´s and con´s in a specific field of application (e.g., cancer research, virology, drug testing, tissue engineering, stem cell biology, gene therapy) based on scientific literature
Course contents	- Theory of cell culture standard techniques (mechanic and enzymatic cell detachment, composition of cell culture media, adherent and suspension cell cultures, finite and immortalisied cell lines, primary cells) - equipement of cell culture lab - types of contamination and their specific detection - cell counting and calculation of cell number - replacement of animal testing by cell culture based assays in different fields of applications presented by students
Prerequisites	General and organic chemistry, physics, electronics, biochemistry and molecular biology, instrumented analysis in laboratory medicine
Assessment Methods	- Course immanent assessment method (presentation of recent papers by students and discussion) and end exam
Recommended Reading and Material	- Freshney, R. (2010): Culture of Animal Cells - A Manual of Basic Technique and Specialized Applications,John Wiley & Sons-Verlag - Handouts of lectures
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% you lose the first attempt in the exam.
Comments	

Medical Imaging and Analysis

Degree programme	BBE
Semester	4

Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	The lecture is a comprehensive and compact introduction to medical image processing.All methods are illustrated in practical lessons by simple MATLAB examples. necessary.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - develop simple prototypes for basic image processing in defined clinical situations. - understand the functionality in commercially available software and to use it adequately. - transfer and manipulate medical imaging data for further use in biomedical engineering applications.
Course contents	- Basic physics of imaging with a view on image processing - Clinical apllication examples - Data storage and -formats - Operations in intensity space - Filtering operations in the spatial domain, Fourier transform, linear filter theory, convolution theorem
Prerequisites	Mathematics 1 & 2Medical physicsStructured Programming in Biomedical Engineering
Assessment Methods	- End exam (multiple choice test)
Recommended Reading and Material	- W. Birkfellner, with contributions by M. Figl, J. Hummel, Z. Yaniv and Ö. Güler: Applied Medical Image Processing – A Basic Course, 2nd Edition, CRC Press, ISBN: 978-1-4665-5557-0
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% you lose the first attempt in the exam.
Comments	

Engineering Heart, Lung and Circulation

Degree programme	BBE
Semester	4

Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	This integrated course provides an overview on most important diagnostic and therapeutic tools and devices for heart, lung and circulatory system, and trains a simple example for a risk analysis of such devices
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - select appropriate methods for pressure- and flow-measurement in Lung and Circulation for given settings and to explain this selection. - compare different methods for ECG-recording and to recognicze signal distortions and take methods to eliminate such distortions. - describe the main components of pacemakers and the settings for different cardiac pathologies and to explain the reasons for these settings. - describe the workflow of spirometric and oxymetric investigations and to compare the advantages and limitations of these methods. - describe the important aspects of electrical safety of given device settings and to recognize correlated problems. - perform simple risk analyses of devices in lung and cardiovascular medicine.
Course contents	- Basics of Fluid Dynamics in respect of fluids in circulation and lung - Invasive and noninvasive technologies for pressure measurement - Invasive and noninvasive technologies for flow measurement - ECG: Physiological background, most important pathophysiological phenomenons, ECG-recording, basic circuits - Spirometry, Oxymetry - Cardiac pacemakers: Basics, Components, modes of operation - Safety requirements of devices and installations in respect of cardiac safety - Applied risk analysis for devices in heart,lung, circulatory applications
Prerequisites	Basics in Physics Anatomy and Physiology of Lung, Heart and Circulation (Overview)
Assessment Methods	- Course immanent assessment method and end exam (seminar

	work 30% and written exam 70%, both parts must be assessed positively)
Recommended Reading and Material	- Oertel H, Ruck S: Bioströmungsmechanik, Vieweg 2012; - Bronzino R, Patterson J: Handbook of Biomedical Engineering, CRC 2015 - Tschaut RJ (Hrsg): Extrakorporale Zirkulation in Theorie und Praxis, Papst 2005 - Kay PH, Munsch CM: Techniques in extracorporeal circulation, Arnold 2004 - Boltz A, Urabszek W: Technik in der Kardiologie, Springer 2002
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% you lose the first attempt in the exam.
Comments	

Medical Data Engineering

Degree programme	BBE
Semester	4
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	Databases, Austrian electronic insurance card system (eCard, GIN), software development project in medicine.
Teaching methods	The course introduces the topics in lectures and discussions. Students will then immediately apply the knowledge and develop skills in hands-on practice and in a software development project in groups.
Learning outcome	After passing this course successfully students are able to ... - design software for healthcare which uses the services of the "Gesundheits- Informations- Netz" (GIN, Austrian eCard system, electronic health insurance card). - generate and use structured data in healthcare, similar to the medical records as defined in the CDA implementation guides for the Austrian Electronic Healthcare Record ELGA and in the eCard services.

	- conceptualise database applications for healthcare and implement basic database transactions. - apply and adhere to scientific rules and forms for the creation and analysis of scientific texts and be able to distinguish them from non-scientific ones
Course contents	- Gesundheits-Informations Netz (GIN) - software engineering for healthcare - Database Design - Structured data in healthcare
Prerequisites	Fundamentals of Computer Science and Software Development
Assessment Methods	- Course immanent assessment method (project work, assignments) and final exam
Recommended Reading and Material	- Datenbanksysteme: Heide Faeskorn-Woyke / Birgit Bertelsmeier / Petra Riemer / Elena Bauer SBN: 978-3-8273-7266-6 - e-book Datenbanksysteme: Heide Faeskorn-Woyke / Birgit Bertelsmeier / Petra Riemer / Elena Bauer ISBN: 978-3-8632-6632-5 - moderne Betriebssysteme: Andrew S. Tanenbaum SBN: 978-3-8273-7342-7
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% you lose the first attempt in the exam.
Comments	

Circuitdesign and Signal Analysis

Degree programme	BBE
Semester	4
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	The theoretical part of the lecture discusses electronic components, operational amplifier circuits and various designs of analog front-end stages. In the course, the students implement a simple bio-signal amplifier for recording myoelectric signals. In the laboratory sessions, this electronic circuit is assembled and evaluated.

Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - analyze passive networks for direct current and alternating current. - design a simple front-end amplifier for recording bio-electrical signals. - testing and evaluating electronic circuits. - descriptive analysis of analog front-end stages and active filters.
Course contents	- Passive components - AC and DC linear network analysis - Complex signal analysis - ESD protection circuits - Operational amplifier circuits: amplifier and first-order filter circuits - Instrumentation amplifier for bioelectrical measurements - Design of single and dual supplies for analog and digital circuits - Guidelines for evaluation of electronic circuits - Assembling and assessment of a biosignal amplifier
Prerequisites	Fundamentals of electronicsBasics of measurement technology
Assessment Methods	- The assessment consists of 25% homework and 75% written exam; each part must be passed successfully.
Recommended Reading and Material	- Glisson TH (2011), Introduction to Circuit Analysis and Design, Springer Netherlands, ISBN: 978-90-481-9442-1 - Mulukutla SS (2001), Introduction to Electrical Engineering, Oxford University Press, ISBN: 978-0195136043 - Lecture - Handouts
Attendance	Attendance is mandatory for this course, only 25% of absence is tolerated. If the student misses more than 25% then the first try in the exam is lost. 100% attendance of hands-on sessions is mandatory.
Comments	

Immunology

Degree programme	BBE
Semester	4
Course methods	SE
Language	English
ECTS Credits	2.00
Incoming places	Limited

Course description	Introduction to Immunology
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - explain basic connections of immunological interactions. - differentiate between bacterial and viral infections. - define the problems of allergies, autoimmune diseases and transplantations.
Course contents	- Innate and adaptive immune system - Inflammation - Allergy - Autoimmune diseases - Transplantation
Prerequisites	Biochemistry & molecular biologyfunctional anatomy and physiologypathophysiology
Assessment Methods	- Written end exam
Recommended Reading and Material	- Charles A. Janeway jr. u. a. : Immunologie, 5. Auflage, Spektrum Akademischer Verlag Gmbh, Heidelberg, Berlin, 2002
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% you lose the first attempt in the exam.
Comments	

Bioinformatics

Degree programme	BBE
Semester	4
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	Basics of Bioinformatics
Teaching methods	Lectures, discussions, analyses on the computer
Learning outcome	After passing this course successfully students are able to ... - search in literature data bases based on defined criteria. - perform basic sequence comparisons on DNA and protein levels.

	- construct protein structures in 3D. - to analyze gene expression data
Course contents	- literature data bases - sequence comparisons (BLAST) on protein and DNA level - protein prediction tools - protein structures - gene enrichment analysis, gene expression data analysis
Prerequisites	Biochemistry and molecular biologyFundamentals of Computer Science and Software Development
Assessment Methods	- Seminar paper at the end of the course
Recommended Reading and Material	- Seminar slides provided on cis
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% you lose the first attempt in the exam.
Comments	

Neural Engineering

Degree programme	BBE
Semester	4
Course methods	SE
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	The course Neuroprosthetics covers electrophysiology of excitable nerve and muscle tissue; electrical stimulation to restore or improve lost body functions; circuit design for related electronic equipment, e.g. stimulators, biosignal amplifiers; practical applications of functional electrical stimulation. Additionally, hands-on sessions include an exercise about neuromuscular electrical stimulation, and measuremnts of the evoked myoelectrical signals.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - describe methods to elicit action potentials in an excitable tissue. - describe the differences between functional electrical stimulation

	and neuromodulation focused on spinal cord stimulation. - design a stimulation protocol (parameters) for activating of muscles and nerves. - design electronic circuits with the help of a simulation for bio-electrical signals. - describe transcutaneous functional electrical stimulation for upper and lower extremities. - describe bio-electrical signals for controlling neuroprosthetic system, e.g. brain-computer interface.
Course contents	- basics of electrophysiology of excitable nerve and muscle tissue - electrical stimulation to restore or improve lost body functions - circuit design for related electronic equipment, e.g. stimulators, bio-signal amplifiers - practical applications of functional electrical stimulation - related hands-on sessions
Prerequisites	Medical electronics, fuctional anatomy and physiology, systematic and topographic anatoma, biochemistry and molecular biology
Assessment Methods	- Course immanent assessment method (lab reports) and end exam
Recommended Reading and Material	- Malmivuo J and Plonsey R (1995), Bioelectromagnetism, Principles and Applications of Bioelectric and Biomagnetic Fields, Oxford University Press, New York (http://www.bem.fi/book/index.htm) - Presentations slides as a pdf-document.
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% you lose the first attempt in the exam.100% attendance required for hands-on sessions
Comments	

Biomechanics

Degree programme	BBE
Semester	4
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	Introduction to Biomechanics Calculations and Analysis of

	biomechanical examples
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - calculate and interpret static and dynamic biomechanical examples, like the forces in the upper arm during weight lifting. - graphical represent and calculate moments and torque of biomechanical problems. - compare and interpret stress-strain diagrams of different materials. - describe properties of biological tissues, like bones, cartilage or muscles.
Course contents	- Forces - Moment and Equilibrium - Free Body Diagram - Anthropometry - COG, COM, COP - Kinematics and kinetics of movements - Calculations of combinations of movements - Moment of Inertia - Examples of biomechanics in sports and medicine - Mechanic of hard tissues - Musculoskeletal soft tissue mechanics - Biomechanics of lower limb prosthesis - Finite Elements Analysis
Prerequisites	Basics of physicsmathematicsanatomy
Assessment Methods	- Course immanent assessment method and end exam
Recommended Reading and Material	- Andris Freivalds: Biomechanics of the upper limbs, Second Edition. Taylor & Francis Group. ISBN 978-1-4200-9120-5. - Hans A. Richard und Gunter Kullmer: Biomechanik, Grundlagen und Anwendungen auf den menschlichen Bewegungsapparat, Wiesbaden 2013. ISBN 978-3-8348-0384-9 - Duane Knudson: Fundamentals of Biomechanics, Second Edition. Chico 2007. ISBN 978-0-387-49311-4
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case you miss more than 20% you lose the first try in the exam.
Comments	

Business Informatics (BWI)

Business Communication

Degree programme	BWI
Semester	4
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	Business Communication
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - ... - demonstrate a knowledge of the key principles of writing Business English, such as gender neutral English and suitable structure and style - write a CV in English - fill in an online application form successfully in English - write a letter of job application - talk convincingly about the impact of different adverts
Course contents	- CV and covering letter - job interview - presenting and understanding the key concepts behind advertising - business communication
Prerequisites	Completion of previous course
Assessment Methods	- Course immanent assessment method, i.e. active participation in class activities and timely completion of assignments
Recommended Reading and Material	- Maderdonner, O. (2014): English for Business, Skriptum - Additional current handouts and audio-visual support
Attendance	mandatory
Comments	

Information and Communication Systems and Services (BIC)

Business English

Degree programme	BIC
Semester	2
Course methods	UE
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	In this Business English course, students will learn how to write clear, compelling, professional text, as well as, expanding their language toolkit to enable them to record and apply business vocabulary and terminology in the context of future trends in Business and Engineering. These trends would include, amongst others, diversity and inclusion, the globalization of the economy and, also, the internationalization of finance. Moreover, students will advance their verbal and written English language skills by applying critical thinking tools in the creation of impact analyses specifically for technical business audiences of the global community.
Teaching methods	small and medium tasks and activities; open class inputs and discussion; individual task completion settings; peer review and discussion
Learning outcome	After passing this course successfully students are able to ... - record and employ vocabulary for business in technology - create a business technology impact analysis - articulate both orally and in written form the different ways in which technology impacts business - use specific vocabulary and terminology in, for example, leading a meeting
Course contents	- Business in Technology (for example finance and investment, the global economy, digital marketing and sales, international teams, and diversity and inclusion) - Impact Analyses for Business and Technology - Business English Talk
Prerequisites	B2 level English
Assessment Methods	- 30% Business Impact Analysis Group Task - 30% Business Impact Analysis Language Task - 40% in-class writing
Recommended Reading	- Murphy, R. (2019). English Grammar in Use, 5th Edition. Klett

and Material	Verlag.
Attendance	Obligatory
Comments	

Business English

Degree programme	BIC
Semester	6
Course methods	SE
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	Students engage with global economic and technical developments and their impact on society, and thereby acquire relevant terms and concepts together with the appropriate language skills.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - recognize connections between economic theories and forms of government; - analyze the impact of globalization on society and the environment; - conduct various forms of business communication.
Course contents	- Economic concepts and theories - Winners and losers of globalization - Development of technologies - Presenting and negotiating project concepts and business plans - Business communication
Prerequisites	- Listening, reading and speaking skills at level C1 of the Common European Framework of Reference for Languages. - Knowledge and skills necessary to write short scientific papers in English.
Assessment Methods	- Course immanent assessment method
Recommended Reading and Material	- Recommendations: - M. Duckworth (2003): Oxford Business English, Oxford University Press, - I. Mackenzie (2010): English for Business Studies, Cambridge University Press Learning materials: - Dedicated scripts and lecture notes

	- O. Maderdonner, et al. (2014): Economy, Technology and Society, Skriptum - O. Maderdonner (2014): English for Business, Skriptum
Attendance	Attendance is compulsory
Comments	

Electronics and Business (BEW)

Business English

Degree programme	BEW
Semester	2
Course methods	UE
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	In this Business English course, students will learn how to write clear, compelling, professional text, as well as, expanding their language toolkit to enable them to record and apply business vocabulary and terminology in the context of future trends in Business and Engineering. These trends would include, amongst others, diversity and inclusion, the globalization of the economy and, also, the internationalization of finance. Moreover, students will advance their verbal and written English language skills by applying critical thinking tools in the creation of impact analyses specifically for technical business audiences of the global community.
Teaching methods	small and medium tasks and activities; open class inputs and discussion; individual task completion settings; peer review and discussion
Learning outcome	After passing this course successfully students are able to ... - record and employ vocabulary for business in technology - create a business technology impact analysis - articulate both orally and in written form the different ways in which technology impacts business - use specific vocabulary and terminology in, for example, leading a meeting

Course contents	- Business in Technology (for example finance and investment, the global economy, digital marketing and sales, international teams, and diversity and inclusion) - Impact Analyses for Business and Technology - Business English Talk
Prerequisites	B2 level English
Assessment Methods	- 30% Business Impact Analysis Group Task - 30% Business Impact Analysis Language Task - 40% in-class writing
Recommended Reading and Material	- Murphy, R. (2019). English Grammar in Use, 5th Edition. Klett Verlag.
Attendance	Obligatory
Comments	

Computer Science 2

Degree programme	BEW
Semester	2
Course methods	FUV
Language	English
ECTS Credits	6.00
Incoming places	Limited

Course description	Advanced Programming in C
Teaching methods	Integrated course
Learning outcome	After passing this course successfully students are able to ... - explain and apply the concept of pointers and distinguish between pointers and arrays - use multidimensional arrays - utilize structs, unions, enumerations and typedefs - use header files and preprocessor directives - allocate memory dynamically - work with strings - implement simple algorithms and data structures
Course contents	- pointers and arrays - structs, unions, enumerations and typedefs - header files and preprocessor directives

	- dynamic memory management - strings - sorting algorithms
Prerequisites	basics of computer science and programming
Assessment Methods	- Course immanent assessment method
Recommended Reading and Material	- King, K.N. (2008):C Programming, Norton
Attendance	Compulsory attendance during on-campus phases
Comments	

Electronic Engineering 2

Degree programme	BEW
Semester	2
Course methods	FUV
Language	English
ECTS Credits	6.00
Incoming places	Limited

Course description	In the Electronic Engineering 2 course students acquire basic knowledge of fundamental rules in Electrical an Electronics Engineering of AC circuits and understand physical laws and abstractions applied to semiconductor devices.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - apply the methods of complex alternating current technology (e.g. calculation with complex resistors and pointers as well as phasor diagrams) for calculating peaks of voltages and currents as well as phase shifts and to dimension the values of resistors, inductors and capacitors in AC circuits. - analyze and simulate a buck converter circuit. - design transistor circuits (transistor as switch, amplifier)
Course contents	- Inductor / Capacitor in DC / AC circuits - Complex alternating current calculus - Filter Circuits (low-pass, high-pass, band-pass) - Resonance circuits - Power

	- Phasor diagram - Diode, rectifier - Transistor, Mosfet - DC-DC Converter, transformer
Prerequisites	Electronic Engineering 1
Assessment Methods	- Course immanent assessment method and end exam
Recommended Reading and Material	- Maxfield and others (2008): Electrical Engineering – know it all, Newnes Verlag - Seidel, Heinz-Ulrich (2003): Allgemeine Elektrotechnik: Gleichstrom Felder – Wechselstrom, Hanser Verlag - Weißgerber, Wilfried (2013): Gleichstromtechnik und Elektromagnetisches Feld. Ein Lehrund Arbeitsbuch für das Grundstudium, Springer Fachmedien Wiesbaden Verlag - Bieneck, Wolfgang (2014): Grundlagen der Elektrotechnik ; Informationsund Arbeitsbuch für Schüler und Studenten der elektrotechnischen Berufe, Holland und Josenhans Verlag
Attendance	compulsory attendance during on-campus phases
Comments	

Electronic Measurement & Control Engineering

Degree programme	BEW
Semester	2
Course methods	FUV
Language	English
ECTS Credits	6.00
Incoming places	Limited

Course description	The course Electronic Measurement and Control Systems presents the fundamentals of Control Theory like Open Loop, Closed Loop model, calculation of step response and transfer function, Analysis of stability under consideration of different controllers like PID. The issue of gain – and phase margin and the digital controller are also the topics auf this course.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - explain basic terms such as Open Loop, Closed Loop model,

	Stability, gain-and phase margin, P,I and D Controller. - apply calculation method of step response and transfer function. - calculating gain-and phase margin of Control circuit - design a digital controller
Course contents	- Basic principles of Control Circuits - Laplace Transformation - Plants and Controller (P,I and D Controller) - Step Response - Transfer Function - Stability - Control Deviation - Gainand phase margin - Digitalization of the Control process
Prerequisites	Sucessful completiton of the courses of the first semester
Assessment Methods	- Assessment in writing, theory and calculations.
Recommended Reading and Material	- Distance learning materials: - Scripts - VideosBooks: - Electrical Engineering-know it all. - Haager: Regelungstechnik öbv - Matlab
Attendance	compulsory attendance during on-campus phases
Comments	

Laboratory 2

Degree programme	BEW
Semester	2
Course methods	LAB
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	Design and experimental set-up of electronic circuits and circuits, as well as their validation and characterization with modern measuring instruments.
Teaching methods	

Learning outcome	After passing this course successfully students are able to ... - design and experimental set-up basic electronic circuits and validate and characterize them with modern measuring instruments. - measure and interpret voltage and current in circuits with inductor, capacitor, transistor, resistor and diode with an oscilloscope. - simulate and design a buck converter circuit.
Course contents	- Safety regulations, laboratory rules, technical reports - ADC-DAC Voltage - Bridge circuits - Switching of an inductive load - Electronic measurement and control engineering circuits - Buck converter
Prerequisites	Electronic Engineering 1, Electronic Design 1
Assessment Methods	- Course immanent assessment method - Laboratory notes - Laboratory reports - Grading of practical session - Laboratory reports
Recommended Reading and Material	- Maxfield and others (2008): Electrical Engineering – know it all, Newnes Verlag - Seidel, Heinz-Ulrich (2003): Allgemeine Elektrotechnik: Gleichstrom Felder – Wechselstrom, Hanser Verlag - Weißgerber, Wilfried (2013): Gleichstromtechnik und Elektromagnetisches Feld. Ein Lehrund Arbeitsbuch für das Grundstudium, Springer Fachmedien Wiesbaden Verlag - Bieneck, Wolfgang (2014): Grundlagen der Elektrotechnik ; Informationsund Arbeitsbuch für Schüler und Studenten der elektrotechnischen Berufe, Holland und Josenhans Verlag
Attendance	compulsory attendance during on-campus phases
Comments	

Team Work

Degree programme	BEW
Semester	2
Course methods	FUV
Language	English
ECTS Credits	1.50

Incoming places	Limited

Course description	The course prepares students for team work in their studies and in their professional work.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - explain models of team development (for example Tuckman) and to derive interventions for their own practice. - explain team roles (for example Belbin) and to identify them in simple practical examples. - use constructive feedback in team conflicts.
Course contents	- Characteristics and criterias of success in Teamwork - Team development - Team roles - Structure of personalities in team processes - Preferred team roles and personal potential for development - Constructive feedback in conflicts
Prerequisites	none
Assessment Methods	- Course immanent assessment method
Recommended Reading and Material	- Belbin, M. R. (1999): Team Roles at Work, Oxford: Butterworth & Heinemann - Harvard Business Essentials (2004): Creating Teams with an Edge. The Complete Skill Set to Build Powerful and Influential Teams, Boston: Harvard Business School Publishing Corporation - Maginn, M. (2004): Making Teams Work: 24 Lessons for Working Together Successfully, Dubuque: McGraw-Hill Professional Education Series
Attendance	compulsory attendance during on-campus phases
Comments	none

Technical and Creative Communication

Degree programme	BEW
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.50

Incoming places	Limited

Course description	Starting from the Common European Framework of Reference for Languages B2, we aim at developing and strengthening the vocabulary of the students' field of study along with the language skills required for technical and creative communication
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - structure and describe a technical process in English for a given target group; - illustrate and explain abstract technical concepts through real-life examples; - distinguish and implement the basic formal and language-related features of technical communication.
Course contents	- audience adaptation in terms of language and content - impact analysis - technical process descriptions - elements of technical communication - technology and creativity
Prerequisites	Common European Framework of Reference for Languages Level B2 Completion of previous semester course
Assessment Methods	- Course immanent assessment method, i.e. active participation in online activities and timely completion of assignments
Recommended Reading and Material	- Schökler, G. (2015): Einzelskripten, adapted from Maderdonner, O. / et al (2014): Technical and Creative Communication, Skriptum - Connolly, P. / Kingsbury, P. et al. (2014): eSNACK, Lernplattform - Additional current handouts and audio-visual support
Attendance	Compulsory attendance during on-campus phases
Comments	

Mathematics 2

Degree programme	BEW
Semester	2
Course methods	FUV
Language	English
ECTS Credits	3.00

Incoming places	Limited

Course description	Advanced topics in engineering mathematics focussing on signal analysis and differential equations
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - decompose vectors into orthogonal components - expand a given periodic function into its Fourier series (in real and complex form) - determine Fourier and Laplace transforms of functions using tables and transformation rules (shift theorems, scaling properties) - solve simple ordinary differential equations and initial value problems using appropriate methods
Course contents	- Vectors and vector spaces, bases - Scalar products and orthogonality - Fourier series - Fourier transform - Laplace transform - Overview of types of differential equations - Solution methods for simple (in particular linear) ordinary differential equations and corresponding initial value Problems - Solving initial value problems for linear differential equations with constant coefficients using the Laplace transform
Prerequisites	Mathematics 1
Assessment Methods	- Written tests at midterm and end of semester
Recommended Reading and Material	- Papula, L. (2015): Mathematik für Ingenieure und Naturwissenschaftler Band 2, Springer Vieweg - Stingl, P. (2009): Mathematik für Fachhochschulen: Technik und Informatik, Hanser - Sturm, Th. F. (2007): Mathematik für Ingenieure 3 - Timischl, W. / Kaiser, G.: Ingenieur-Mathematik 4, E. Dorner
Attendance	compulsory attendance during on-campus phases
Comments	

Physics 1

Degree programme	BEW
Semester	2

Course methods	FUV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	The lecture focuses on the transfer of basic knowledge on mechanics and thermodynamics and electrodynamics. It is the goal to enable students to describe technical processes by means of scientific methods. Thereby an understanding of physical and scientific modelling is generated. By applying physical laws to simple technical problems the meaning of physical laws is explained.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - find out the relevant physical laws for a given technical problem and apply the laws to solve the Problem - give a physical explanation for simple processes and deduce a mathematical formulation - deduce mathematical equations based on technical Problems - transfer technical problems in a mathematical form so that calculations can be done - analyze the results of a calculation with respect to the technical consequences an give clear advice for implementation
Course contents	- Mechanics - Oszillations and waves - Thermodynamics - Electrodynamics
Prerequisites	Basic mathematical knowledge.
Assessment Methods	- Course immanent assessment method and end exam
Recommended Reading and Material	- Horst Kuchling (2004):„Taschenbuch der Physik“, Carl Hanser Verlag - Halliday, Resnick, Walker (2003): „Physik“, Wiley-VCH
Attendance	compulsory attendance during on-campus phases
Comments	

Business Communication for Engineers

Degree programme	BEW

Semester	4
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	Starting from the Common European Framework of Reference for Languages B2, students engage with global economic and technical developments and their impact on society, and thereby acquire relevant terms and concepts together with the appropriate language skills
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - recognize connections between economic theories and forms of government - analyze the impact of globalization on society and the Environment - compare and contrast corporate innovation models
Course contents	- Economic concepts and theories - Winners and losers of globalization - Development of technologies - Innovation
Prerequisites	Completion of previous course
Assessment Methods	- Course immanent assessment method, i.e. active participation in class activities and timely completion of assignments
Recommended Reading and Material	- Maderdonner, O. / et al (2014): Economy, Technology and Society, Skriptum - Additional current handouts and audio-visual support
Attendance	compulsory attendance during on-campus phases
Comments	

Business Administration 2

Degree programme	BEW
Semester	4
Course methods	FUV
Language	English

ECTS Credits	6.00
Incoming places	Limited

Course description	The course gives an introduction in the area of business administration, with special focus on cost accounting, budgeting and capital invesmtent.
Teaching methods	Distance Learning, Assignments, Videos, Group Work
Learning outcome	After passing this course successfully students are able to ... - explain tasks and functions of management accounting, - calculate costs and determine prices, - prepare a simple master budget, - make capital investment decisions based on qualitative and quantitative information.
Course contents	- management accounting - capital budgeting - budgeting - direct and indirect costs
Prerequisites	Business Administration 1
Assessment Methods	- course immanent assessment + final written exam
Recommended Reading and Material	- John R. Dyson, Accounting for non-accounting students, eight edition, Pearson
Attendance	Attendance is compulsary during on-Campus phases
Comments	

Communication Technologies

Degree programme	BEW
Semester	4
Course methods	FUV
Language	English
ECTS Credits	6.00
Incoming places	Limited

Course description	This lecture offers an introduction to digital mobile communication. On the one hand, fundamentals and implementation of mobile communication systems, in particular with the focus on:- 2nd

	Generation of mobile networks (GSM und GPRS)- 3rd Generation of mobile networks (UMTS)- 4th Generation of the mobile networks (LTE)are covered and on the other hand, the course presents fundamental techniques for data compression, channel coding and channel modeling, in particular with the focus on:- entropy coding- linear block codes- discrete channels
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - outline and compare different mobile network architectures - explain mobile radio interfaces and to list their characteristics - describe different mobile network use cases - calculate characteristics of information sources (e.g. information content, entropy) - design a binary coding with minimum average code word length for information sources - apply linear block codes to detect and correct errors
Course contents	- Radio interface, network architecture and functionalities in 2nd generation of mobile networks (GSM and GPRS) - Radio interface, network architecture and functionalities in 3rd generation of mobile networks (UMTS) - Radio interface, network architecture and functionalities in 4th generation of the mobile networks (LTE) - Principles of information theory (information content, entropy, Markov sources) - Entropy coding (Huffman and Arithmetic Coding) - Pre-Coding (run length encoding, quadtree coding) - Encoding and decoding with linear block codes (generator matrix, parity check matrix, syndrome) - Receiver strategies and channel capacity
Prerequisites	To successfully pass the course, students must have basic mathematical knowledge in:- statistics- linear algebra
Assessment Methods	- Course immanent assessment method (regular homeworks) and end exam
Recommended Reading and Material	- J. G. Proakis, M. Salehi, Digital Communications, Fifth Edition, McGraw-Hill, New York, 2008 - J. Schiller, Mobile Communications, Second Edition, Pearson Education Limited, 2003 - B. Walke, Mobilfunknetze und ihre Protokolle, Band 1 und 2, B. G. Teubner, Stuttgart, 1998. - B. Walke, M. P. Althoff, P. Seidenberg, UMTS –Ein Kurs,

	J.SchlembachFachverlag, 2001
Attendance	compulsory attendance during on-campus phases
Comments	

Computer Science 4

Degree programme	BEW
Semester	4
Course methods	FUV
Language	English
ECTS Credits	6.00
Incoming places	Limited

Course description	Computer science
Teaching methods	Distance Learning
Learning outcome	After passing this course successfully students are able to ... - simulate execution of object-oriented Java programs with pen and paper and predict behaviour and output for given input. - implement entity classes with several class invariants in Java. - analyse requirements based on class diagrams and javadocs and implement those requirements - re-implement behaviour of concrete super-classes in concrete (sub-) classes. - use classes in object oriented Java applications - implement a sortable and searchable linked list of several types of persons. - export and import data to/from text-files with streams and correct exception handling. - implement a console-based, text-menu-driven application with extendable display options using a searchable, sortable custom container that supports file import/export.
Course contents	- Object Oriented Programming (Classes, Objects, Reference, Inheritance, Polymorphism, Interfaces, inner classes) - Exceptions and Exception handling - Introduction to JAVA Collection Framework (Core Collection Interfaces, Iterators, ArrayList, LinkedList)
Prerequisites	Computer Science 1-3

Assessment Methods	- extra credit for continuous submission - final project - final test (PC-based)
Recommended Reading and Material	- David J. Eck: Introduction to Programming using Java. (several verisions, free!) [http://math.hws.edu/javanotes/] - Bert Bates, Kathy Sierra: Head First Jave. 2003, O'Reilly Media (ISBN: 978-0-596-00465-1) other - Bruce eckel: Thinking in Java. several editions, some freely available. [http://www.mindview.net/Books/TIJ/] - Joshua Bloch: Effective Java: A Programming Language Guide. 2008 Addison-Wesley Longmann. (ISBN: 978-0321356680) - Joshua Bloch, Neal Gafter: Java Puzzlers: Traps, Pitfalls, and Corner Cases. 2005, Addison-Wesley Longmann. (ISBN: 978-0321336781) - tutorials and additional information on java webpage [http://www.oracle.com/technetwork/java/index.html]
Attendance	kickoff and final test mandatory
Comments	-

Moderation & Problem Solving Techniques

Degree programme	BEW
Semester	4
Course methods	FUV
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	The course prepares the students for the role of a facilitator using relevant methods of problem solving and supporting creativity.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - plan a moderation cycle adapted to task and the needs of the target group. - explain selected creativity techniques (e.g. emotive word analysis, morphological box) and to apply them by means of examples. - explain selected analysis and decision-making techniques (e.g. Fishbone Diagram, decision matrix) and to apply them by the means of examples.

Course contents	- Ojectives and roles (eg. moderator, keep a log) of moderation - Expiration of a moderation - Brainstorming and creativity techniques - Analysis and Decision-Making-Techniques "
Prerequisites	none
Assessment Methods	- Course immanent assessment method
Recommended Reading and Material	- Pocket Mentor Series (2008): Making decisions, Boston, Harvard Business School Press
Attendance	compulsory attendance during on-campus phases
Comments	none

Physics 3

Degree programme	BEW
Semester	4
Course methods	FUV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	Course mainly focuses physical problems solveable by ODEs: for example: growth phenomena and oscillations. Prospects to wave phenomena and transport phenomena as thermal conductivity effects.
Teaching methods	Blended learning with MoodlePrivate study of well defined tasksIndividual written elaboration and collegiate review
Learning outcome	After passing this course successfully students are able to ... - Description of physical problemsMathematical solution and interpretation of resultsHow to use specific literature
Course contents	- ElectricityMagnetismGrowth EffectsOscillationProspects to wave phenomena and transport phenomena as thermal conductivity effectsUncertainty in Measurement Results
Prerequisites	Elementary physics and mathematics
Assessment Methods	- Individual written elaborationCollegiate reviewExamination
Recommended Reading	- Gerthsen: PhysikTipler: PhysikModul ScriptsWeb

and Material	
Attendance	
Comments	

Electronic Project 2

Degree programme	BEW
Semester	4
Course methods	FUV
Language	English
ECTS Credits	6.00
Incoming places	Limited

Course description	Application of electronic design to develop an electronic device in a project environment. Theme control systems
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - design and simulate electronic circuits - assemble prototypes, to operate and measure them - design and simulate analog and digital control Systems - design algorithms for control systems and apply them on a microprocessor - write technical documentations
Course contents	- Analog and digital control Systems - C-programming - Microcontroller programming - Simulation in MatLab
Prerequisites	Control systems
Assessment Methods	- Course immanent assessment method - Technical documentation - Individual examination of circuit and measurement knowledge - Working prototype
Recommended Reading and Material	- Hager, Wilhelm (200): Regelungstechnik, öbv - Schmidt, Günther (1994): Grundlagen der Regelungstechnik, Springer - Tietze, Ulrich / Schenk, Christoph / Gamm, Eberhard (1999): Halbleiter – Schaltungstechnik, Springer

	- Scripts
Attendance	compulsory attendance during on-campus phases
Comments	

Advanced Communication

Degree programme	BEW
Semester	6
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	The students acquire writing and speaking skills necessary to complete their bachelor studies, such as writing abstracts and techniques for successful presentations
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - write abstracts in compliance with given formal and language-related Guidelines - present one of their term papers in english to the exam committee and to defend their paper
Course contents	- Structure of an abstract vs. German summary - Writing process - Building an English presentation from a German paper - Presentation techniques and relevant language
Prerequisites	Common European Framework of Reference for Languages Level B2Completion of previous semester course
Assessment Methods	- Course immanent assessment method, i.e. active participation in class activities and timely completion of assignments
Recommended Reading and Material	- Maderdonner, O. / et al (2014): Abstract Writing, Skriptum - Maderdonner, O. / et al (2014): Presentation Essentials, Skriptum - Additional current handouts and audio-visual support
Attendance	compulsory attendance during on-campus phases
Comments	

Business Law

Degree programme	BEW
Semester	6
Course methods	FUV
Language	English
ECTS Credits	6.00
Incoming places	Limited

Course description	Imparting knowledge of selected legal topics regarding the international economic law
Teaching methods	*) Presentations and examples for self assessment *) Case studies as examples and for self study *) Scrips for self study
Learning outcome	After passing this course successfully students are able to ... - specify the legal rules - interpret legal cases - find solutions for legal problems by using these legal rules - utilise selected legal data-banks - evaluate legal decisions concerning defined questions and answer these questions - develop arguments to justify legal decisions
Course contents	- International Economic Law, Introduction, Actors and Rules/Principles - World Trade Organization (WTO) and law of the WTO - United Nations Convention on Contracts for the International sale of goods - Law of the European Union & Case Study - Competition Law - International property rights
Prerequisites	None
Assessment Methods	- Assignments (50%) and Exam (50%), but at least 1% from each part
Recommended Reading and Material	- Scripts and materials (audio-visual presentations, etc.) available in the downloadarea of moodle
Attendance	compulsory attendance during on-campus-phases
Comments	

Change Management

Degree programme	BEW
Semester	6
Course methods	FUV
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	The course Change Management prepares the students for contact with change processes from a systemic view.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - identify phases (for example by B. Conner) and dynamics (symptoms, causes) of resistance using simple examples and explain. - name basic models of change management (for example 3-phase-model of Lewin, strategy models of Glasl) and to analyze concrete situations by reference to them. - explain methods of integration of employees (for example kick-off workshop , interview) and to explain consequences of participation / non-participation.
Course contents	- Guidelines and models for change processes - Context clarification - Handling of resistance - Systemic Thinking - Methods of employee participation
Prerequisites	none
Assessment Methods	- Course immanent assessment method (participated sucessfully)
Recommended Reading and Material	- Conner, Daryl R. (2006): Managing at the speed of change, Verlag Randome House, NY - Key Literature of the course: Managing at the Speed of Change: How Resilient Managers Succeed and Prosper Where Others Fail, New York, 2006. - Spencer Johnson, Who moved my Cheese. An Amazing Way to Deal with Change in your Work and in your Life, New York 1998 - Jeannene LaMarsh, Changing the Way We Change. Gaining Control of Major Operational Change, 1995

	- Harvey Robbins, Michael Finley, Why Change doesn't Work. Why Initiatives go Wrong and how to Try Again - and Succeed, 199 - Managing Change and Transition. Practical Strategies to Help You Lead During Turbulent Times (Harvard Business Essential Series), 2003
Attendance	compulsory attendance during on-campus phases
Comments	none

Technology Management

Degree programme	BEW
Semester	6
Course methods	FUV
Language	English
ECTS Credits	6.00
Incoming places	Limited

Course description	Technology Management
Teaching methods	Lecture,Self Studies,Elaborations on set topics, Preparation of a seminar paper on an individually agreed case.
Learning outcome	After passing this course successfully students are able to ... - explain typical challenges in Innovation- and Technology Management. - apply simple tools for organizing Innovation and Technoloy Management projects.
Course contents	- Differentiation: Technology Management - Innovation Management - Importance of Technology and Innovation Management for enterprises and organizations. - Spotting opportunities for Technology and Innovation Management - Designing plans for Technology and Innovation Management activities.
Prerequisites	According to the position of the course in the Program's Curriculum
Assessment Methods	- Assignments - Presentation - Final written exam
Recommended Reading and Material	- The Tao of Innovation: Nine Questions every Innovator must answer. Tan, Teng-Kee et al., 2015, Imperial College Press, ISBN:

	978-1-78326-620-3
Attendance	Compulsory
Comments	

Master DEGREE PROGRAMS

Information Systems Management (MWI)

System Integration

Degree programme	MWI
Semester	2
Course methods	ILV, FL
Language	English
ECTS Credits	5.00
Incoming places	Limited

Course description	All the different applications of a company‘s IT environment need to communicate with other systems. The course Systems Integration focuses on the fundamentals and most important concepts to improve communication between IT systems on each level to help you to plan and develop value-adding integration solutions. The objective is to get to know the most important concepts for Enterprise Application Integration (EAI). Microsoft BizTalk Server serves as an example of how Microsoft implemented these patterns and principles. Practical exercises will give the possibility to gain some experience in developing system integration solutions.
Teaching methods	Review questions, practical exercises, presentation of solutions, preparation and presentation of a related topic as part of the group project
Learning outcome	After passing this course successfully students are able to ... - reproduce the context, advantages and disadvantages of basic messaging principles and common data formats (flat files and XML) in terms of connecting IT systems. - reproduce and explain the most important enterprise application integration patterns. - explain the purpose of transactions and their use as atomic or long-running transactions within enterprise application integration solutions. - reproduce and evaluate the advantages and disadvantages of enterprise application integration patterns to develop a suitable integration software design.

	- analyse and to make use of the different roles and environments needed as part of the software development process. - apply the basic principles of web services to implement SOAP and WSDL based web services by using Microsoft Visual Studio as development environment. - develop an enterprise application integration solution by using Microsoft BizTalk Server as messaging middleware.
Course contents	- Message based communication - Web services - Enterprise application integration - Reliability and environments - Message broker - Content-based routing - Business process modeling - Transactions
Prerequisites	
Assessment Methods	- Review questions - 15% - Practical exercises - 30% - Group project - 30% - Final Exam - 25%
Recommended Reading and Material	- Course book - VMware image including a complete Microsoft BizTalk Installation
Attendance	In general attendance is not mandatory in this course. But you only get the points for the review questions and practical exercises if you attend the corresponding class. Please plan the attandance so that you can positively complete the different parts of the course.
Comments	

International Business and Engineering (MIW)

Int. Marketing und Product Management

Degree programme	MIW
Semester	2
Course methods	ILV, FL
Language	English
ECTS Credits	3.00

Incoming places	Limited

Course description	Internationalization, globalization and culturalization are currently known as key success factors of market and brand leadership. According to the current meaning students shall gain an overview of decision fields and peculiarities of international marketing in theory comparison and in the dispute with practice-oriented decision-making situations based on case studies. In particular, students should learn to understand the strategic challenges of market-oriented internationalization strategies and shall name the resulting consequences and requirements on the analysis, Market Selection- and positioning decision and apply. Using practical examples, the students will be sensitized between mainstream marketing and International Marketing with respect to the differences in the marketing mix and should – from the perspective of an acting marketing head - acquire knowledge to build, implement and guide a comprehensive internationalization process from the perspective of marketing communication.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - explain the main spheres of activity of nternationalization by Kotler and implement their consequence on the basis of practical cases decisions (Case Studies). - apply cultural influences on the models of Hofstede, Hall and Thomas as an evaluation basis for environmental analysis and market selection to analyze their influence on the assessment of market attractiveness and to develop appropriate market selection programs. - assess different brands from the FMCG, IGM and DLM regarding their internationalization and positioning strategies and identify the differences in the respective marketing mix. - implement the essential decisions of internationalization based on a Case Study in objective, market selection and program design (marketing mix development) and to justify their choices from the perspective of marketing managers. - identify the essential model and approach differences in the product, price, distribution and communication policy between mainstream marketing and international marketing, to interpret their impact on the company's success and its market position and to develop plans for an independent marketing mix based on given project tasks in the context of an internationalization strategy at the

	level of the market leaders.
Course contents	- Introduction to the global product and brand management - Global product strategies and their origins - Management of global brands during the product life cycle - Standardization versus adaption - Analysis of various branding strategies based on familiar examples
Prerequisites	- Basic Knowledge of Mainstream Marketing and Business Administration- English speaking and writing | Level C1
Assessment Methods	- written exam (75%) - exams via Moodle (each 5%, total 25%)
Recommended Reading and Material	- Hollensen (2012): Essentials of Global Marketing, Pearson - Müller/Gelbrich (2004): Interkulturelles Marketing, Vahlens - Usunier/Lee (2012): Marketing Across cultures, Pearson
Attendance	Attendance is compulsory
Comments	

Marketing Trends

Degree programme	MIW
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	This marketing course supports the deepening of already acquired basic knowledge in international marketing. The course builds a bridge to the actual development in all areas of marketing activities.
Teaching methods	Key note speach; case studies; research; presentations
Learning outcome	After passing this course successfully students are able to ... - have an entire understanding of the marketing trends for a company and surrounding areas; - on basis of this knowledge they are able to develop marketing strategies for enterprises in different industries; - transfer already acquired marketing skills in the diverse entrepreneurial challenges in our days.

Course contents	- Employer Branding - Big Data - Neuromarketing - Corporate Social Responsibility and Sustainability - Mass Customization - Crossmedia - Social Media - Content Marketing - Multi-Channel Retailing
Prerequisites	English in written and spoken | Level C1- Int. Marketing and product management
Assessment Methods	
Recommended Reading and Material	- Thomas/Pop/Iorga/Ducu (2017): Ethics and Neuromarketing, Springer - Marr, Bernard (2016): Big Data in Practice, Wiley - Mosley, Richard (2014): Employer Brand Management, Wiley - Camilleri, Mark (2017):Corporate Sustainability, Social Responsibility and Environmental Management, Springer - Usunier/Lee (2012): Marketing Across Cultures, Pearson Education Limited
Attendance	compulsory attendance
Comments	

Global Economy und Case Studies 2

Degree programme	MIW
Semester	2
Course methods	SE
Language	English
ECTS Credits	2.00
Incoming places	Limited

Course description	Students engage with the impact of global economic developments on selected countries and societies through lectures and seminar papers
Teaching methods	Seminar – attendance is mandatory.
Learning outcome	After passing this course successfully students are able to ...

	- analyse the connections between economic theories and government policies analyse the impact of globalisation on society and the environment use given guidelines to write term papers about current economic topics
Course contents	- Political and economic challenges in developed and threshold countries, particularly BRICS and MINT countries Globalisation strategies of multinational corporations Seminar papers on global economic topics
Prerequisites	Global economy 1
Assessment Methods	- Active participation and quality of written contributions including term paper
Recommended Reading and Material	- Current handouts and audio-visual support
Attendance	Attendance is compulsory
Comments	

Healthcare and Rehabilitation Technology (MGR)

Wahlfach - Introduction to MATLAB for Applications in Life Sciences

Degree programme	MGR
Semester	2
Course methods	SO
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	This course freely follows the previous introduction to MATLAB for Applications in Life Sciences (MLS1) and furthermore deepens the foundations of selected chapters from the field of life sciences. At the end of the course, students should be able to use MATLAB in their own work for purposes of processing presented signals/biosignals. The course consists of interactive lectures with students solving sample MATLAB problems ranging in difficulty. Individual topics can be introduced into the course setup.
Teaching methods	Interactive lectures about selected topics from the field of Life Sciences, Practical solution of assignments by students supported by

	lecturer, Project consultations
Learning outcome	After passing this course successfully students are able to ... - Use MATLAB for data manipulation and visualization - Generate signals and perform basic signal operations in MATLAB - Create and use basic digital filters to process signals in MATLAB - Apply gained knowledge and techniques to analyse specific biomedical signals (ECG/EMG etc.)
Course contents	- Signals classification and properties - Operations with signals and signal generation - Design of digital filters - Biosignal analysis
Prerequisites	Basic programming knowledge, General knowledge from Life Sciences on bachelor level
Assessment Methods	- Activity during lectures
Recommended Reading and Material	- V.K. Ingle and J. G. Proakis, Digital Signal Processing Using MATLAB, 1st ed. Pacific Grove, USA: Brooks/Cole Pub. Co., 1999 - A. B. Biran, What Every Engineer Should Know About Matlab and Simulink. New York: Taylor & Francis Group, 2010.
Attendance	Attendance is mandatory, only 20% of absence is tolerated
Comments	

Telecommunications and Internet Technologies (MTI)

Mobile and Wireless Systems

Degree programme	MTI
Semester	2
Course methods	SE, FL
Language	English
ECTS Credits	6.00
Incoming places	Limited

Course description	Introduction to mobile communication and wireless access networks
Teaching methods	Lectures & two written exams
Learning outcome	After passing this course successfully students are able to ... - explain the architecture of current mobile networks and to describe

	the functions of the network elements. - explain the technical implementation of mobile radio network procedures (like network attachment, connection setup, handover, connection release, e.g.) and the related signaling mechanisms between the network elements. - explain the physical layer technologies used on the radio interface (digital modulation schemes, multiplex and multiple access methods, antenna technologies, e.g.) and to model them using mathematical methods. - explain multiplexing and multiple access methods as well as media access mechanisms used in wireless systems.
Course contents	- Network architectures, network elements and protocols in mobile communications systems (GSM, GPRS, UMTS, LTE, ...) - Radio systems for IoT devices (NB-IoT, Lora, …) - Procedures and signaling in mobile systems - Physical layer technologies on the radio interface
Prerequisites	Completion of all previous MTI courses
Assessment Methods	- Two written exams
Recommended Reading and Material	- Deepening & optional: Martin Sauter: From GSM to LTE-Advanced Pro and 5G: An Introduction to Mobile Networks and Mobile Broadband; Third Edition, Wiley 2017
Attendance	optional
Comments	

IP Routing and Network Management

Degree programme	MTI
Semester	2
Course methods	LAB, FL
Language	English
ECTS Credits	6.00
Incoming places	Limited

Course description	Planning, configuration and operation of IP routing protocols, Multiprotocol Label Switching, VPN and management of IP networks
Teaching methods	
Learning outcome	After passing this course successfully students are able to ...

	- explain IP routing concepts, MPLS and VPN services - configure IP routing protocols (OSPF, BGP , ...) in the simulator or in the lab - explain modern network management methods such as SNMP, Software Defined Networking and Network Function Virtualization
Course contents	- IP routing protocols (OSPF, BGP) - MPLS and VPN Services - Management of IP networks, SNMP - Software Defined Networking and Network Function Virtualization - simple network analysis
Prerequisites	Completion of all previous MTI courses
Assessment Methods	- Assessment of laboratory exercises / simulation exercises documented by students in lab protocols - Reflection about laboratory protocol / exercise with the lector
Recommended Reading and Material	- Kent Hundley: Alcatel-Lucent Scalable IP Networks Self-Study Guide; Wiley Publishing Inc. 2009 - Relevant RFCs - Selected white papers of vendors of network components
Attendance	compulsory attendance
Comments	

Credit Course RFID and NFC for IoT Systems 2

Degree programme	MTI
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	NFC enabled smartphones and devices with NFC air interface became more important regarding industry 4.0. Information about the specified protocols, data rates, and formats are placed in this course.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - design an NFC tag-based application - evaluate different NFC modes regarding their technical

	parameterization - compare RFID and NFC
Course contents	- Definition of NFC - Architecture - NFC data exchange format (NDEF) - Compatibility with RFID - Operating modes - Field of applications - Problem areas
Prerequisites	Completion of all previous MTI courses
Assessment Methods	- Presentation
Recommended Reading and Material	- Finkenzeller, Klaus.(2012: RFID-Handbuch: Grundlagen und praktische Anwendungen von Transpondern, kontaktlosen Chipkarten und NFC, Carl Hanser Verlag GmbH & Co. KG; Auflage: 6., aktualisierte und erweiterte Auflage - Igoe, Tim/ Coleman, Don/ Jepson, Brian. 2014: NFC mit Android und Arduino; O'Reilly Verlag; Auflage: 1
Attendance	Optional
Comments	

Telecommunications and Internet Markets

Degree programme	MTI
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	This course deals with basic theories of Marketing aspects in view of the Telecom and Internet Industry. Topics are Strategic Product Planning, Market Segmentation, Target Market definition and Positioning.The Theory is applied to new Trends and Products in the Telecom and Internet Industry manufacturers, and Internet content providers.
Teaching methods	Initial LessonStudents prepare own Lessons on predefined topics.Joint Discussion

Learning outcome	After passing this course successfully students are able to ... - describe the Telecom and Internet industry and corresponding markets - explain the basic marketing theories for Product strategy, Segmentation, Target Markets and Segmentation. - name some recent trends in the industry and provide a educated estimation in view of the marketrelevance of those trends and products.
Course contents	- Telecom and Internet industry, Technology Life Cycle, - Product strategy, Segmentation, Target Markets and Segmentation. - Analysis of new technologies for communication producst and services.
Prerequisites	Completion of all previous MTI courses
Assessment Methods	- Seminar lecture - Participation
Recommended Reading and Material	- Principles Of Marketing, Kotler & Armstrong - Principles of Marketing from http://www.saylor.org/books - The Product Managers Desk Reference, Steven Haines - Praxishandbuch Produktmanagement, Erwin Matys - Crossing the Chasm, Geoffrey Moore - OECD Digital Economy Outlook 2017 (online readable, http://www.oecd.org) - + Various Internet resources
Attendance	Obligatory
Comments	

IT Project Management

Degree programme	MTI
Semester	2
Course methods	SE, FL
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	In this course you learn about the fundamentals of project management based on the PMA approach, with focus on the project

	start process. - Develop knowhow on project management methods - Discuss the benefits of professional project management - Apply project management methods on a project
Teaching methods	PresentationDiscussion
Learning outcome	After passing this course successfully students are able to ... - define projects, to initialize projects and to discuss and to analyze the use of project management - discuss and to apply project management methods (project objectives plan, objects of consideration plan, work breakdown structure, project environment analysis, ...) based on a project description
Course contents	- Project management definition Methods of the project start: - Project assignment - Project objectives - Project planning - Project costs - Project organization
Prerequisites	Completion of all previous MTI courses
Assessment Methods	- Course immanent assessment method consisting of - Groupwork - Exam
Recommended Reading and Material	- Gareis, R. (2006): Happy Projects!; Manz (available at our library in German and English)
Attendance	Mandatory
Comments	none

Intercultural Communication

Degree programme	MTI
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	We aim at raising intercultural awareness and broadening the students' horizons

Teaching methods	Interactive, multi-channel, real-life-based presentations and discussions, with an emphasis on student participation.
Learning outcome	After passing this course successfully students are able to ... - meet the challenges of communicating with members of other cultures - recognize the potential of working in an intercultural team - act flexibly and confidently in an unknown environment
Course contents	- Terms and theories of culture: Johari window, Iceberg theory etc. - Manifestations of culture - Inside and outside perspectives on culture - English as a lingua franca for intercultural encounters
Prerequisites	Completion of all previous MTI courses
Assessment Methods	- Course immanent assessment method, i.e. active participation in class activities and timely completion of assignments
Recommended Reading and Material	- Trompenaars, F., and Hampden-Turner C., (1998) Riding the Waves of Culture, London: Nicholas Brealey ISBN 1-85788-176-1 (on CIS) - Additional current handouts and audio-visual support
Attendance	Compulsory
Comments	

Credit Course Agile Software Development

Degree programme	MTI
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	In this course students learn about the fundamentals of agile project management based on the SCRUM approach, with additional aspects like effort estimation and the pre project phase. Develop knowhow on agile project management methods. Discuss further agile topics based on student presentations.
Teaching methods	

Learning outcome	After passing this course successfully students are able to ... - define agile projects, to initialize projects and to discuss and to analyze the use of agile project management - discuss and apply agile project management methods based on a project description - attend on effort estimation process
Course contents	- Agile Project management models with focus on software and IT projects: - Pre Project phase - Differences between classical models and agile approaches - SCRUM as process - SCRUM roles - Effort estimation biases and process
Prerequisites	Completion of all previous MTI courses
Assessment Methods	- Final written exam - Students presentation
Recommended Reading and Material	- Kenneth S. Rubin: Essential Scrum: A Practical Guide to the Most Popular Agile Process (Addison-Wesley Signature Series (Cohn)) Paperback, August 5, 2012
Attendance	Mandatory
Comments	Credit course: Registration for regular students to this course takes place at the beginning each semester, hence this course depending on amount of registrations might not open.

Credit Course iPhone App Development 2

Degree programme	MTI
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	This course features profound practical knowledge in app development on one of the currently most relevant mobile smartphone platforms. In the course, the students develop a smartphone app under the guidance of the lecturer.

Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - Implement advanced concepts and technologies (sensors, maps, notifications,...) - Using Core Data for persistent storage of data - Path through distribution process (including localization)
Course contents	- Sensors - Core Data - Localization - Notifications - Distribution - Swift
Prerequisites	Completion of all previous MTI courses
Assessment Methods	- Presentation of project results
Recommended Reading and Material	- Mike Rogers (2015): Swift Recipes: Problem-Solution Approach, Apress - Neil Smyth (2015): iOS 8 App Development Essentials - Second Edition: Learn to Develop iOS 8 Apps using Xcode and Swift 1.2, CreateSpace Independent Publishing Platform - Official Developer Page: http://developer.apple.com/devcenter/ios/index.action
Attendance	Optional
Comments	Credit course: Registration for regular students to this course takes place at the beginning each semester, hence this course depending on amount of registrations might not open.

Credit Course User Experience Design

Degree programme	MTI
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	UID Basics and introduction into User Centred Design methods
Teaching methods	lightning talks, discussions, group work, small exercises

Learning outcome	After passing this course successfully students are able to ... - define UX Design methods and name their (dis)advantages as well as intended use - name and define ux design guidelines - create UX prototypes and validate them with user based tests
Course contents	- UX Definitions and Design-Guidelines - UX Prototyping (tool based) - UX Evaluation (in a lab environment)
Prerequisites	basics of computer science
Assessment Methods	- Course immanent assessment
Recommended Reading and Material	- Neuro Web Design, What makes them click? Weinschenk Susan, 2009, New Riders - About Face - Interface and Interaction Design Cooper Alan, Reimann Robert, Cronin David, 2010, mitp - Universal Principles of Design, Lidwell William, Holden Kritina, Butler Jil, 2010, Rockport Publishers - The powerpoint slides of this course show, what parts of the books are relevant
Attendance	Optional - (please see comments)
Comments	Credit course: Registration for regular students to this course takes place at the beginning each semester, hence this course depending on amount of registrations might not open.

Credit Course Android App Development 1

Degree programme	MTI
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	In this course, students will learn how to develop Android apps using Android Studio.
Teaching methods	lectures / live demos, online trainings, presentations by students
Learning outcome	After passing this course successfully students are able to ... - develop and design a simple Android app with Android Studio and

	the use of the Android debugging tools - install and test the app in the emulator and the phone
Course contents	- Android Studio and debugging tools - Implementation of an Android app
Prerequisites	Basic knowledge according to the admission requirements.The learning objectives are individually oriented to the respective previous knowledge of the students (Beginner, Advanced Learner and Pro Track)
Assessment Methods	- Course immanent assessment method - Presentation and discussion of the developed app
Recommended Reading and Material	- Android Developer Page: http://developer.android.com/index.html - Udacity course: Developing Android Apps: https://www.udacity.com/course/developing-android-apps--ud853
Attendance	required
Comments	Credit course: Registration for regular students to this course takes place at the beginning each semester, hence this course depending on amount of registrations might not open.

Credit Course Android App Development 2

Degree programme	MTI
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	In this course, students will learn how to develop Android apps using Android Studio.
Teaching methods	lectures / live demos, online trainings, presentations by students
Learning outcome	After passing this course successfully students are able to ... - develop and design a simple Android app with Android Studio and the use of the Android debugging tools - install and test the app in the emulator and the phone
Course contents	- Android Studio and debugging tools - Implementation of an Android app

Prerequisites	Basic knowledge according to the admission requirements.The learning objectives are individually oriented to the respective previous knowledge of the students (Beginner, Advanced Learner and Pro Track)
Assessment Methods	- Course immanent assessment method - Presentation and discussion of the developed app
Recommended Reading and Material	- Android Developer Page: http://developer.android.com/index.html - Udacity course: Developing Android Apps: https://www.udacity.com/course/developing-android-apps--ud853
Attendance	required
Comments	Credit course: Registration for regular students to this course takes place at the beginning each semester, hence this course depending on amount of registrations might not open.

Credit Course Error Correcting Codes

Degree programme	MTI
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	This Course will provide a deeper view about error correcting codes. Especially following Codes will be the topic of discussions: Reed Muller code and its special realization Hadamard Code, cyclic Codes like BCH and Reed Solomon as well as convolutional Codes like Viterbi one. A simulation of this Code in MATLAB and Simulink will be a part af this course
Teaching methods	Scipts and simulations will be used during this courses
Learning outcome	After passing this course successfully students are able to ... - generate a Hadamard Code and simulate it - generate a cyclic BCH and Reed-Solomon Code and simulate it - generate a convolutional codes and simulate it
Course contents	
Prerequisites	Basis knowledge of ECC

Assessment Methods	
Recommended Reading and Material	
Attendance	
Comments	Credit course: Registration for regular students to this course takes place at the beginning each semester, hence this course depending on amount of registrations might not open.

Credit Course Foundation of an enterprise

Degree programme	MTI
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Credit Course Digital Radio and TV Systems 2

Degree programme	MTI
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	This course gives an overview about the digital transmission technologies in DVB-S/S2, DVB-C/C2 and DAB/DAB+ systems as far as LTE/Broadcast functionalities.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - explain the technical differences of the variousDVB Systems and show there robustness in comparison to analog systems - explain all necessary quality parameters (e.g. C/N) of a digital transmission chain

Course contents	- Digital signal processing and digital transmission systems - DVB-S/S2, DVB-C/C2, DAB+, DRM, DRM+, LTE/Broadcast
Prerequisites	Completion of all previous MTI courses
Assessment Methods	- presentation / written examination
Recommended Reading and Material	- Walter Fischer: Digitale Fernseh-und Hörfunktechnik in Theorie und Praxis (3.Auflage); Springer - Ulrich Reimers: DVB-Digitale Fernsehtechnik (3.Auflage); Springer - 3gpp Rel. 14
Attendance	Optional
Comments	Credit course: Registration for regular students to this course takes place at the beginning each semester, hence this course depending on amount of registrations might not open.

Credit Course Windows Server 2

Degree programme	MTI
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	Windows Server 2 is about the following topics:- Domain Controller- Active Directory- File services and storage- Group Policy- Windows Firewall
Teaching methods	Based on practical topics each lesson, the student will learn partially the basics of administrating windows server
Learning outcome	After passing this course successfully students are able to ... - ADDS installation - ADDS administration - File service and storage installation - File service and storage administration - Group Policy administration - Windows Firewall administation
Course contents	- Windows Server 2012 R2 / 2016 - Powershell 5 - Active Directory Directory Services

	- Group Policy - Windows Firewall - File service and storage Services
Prerequisites	Basic knowledge of Windows Server, AD, GPO as well as advanced knowledge of virtualization and networks.
Assessment Methods	- protocols
Recommended Reading and Material	
Attendance	Attendance is mandatory
Comments	Credit course: Registration for regular students to this course takes place at the beginning each semester, hence this course depending on amount of registrations might not open.

Credit Course Internet of Energy 2

Degree programme	MTI
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	The requirements for the energy supply have changed fundamentally. Global warming is now considered as driver for changes in the energy sector and requires a holistic view of the electricity, gas and heat / cold supply. Our flats are becoming smart homes and our cities will be developed to smart cities. To ensure the potential synergies of different infrastructure technologies, it requires a high information and data exchange. This means that the IT and telecommunication sector get an increasingly important role in context of energy supply. The objective of merging the disciplines of energy, IT and telecommunications is imminent. In addition to considering the requirements for climate change, end users should have additional comfort and should have possibilities to become more efficient in the use of energy.In the lecture "Internet of Energy" the requirements for future energy networks will be shown and a potential migration path starting from todays energy networks via Smart Metering towards Smart Grids is discussed. The

	corresponding enabling technologies are presented and the main processes and operational management aspects are highlighted.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - identify the essential components of a smart home. - recognize and explain the interactions of energy and communication in urban areas and Smart Cities.
Course contents	- Smart Home - Smart City
Prerequisites	Completion of all previous MTI courses
Assessment Methods	- End exam or students work out selected topics in group work.
Recommended Reading and Material	- Stephen F. Bush: Smart Grid: Communication-Enabled Intelligence for the Electric Power Grid, Wiley – IEEE, Hardcover, March 31, 2014
Attendance	Optional
Comments	Credit course: Registration for regular students to this course takes place at the beginning each semester, hence this course depending on amount of registrations might not open.

Credit Course Mental Power in IT Disciplines

Degree programme	MTI
Semester	2
Course methods	SE, FL
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	In thus course you will learn to use the whole capacity of your brain to solve problems and to achieve any goal you wish.
Teaching methods	- Seminar- Distant Learning
Learning outcome	After passing this course successfully students are able to ... - formulate goals you want to achieve which are suitable for your subconsious mind - practicing basic elements of attention meditation - focus the consciousness mind on goals to align unconscious

	processes
Course contents	- Processing of information in the human brain - Consciousness and unconsciousness parts of the brain - Gaining consciousness use of primarily unconsciousness parts of the brain - Using skill full meditation techniques to improvebusiness performance
Prerequisites	Completion of all previous MTI courses
Assessment Methods	- Continuous assessment
Recommended Reading and Material	- James Borg, "Mind Power", Pearson 2010 - Kazuo Inamori, "A Compass to Fulfillment", Mc Graw Hill 2010 - Heinz Hilbrecht, "Meditation und Gehirn", Schattauer, 2010 - Richard Bandler, "Veränderung des subjektiven Erlebens", Jungfern Verlag 2007, Original: "Using your brain - for a change", Real People Press, U.S. (August 1985) - Henry P. Stapp, "Mindful Universe" 2nd Edt Springer 2011 - Chade-Meng Tan "Search Inside Yourself" Optimiere dein Leben durch Achtsamkeit, Goldmann Verlag 2015
Attendance	Required
Comments	Credit course: Registration for regular students to this course takes place at the beginning each semester, hence this course depending on amount of registrations might not open.

Credit Course Digital Broadcast and Mobile Network Lab 2

Degree programme	MTI
Semester	2
Course methods	LAB
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	This course deals with the practical application of DAB+ transmission techniques and a testimplementation of a gsm network
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - implement a DAB+ sender and receiver based on open source

	technologies - catch and analyse signals in digital broadcasting networks - implement an openBTS network
Course contents	- Analysis of signal transmission in digital broadcasting networks - Implementing of a DAB+ transmission chain - implementing of an openBTS network
Prerequisites	Completion of all previous MTI courses
Assessment Methods	- Assessment of the lab protocol
Recommended Reading and Material	- Walter Fischer: Digitale Fernseh-und Hörfunktechnik in Theorie und Praxis (3.Auflage); Springer - Ulrich Reimers: DVB-Digitale Fernsehtechnik (3.Auflage); Springer
Attendance	required
Comments	The course is blocked on two Saturdays

Digital Transmission Systems

Degree programme	MTI
Semester	2
Course methods	SE, FL
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	Basic principles of source- and channel-coding in digital transmission systems
Teaching methods	Lectures, assignments & written exams (Moodle-based)
Learning outcome	After passing this course successfully students are able to ... - understand source- and channel-coding principles. - encode and decode information using common source- and channel-coding algorithms. - understand the basic types of channel models and receiver strategies. - understand and apply the mathematical foundations of source- and channel coding.
Course contents	- Source- and channel-coding - Channel-models

	- Receiver strategies
Prerequisites	Completion of all previous MTI courses, especially Telecommunication Engineering
Assessment Methods	- Moodle-based written exam (90%), assignments (10%)
Recommended Reading and Material	- Lecture-notes (Moodle)
Attendance	optional
Comments	Credit course: Registration for regular students to this course takes place at the beginning each semester, hence this course depending on amount of registrations might not open.

Telecommunication Service Delivery Plattforms

Degree programme	MTI
Semester	2
Course methods	SE, FL
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	This course introduces the IP Multimedia Subsystem (IMS). It is a platform for telco operators to develop and provide telecommunication services and is based on the Session Initiation Protocol (SIP) including specific protocol extensions.
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - explain the reasoning behind IMS, - describe the architecture of IMS, - explain the roles of different network elements and - explain the most important procedures (registration session setup/ear down, integration of service platforms)
Course contents	- The architecture of IP Multimedia Subsystems (IMS) - The role of the network elements of IMS - The main protocol procedures of IMS (registration, session setup/tear down) - Messages-flows and analysis - Further aspects: Quality of Service, Charging

Prerequisites	Completion of all previous MTI courses
Assessment Methods	- Written end exam
Recommended Reading and Material	- G. Camarillo, M. Garcia-Martin (3rd edition, 2008): The 3G IP Multimedia Subsystem, (IMS), Wiley & Sons - M.Poikselka, G.Mayer, H. Khartabil (3rd edition, 2009): The IMS - IP Multimedia Concepts and Services, Wiley & Sons
Attendance	Optional
Comments	

Integrative Urban Development - Smart City (MSC)

Scientific Writing

Degree programme	MSC
Semester	4
Course methods	SE
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	Writing a scientific paper on master thesis topic in the format and style of an IEEE Scientific Paper
Teaching methods	Seminar
Learning outcome	After passing this course successfully students are able to ... - write abstracts of scientific papers according to the given formal and linguistic criteria - write scientific papers in accordance with the style required by the discipline - use appropriate linguistic features and language style for scientific papers
Course contents	- The role, content, style, forms (or research and review) of scientific papers - Outline of a scientific paper - Linguistic criteria of a scientific paper - Constituents of a scientific paper
Prerequisites	all modules of semesters 1-3

Assessment Methods	course contents and assesment of Scientific Paper
Recommended Reading and Material	- IEEE Editorial Style Manual - Academic Integrity at MIT - Glasman-Deal, H. (2011): Science Research Writing for Non-Native Speakers of English - Course material provided by Lecturer
Attendance	Attendance is compulsory
Comments	Prerequisites not required for Incomings

Project 2

Degree programme	MSC
Semester	2
Course methods	PRJ
Language	German/English
ECTS Credits	6.00
Incoming places	Limited

Course description	Implementation of project analyzed in first semester
Teaching methods	project work
Learning outcome	After passing this course successfully students are able to ... - plan a project based on functional requirements - realize resource planning - implement project based on requirements - write a scientific paper about project results
Course contents	- Implementation of project in (an interdisciplinary) team - document progress in the project manual - project specification - time and resource planning - implement project based on resource planning
Prerequisites	project work 1, technical skills depending on project topic
Assessment Methods	- course immanent, project result, documentation, presentations, paper
Recommended Reading and Material	- depending on project tropic
Attendance	Attendance is compulsory.

Comments	

IT Security (MCS)

Advanced English Communication

Degree programme	MCS
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	We aim at conveying the language-related criteria and techniques required for leading and participating in discussions and writing a summary on current issues and topics in International Business, Software Development and innovation. The theory and examples of different innovative management concepts will be analysed for the possible implementation in the students' own business environment. Moreover, the course will examine the unique organisational cultures and management concepts that enable innovation.
Teaching methods	Active participation and discussion .Fulfilment of writing assignments and presentation
Learning outcome	After passing this course successfully students are able to ... - understand the importance of culture to a firm. - explain the characteristics of an innovative culture. - develop concepts for how an organisation can become more innovative. - use of subject specific vocabulary
Course contents	- Language and techniques for leading a subject related discussion - Defining, researching, presenting, and leading a discussion on an appropriate professional topic; - Vocabulary work-up based on research sources for the discussion topic - Writing a summary of the main facts and arguments pertaining to the discussion topic

	- Schumpeter's concept of creative destruction / Schien's theory of leadership / Cameron and Quinn's model for diagnosing organisational culture - Case studies: Innovative businesses, e.g. Google, Apple, Toyota
Prerequisites	Common European Framework of Reference for Languages Level B2
Assessment Methods	- Course immanent assessment method, i.e. active participation in class activities and timely completion of assignments
Recommended Reading and Material	- Lecturer Handouts
Attendance	Compulsory
Comments	

Scientific Writing

Degree programme	MCS
Semester	4
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	The focus of the course is an overview of academic language and formal criteria required for writing and presenting a conference paper, and writing an abstract.
Teaching methods	Teaching methods will be used to give the students opportunities to improve and refine their written language skills. Mini- lectures will be used for input on writing techniques and use of language. However, students will also be given in-class activities to actively engage in using the language in order to enhance language awareness and sensitivity. These activities may include pair activities, group activities, etc. Students will be encouraged to approach written language analytically and critically, for example by giving constructive feedback after in-class writing activities, comparing and analyzing texts, etc. Students will be encouraged to use appropriate language when presenting.
Learning outcome	After passing this course successfully students are able to ...

	- structure a conference paper according to the formal criteria given - write a conference paper according to the language related criteria given - write an abstract according to the formal criteria given - write an abstract according to the language related criteria given - present a conference paper
Course contents	- The role, content, structure, and style of a conference paper - The role, content, style and types of scientific abstracts - Language-related criteria of a conference paper and an abstract - Writing a conference paper and abstract - Presenting a conference paper
Prerequisites	Completion of previous semester courses
Assessment Methods	- Active participation in class activities and timely completion of assignments
Recommended Reading and Material	- Göschka, M. et al (2014) Guidelines for Scientific Writing, Skriptum Additional current handouts
Attendance	Attendance is compulsory at all lessons for this course.
Comments	

Tissue Engineering and Regenerative Medicine (MTE)

Gene Regulation and Signal Transduction

Degree programme	MTE
Semester	2
Course methods	VO
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	This course provides necessary information to understand cellular signalling and how genes are regulated. The topics cover aspects of signal transduction in the context of tissue engineering and regenerative medicine.
Teaching methods	Lecture presenting basics and applied examples.
Learning outcome	After passing this course successfully students are able to ...

	- explain the basic principles of DNA/protein interaction - specify components and regulation of important signaling pathways (e.g. Raf-MEK-ERK, PI3K-AKT-mTOR; apoptosis) and mechanisms of mechanotransduction - interpret and analyze results from typical signaling experiments (Western blots, IPs…) - explicate the relevance of signal transduction in Tissue Engineering
Course contents	- signaling pathways (RAF-MEK-ERK, mTOR/AKT, Wnt/beta-catenin) - apoptosis - mechanotransduction - aspects of cellular signaling in Tissue Engineering
Prerequisites	Molecular Biochemistry and Cell Biology
Assessment Methods	- final written exam
Recommended Reading and Material	- current scientific literature suggested by lecturers
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case more than 20% are missed the first try in the exam is lost.
Comments	

Study Design and Biostatistics

Degree programme	MTE
Semester	2
Course methods	VO
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	The first part of the course provides an overview including details of different study design concepts. Subsequently, some selected parts of biostatistics are discussed. Additionally students present scientific literature in an oral presentation and receive detailed feedback on their presentation skills.
Teaching methods	- Lecture format- Occasional take-home readings- Discussions in classroom

Learning outcome	After passing this course successfully students are able to ... - define general rules/key points of an appropriate study design - identify types of models/study design approaches utilized in various areas of pre- and clinical research - define and critically assess the influence of key advantages and weaknesses of most commonly modeling systems used in pre- and clinical research - define basic rules/definitions used in biomedical descriptive statistics - perform a critical preliminary assessment of (quantitative) data as well as selection of appropriate tests for statistical evaluation of (quantitative) data - define most common do's and don't's in a power point presentation - define/practically apply the optimal tactics for an effective scientific meeting-type talk - apply a "damage control" in the post-talk question/answer period
Course contents	- Study design overview for 1) in vitro, 2) in vivo and 3) clinical study sections - Detailed description of study types, their applicability and pro-and cons for each section. - Selected (introductory) study design-related aspects of biostatistics: types of data, distributions/normality, hypothesis testing, data transformation, appropriate approach/selection of statistical tests - Curriculum also includes graded data presentation training (a.k.a. Power Talk Training) by students in a form of a 10min power point (PP) talk/each (followed by a detailed feedback from the lecturer)
Prerequisites	- An open mind and mental flexibility- Positive thinking and eagerness to interact with the lecturer- Knowledge of the basic statistical concepts is useful
Assessment Methods	- Final grade will combine 50% of the test score and 50% of the PP talk.
Recommended Reading and Material	
Attendance	Attendance is mandatory in this course, only 20% of absence is tolerated. In case more than 20% are missed the first try in the exam is lost.
Comments	Students must get approval of the topics to present from the lecturer; titles/topics need to be sent to the lecturer at least 3 days before the scheduled talk. The order of individual talks is to be decided by students.

Ethics in Engineering and Medicine

Degree programme	MTE
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.00
Incoming places	Limited

Course description	The course imparts basic knowledge of bioethics to the students. Ethical questions in bioengineering and biomedicine including their impacts on society and the training of ethical decision-making and argumentation take center stage.
Teaching methods	Seminar: - Theory Inputs- Case Studies- Group work- Ethical arguing- Discussions
Learning outcome	After passing this course successfully students are able to ... - outline selected basic terms and principles of biomedical ethics (for example moral status, allocation ethics, concepts of health and disease/disabilities) by the means of simple examples. - apply ethical standards to latest research developments in selected actual case studies in bioengineering and biotechnology. - describe the steps of ethical decision-making and argumentation and to apply them in selected case studies for ethical assessment of conflicting issues in the field of biomedical research and medicine.
Course contents	- Fundamental positions of bioethical decision-making and argumentation - Experiments with human subjects and animals - Ethics issues of resource allocation - Ethical concepts to health-disease/illness-disabilities - Intercultural ethical aspects of bioengineering and biotechnology - Selection of actual subjects of biotechnology and / bioethics
Prerequisites	
Assessment Methods	- Course with an immanent character (grade):
Recommended Reading and Material	- Literature at the beginning of the course
Attendance	Attendance is mandatory in this course, only 20% of absence is

	tolerated. In case you miss more than 20% compensation work is required.
Comments	

Biotechnology

Degree programme	MTE
Semester	2
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	Design and optimization of recombinant protein production
Teaching methods	Basics and theory are presented within an interactive lecture. Practical examples for application are discussed. Excursion
Learning outcome	After passing this course successfully students are able to ... - Bioprocess design for the production of recombinant proteins from gene to purified product applying microbial and/or mammalian systems - Choice of appropriate expression systems and plasmids for recombinant production - Definition of strategies for product development and expression systems - Characterization of concept and principle of bioprocess design (up- and downstream processing) - Design and characterization of various bioreactor types - Application of high-level data exploration and interpretation - Combination of gained knowledge with scientific state of the art - Characterization, interpretation, and application of function and interactivity of complex systems
Course contents	- Basics - recombinant protein production - Expression hosts - overview - Upstream Processing: 1) Cultivation systems (bioreactor, monitoring), 2) Process modes - Downstream Processing - Multivariate data analysis
Prerequisites	Basics biology, mathematics, physics

Assessment Methods	- Written exam
Recommended Reading and Material	- Bioprocess Engineering Principles, Pauline M Doran, 2nd edition ISBN 978-0-12-220851-5 - Bioprozesstechnik, Horst Chmiel, ISBN 978-3-8274-2476-1 - Taschenatlas der Biotechnologie und Gentechnik, Rolf D. Schmid ISBN 978-3-527-33514-5
Attendance	
Comments	

Mechatronics/Robotics

International project management

Degree programme	MMR
Semester	2
Course methods	ILV
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	This course is an introduction to project portfolio management and to international project management. It explains some of the critical success factors of managing projects in heterogeneous project portfolio environments and in international projects – especially those that are not present or perhaps not that critical in a domestic project.
Teaching methods	Inverted classroom concept, preparation in writing, working on and presenting case studies, analyses, discussions, group work
Learning outcome	After passing this course successfully students are able to ... - identify, categorize, evaluate, select and prioritize the components of a project portfolio - balance a project portfolio regarding the relevant indicators of a concrete company scenario, e.g., time patterns and schedule, regional balance, target market priorities, utilization of resources - evaluate the influence of culture on international projects - explain the necessity of different management styles in international projects - analyze team management according to specific situations in

	international projects - explain the challenges of collaboration of virtual teams - identify communication problems in international projects
Course contents	- Differences between projects, project portfolios and programs - Project portfolios and company strategy - Roles in project portfolios - Processes of project portfolio management - What is culture in international projects? - Leadership in international projects - Multicultural teams in projects - Managing virtual project teams - International communication
Prerequisites	Course Project Management
Assessment Methods	- Course immanent assessment method (preparation in writing, case studies, contribution in discussions) - When a group mark is given that is identical for all team members, the lecturer and the degree programme director reserve the right to give different individual marks in cases where there is a noticeable discrepancy in the level of achievement of individual students.
Recommended Reading and Material	- ADLER, Nancy J., & GUNDERSEN, Allison (2007), International Dimensions of Organizational Behavior. Ohio: Thomson South-Western - Binder, Jean (2007): Global Project Management: Communication, Collaboration and Management Across Borders, Farnham: Ashgate Publishing - Hofstede, Geert, Hofstede, Gert Jan (2010): Culture and Organizations: Software of the Mind, 3rd edition, New York: McGraw-Hill - KÖSTER, Kathrin (2009), International Project Management, London: Sage - Lomnitz, Gero (2008): Multiprojektmanagement. Projekte erfolgreich planen, vernetzen und steuern, 4. Auflage, Frankfurt am Main: Moderne Industrie - Martinelli, Russ J., Waddell, James M., Rahschulte, Tim J. (2017), Projects Without Boundaries: Successfully Leading Teams and Managing Projects in a Virtual World, Hoboken (New Jersey): John Wiley & Sons - Solomon, Charlene, Schell, Michael (2009): Managing Across Cultures: The Seven Keys to Doing Business with a Global Mindset, New York: McGraw-Hill

Attendance	Attendance is compulsory
Comments	Teaching language is English

Power Electronics (MLE)

Intercultural Communications

Degree programme	MLE
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	We aim at raising intercultural awareness and broadening the students' horizons
Teaching methods	
Learning outcome	After passing this course successfully students are able to ... - meet the challenges of communicating with members of other cultures - recognize the potential of working in an intercultural team - act flexibly and confidently in an unknown environment
Course contents	- Terms and theories of culture: Johari window, Iceberg theory etc. - Manifestations of culture - Inside and outside perspectives on culture
Prerequisites	Completion of previous semester courses
Assessment Methods	- Grade depends on: - Attendance - Presentation of an intercultural aspect in class - Participation in class discussions
Recommended Reading and Material	- Lewis, R.D. et al (2012) When Cultures Collide 3rd ed., Nicholas Brealey International - Additional current handouts and audio-visual support
Attendance	Attendance is compulsory
Comments	

Medical Engineering & eHealth

Bioinformatics

Degree programme	MME
Semester	2
Course methods	ILV
Language	English
ECTS Credits	4.00
Incoming places	Limited
Course description	Computer Science provides for modern and essential methods for analyzing and researching biological systems. The course presents computer aided methods in context of biomedical examples.
Teaching methods	Seminar / WorkshopProblem based learning
Learning outcome	After passing this course successfully students are able to ... - describe biologial systems - apply presented computer-aided methods in context of biomedical questions. - select computer aided methods for successfully investigating biomedical systems
Course contents	- Introduction Bioinformatics, Computational Biology and Systems Theory - State of the art technologies(Data Mining, Web Technologies, Algorithms, analytical methods) - practical tasks (adapted to students background)
Prerequisites	- Basic computer science background- Basic programming skills- Basic biomedical background
Assessment Methods	- Continuous evaluation of tasks and final exam
Recommended Reading and Material	- Provided per topic in course
Attendance	Attendance is not required except for assessment of tasks and final exam.

Artificial Intelligence

Degree programme	MME
Semester	2

Course methods	ILV
Language	English
ECTS Credits	4.00
Incoming places	Limited

Course description	This Lecture builds up knowledge about the algorithms and the basics of artificial intelligence (AI) and soft computing
Teaching methods	Theory, Examples, Excercises
Learning outcome	After passing this course successfully students are able to ... - describe agents and environments - decribe the concept of rational behavior - destinguish between different problem environments - distinguish between agent structures - name problem-solving agents - design a kind of goal-based agent - distinguish between problem types - do a graph search with partial information - find a defined problem formulation - name the basic search algorithms including: e.g. uninformed search strategies - enabling a constraint satisfactory search - using informed search strategies - define the first heuristic functions for the informed search - know, how to apply simulated annealing techniques - know how to apply evolutionary algorithms
Course contents	- Basic algorithms of artificial Intelligence - Agents - Problem Solving strategies - Informed Search - Constrain Satisfactory Problems - AI and Games
Prerequisites	
Assessment Methods	- Exercises (20%) and project (80%)
Recommended Reading and Material	- Artificial Intelligence: A Modern Approach (Prentice Hall Series in Artificial Intelligence) Stuart Russell, Peter Norvig
Attendance	Attendance not required but recommended!The student needs to be present for the project meetings and final presentation.

Comments	

Electromagnetic Compatibility

Degree programme	MME
Semester	2
Course methods	ILV
Language	English
ECTS Credits	4.00
Incoming places	Limited

Course description	The course is subdivided in two parts:- Part 1 covers physical fundamentals of Electromagnetic Compatibility (EMC) related to electrical appliances including regulatory basics for product conformity- Part 2 focuses on effects of electromagnetic fields (EMF) on the human body, including regulatory basics for limiting personal exposure against EMFs, as well as electromagnetic influences on implants
Teaching methods	Lessons and practical homework (1 assignment, chosen from several proposals)The course will be held in 10 units (6:35 - 9:00 p.m. each)One of these units will be held as an excursion to the EMC labs in Seibersdorf (approx. 35 km southeast of Vienna)For a detailed schedule of the units, please see semester planDetails about the excursion will be negotiated in the course between lecturer and students
Learning outcome	After passing this course successfully students are able to ... - identify potential problems of electromagnetic compatibility during product development - apply the fundamental EMC design rules in practice - name the most important directives, standards and guidelines relevant for EMC comformity assessment of medical equipment and use them to assess the properties of a device in view of the underlying legal requirements - estimate the relevance of exposure situations in practice - name the technical possibilities of exposure assessment, their advantages and drawbacks and their limitations - identify potentially harzardous situations regarding electromagnetic interference with electronic implants in practice - name the most important directives, standards and guidelines

	relevant for limiting personal exposure against electromagnetic fields
Course contents	- Part 1 (Lamedschwandner): - Introduction to Electromagnetic Compatibility (EMC) - EMC conformity assessment - European Union directives and CE marking of products - The EMC directive - EMC standards - EMC test methods - Functional safety and EMC - Development of electrical appliances with respect to EMC - Design basics - Printed circuit board design - Cabling, grounding and shielded cables - EMC filters, ferrites and box shielding - Economic EMC design principle - Part 2 (Schmid): - Biophysical basics - Effects of electromagnetic fields on the human body - Excitation of cells by induced currents (low frequency fields) - Tissue heating by power absorption (radio frequency and microwave fields) - Other reported, but not yet established effects - Safety limits and regulatory basics - Exposure assessment methods - Electromagnetic interference with implants - Malfunction of electronic implants - Concentration of currents by metallic implants - Movement of ferromagnetic implants in strong magnetic fields
Prerequisites	Fundamentals of electrical engineering
Assessment Methods	- Solution and Presentation of homework (50%) - Written exam (50%)
Recommended Reading and Material	- Lamedschwandner K. EMC for MBE – Part 1, Chapter 1-3. Presentation Slides. Available in download section of the course - Paul CR. 2006. Introduction to Electromagnetic Compatibility, 2nd Edition, Wiley, New York, ISBN: 978-0-471-75500-5 - Schmid G. EMC for MBE. Part 2, EMF Safety. Presentation Slides. Available in download section of the course
Attendance	Attendance is compulsory
Comments	

Study Design and Biostatistics

Degree programme	MME
Semester	2
Course methods	SE
Language	English
ECTS Credits	3.00
Incoming places	Limited

Course description	A collection of mathmatical methods in the field of non-parametric statistics are presented. These can be used for planning experiments. Obtaining , organizing, summarizing presenting and analysing this data will be followed up by interpreting it and drawing conclusions based on this data sets.
Teaching methods	Lecture & Examples
Learning outcome	After passing this course successfully students are able to ... - justify a research question in the field of non-parametric statistics after identifying the current state of the art with regard to scientific considerations, formulate the question comprehensibly and to define verifiable target criteria - plan the phases of a scientic study, conduct it precisely, document it comprehensibly, and to ensure the comprehensibility, dependability, plausibility and transferability to other problems areas and contexts - relate research questions and results to a medical environment
Course contents	- Testing methods for frequencies - Testing methods for rank-data - Tesing methods for cardinal data - Relationship metrics and their tests - Agreement metric
Prerequisites	Parametric Statistics. The only mathematical prerequisite needed for the material found in the outline is arithmetic and some basic algebra.
Assessment Methods	- writen exam 50% - moolde examples 50%
Recommended Reading and Material	- Elementary Statistics, Mario F. TriolaPublication Date: January 6, 2011 | ISBN-10: 0321694503 | ISBN-13: 978-0321694508 | Edition: 11

	- Nonparametric Statistics for Health Care Research Statistics for Small Samples and Unusual Distributions Second Edition ISBN 978 - 1 - 4522 - 8196 - 4 (pbk.: alk. paper) Medicine ? Statistical methods. Nonparametric statistics.
Attendance	optional
Comments	

Ethics

Degree programme	MME
Semester	2
Course methods	VO
Language	English
ECTS Credits	1.00
Incoming places	Limited

Course description	The course imparts basic knowledge of ethics in medicine to the students. The focus is on raising the awareness of the relevance of ethical questions in engineering and medicine and their ethical impacts on society and the training of ethical decision-making and argumentation.
Teaching methods	Seminar: Theory InputsCase StudiesGroup workEthical arguingDiscussions
Learning outcome	After passing this course successfully students are able to ... - outline selected basic terms and principles of medical ethics (for example moral status, allocation ethics, concepts of health and disease/disabilities) by the means of simple examples. - apply ethical standards to latest research developments in selected actual case studies in medicine and engineering. - describe the steps of ethical decision-making and argumentation and to apply them in selected case studies for ethical assessment of conflicting issues in the field of research and medicine.
Course contents	- Fundamental positions of ethical decision-making and argumentation - Experiments with human subjects and animals - Ethics issues of resource allocation - Ethical concepts to health-disease/illness-disabilities - Intercultural ethical aspects of medicine and engineering

	- Medical information systems (eHealth, data security, privacy, confidentiality)
Prerequisites	
Assessment Methods	- Course with an immanent character (grade): - Introduction into a chosen topic by the student - Hand out - The student is leading a discourse about the chosen in the group
Recommended Reading and Material	- Literature at the beginning of the course
Attendance	Attendance is compulsory
Comments	

Scientific Publishing

Degree programme	MME
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.50
Incoming places	Limited

Course description	A basic understanding of “scientific life” is given, covering writing rules, strategies for scientific papers publishing, "how to find RELEVANT literature", and how to survive a scientific conference.
Teaching methods	Upfront teaching, group work, students presentation
Learning outcome	After passing this course successfully students are able to ... - Explain the structure of a scientific paper - Write a scientific abstract according to scientific journals rules - Can explain the process from having a first idea to getting a paper accepted - Can prepare a scientfic presentation (oral, poster) for a scientific conference
Course contents	- What to do before a (scientific) paper is written - Structures of scientific papers - Basics of scientific writing - Literature search, Inside PubMed - Critical Comments about today's publication behavior

	- What else is needed to get a publication accepted - The review - The Scientific Conference - Paper / Poster Presentation
Prerequisites	Basic writing skills
Assessment Methods	- Quality of a self written abstract - Evaluation of other abstrracts - Quality of "scientific conference like" presentation - Evaluation of presentations - Written exam
Recommended Reading and Material	- http://www.icmje.org
Attendance	
Comments	

Quality and Regulatory Affairs Management

Degree programme	MME
Semester	2
Course methods	ILV
Language	English
ECTS Credits	4.00
Incoming places	Limited

Course description	The course introduces the main processes and steps of implementing quality management systems for design and development and putting to market of medical devices. It provides the necessary steps for addressing regulatory issues in an application oriented perspective.
Teaching methods	Lectures will introduce the topics. Students will extend their knowledge and skills in small assignments.
Learning outcome	After passing this course successfully students are able to ... - describe and handle processes to address regulatory issues of medical devices, regarding especially the “Medical Device Directive” - use quality management systems to address regulatory issues in a structured way - describe and perform measures of risk management, generally and

	in the sense of a "Medical IT-Network Risk Manager" (IEC 80001-1).
Course contents	- Medical Device Directive and Harmonised Standards (ISO 13485, ISO 14971, EN 60601-x, IEC 80001-1, …). Case examples and experiences from the steps of medical device development, from the initial concept to market. Classification, methods for evaluation of conformity). Risk analysis, risk analysis case file. software as medical device, CE mark, accredited and notified bodies. Basic introduction to further regulations (EMC, biocompatibility, RoHS...). Basic of clinical trials. EU- vigilance system. IVD`s, AIMDD. International requirements (FDA, CMDCAS, GxP, UL, ...). - Case studies and experiences from medical device development from the idea to marketability. Classification, methods for conformity testing. Risk analysis, software as medical device, CE marking, accredited and notified bodies. - Further fields of expertise (EMC, Biocompatibility, RoHS...). Clinical evaluation. EU vigilance system. IVDs, AIMDD. International requirements (FDA, CMDCAS, GxP, UL, ...).
Prerequisites	- Basic concepts of device or software development. - Basic concepts of quality.
Assessment Methods	- Final exam and smaller assignements
Recommended Reading and Material	- See learning platform
Attendance	The course includes discussions and assignments, so attendance is necessary to participate in assignments and discussions. In case students miss lectures they must contact the lecturers and agree on measures to handle the situation.
Comments	

eHealth Applications

Degree programme	MME
Semester	2
Course methods	ILV
Language	English
ECTS Credits	4.00
Incoming places	Limited

Course description	We want to understand what "eHealth" actually is, which applications exist, what needs to be done to implement it, on the legal side, in IT systems, in the medical system and economically. How can we evaluate eHealth applications e.g. costs - benefit? We will look at eHealth with the eyes of politicians, patients, economists, industry, medical experts. The course uses a “Problem Based Learning” (PBL) approach. Students will experience the views of different stakeholders in an additional business role playing game.
Teaching methods	The course uses problem based learning, triggered by brief presentations from the lecturer. As a result this students will develop evidence based recommendations to stakeholders. A role playing game will enable us to understand how the stakeholders act, and provoke feedback to the recommendations.
Learning outcome	After passing this course successfully students are able to ... - explain requirements and recent examples of applications of eHealth - critically consider literature and other sources of information for evaluating eHealth applications - consider the views of different stakeholders in designing eHealth applications
Course contents	- requirements and recent examples of applications of eHealth - basic introduction into the socioeconomic environment of eHealth (reimbursement, sustaining resources, legal issues) - engineering concepts for eHealth
Prerequisites	Basic knowledge of software development, familiarity with the medical field
Assessment Methods	- Seminar paper: Evidence based recommendation to stakeholders
Recommended Reading and Material	- eHealth Action Plan 2012-2020 (http://ec.europa.eu/health/ehealth/docs/com_2012_736_en.pdf)
Attendance	The course uses PBL therefore attendance is mandatory.
Comments	Attendance to relevant events (congresses, workshops: eHealth Summit, HL7 Jahrestagung, IHE Day, ...) can be accredited for the course, contact the lecturers.

Introduction to MATLAB for Applications in Life Sciences

Degree programme	MME
Semester	2

Course methods	ILV
Language	English
ECTS Credits	1.50
Incoming places	Limited
Course description	This course freely follows the previous introduction to MATLAB for Applications in Life Sciences (MLS1) and furthermore deepens the foundations of selected chapters from the field of signal processing. At the end of the course, students should be able to use MATLAB in their own work for purposes of processing presented signals/biosignals. The course consists of interactive lectures with students solving sample MATLAB problems ranging in difficulty. Individual topics can be introduced into the course setup. Students can attend the first lecture without registration.
Learning outcome	After passing this course successfully students are able to ... • Generate signals and perform basic signal operations in MATLAB • Create and use basic digital filters to process signals in MATLAB • Apply gained knowledge and techniques to analyse specific biomedical signals (ECG/EMG etc.)
Course contents	• Signals classification and properties • Operations with signals and signal generation • Design of digital filters • Biosignal analysis
Prerequisites	The MATLAB programming knowledge, General knowledge from field of Life Sciences on bachelor level
Assessment Methods	Contribution during lectures, Individual exercises
Recommended Reading and Material	[1] V.K. Ingle and J. G. Proakis, Digital Signal Processing Using MATLAB, 1st ed. Pacific Grove, USA: Brooks/Cole Pub. Co., 1999. [2] A. B. Biran, What Every Engineer Should Know About Matlab and Simulink. New York: Taylor & Francis Group, 2010.
Attendance	Attendance is mandatory, only 20% of absence is tolerated.

Advanced Optics

Degree programme	MME
Semester	2

Course methods	ILV
Language	English
ECTS Credits	4.00
Incoming places	Limited

Course description	Geometric Optics, Microscopy Techniques & Spectroscopy (including medical applications)
Teaching methods	Frontal lecture Advanced OpticsLaboratory exercises (spectroscopy + microscope, mechanical eye model)
Learning outcome	After passing this course successfully students are able to ... - explain Maxwell's equations and simple conclusions from them - define basic properties of light and the behavior at interfaces (refraction, (total) reflection, polarization, Fresnel formulas, Brewster law) - represent applications of optical components (lenses, mirrors, prisms, optical fibers, diffraction gratings, classical light sources, LED, laser, polarizers) simple optical systems (light microscope) - represent applications of optical components (lenses, mirrors, prisms, optical fibers, diffraction gratings, classical light sources, LED, laser, polarizers) and of simple optical systems (light microscope) - define spherical aberrations, coma, astigmatism, chromatic aberration, distortions, explain Abbe's diffraction limit, classifying Zernike polynomials with respect to the context - illustrate discussed microscopic techniques and their advantages, represent the functioning of the human eye based on the eye model - present basics of spectroscopy and explain medical application of scattering (Raman, Brillouin)
Course contents	- Motivational introduction to modern optical topics (computer-generated holograms, laser physics, metamaterials) - Meaning of the Maxwell's equations + simple conclusions from them, behavior of light rays in propagation + at interfaces (refraction, (total) reflection, Brewstergesetz, Fresnel formulas) - Overview of optical components (lenses, mirrors, prisms, optical fibers, diffraction gratings, classical light sources, LED, lasers, polarizers), thin & thick lenses, mirrors (image construction, matrix method) - Aberrations (characterization, minimization, spherical aberration, coma, astigmatism, distortion, chromatic aberration, Abbe diffraction

	limit, Zernike polynomials) - Microscopy techniques + mechanical eye Model - Spectroscopy in general with focus on: Raman and Brillouin scattering
Prerequisites	Basics of Analysis and Algebra, Basics of Physics
Assessment Methods	- Written exam - 1 Laboratory protocol
Recommended Reading and Material	- Bergmann & Schäfer. "Lehrbuch der Experimentalphysik". Band 3. Optik. 2004. - Bergmann & Schäfer. "Lehrbuch der Experimentalphysik". Band 3. Optik. 2004. - Born & Wolf. "Principles of Optics". 1999
Attendance	Frontal lectures: 80%Laboratory exercises: 100%
Comments	

Project Management and Leadership Skills

Degree programme	MME
Semester	2
Course methods	SE
Language	English
ECTS Credits	1.00
Incoming places	Limited

Course description	This course provides an overview of both the latest practical and the current theoretical leadership theories. One of the course's fundamental components will be the reflection of own behaviour regarding particular issues concerning leadership in project management.
Teaching methods	Theory inputTeamworkRole play
Learning outcome	After passing this course successfully students are able to ... - identify and to explain tasks and instruments of leadership (for example delegation, agreement on objectives). - explain classical management models (for example leading continuum, Maturity Model) and to apply to practical examples. - describe different assumptions about human nature (for example McGregor) and to derive the consequences for the leading of co-

	workers.
Course contents	- Leadership styles and instruments (for example staff appraisal) - Motivation, promotion and development of employees - Leadership functions versus professional tasks - Consequence of “not leading” - Role of the leader in a change process - Dealing with crises, success and failures
Prerequisites	Team Management Skills
Assessment Methods	- An individual reflection paper about the leadership issues encountered in the semester and how the knowledge about leadership was applied.
Recommended Reading and Material	- Daft, R. (2008): New Era of Management, Mason/Ohio:Thomson - Pettinger, R. (2007): Introduction to Management, Houndmills/Hampshire: Palgrave Macmillan - Schermerhorn, J. (2008): Management, Hoboken/New Jersey: John Wiley
Attendance	Attendance is compulsory
Comments	This course may reflect team experiences from elsewhere, e.g from the Project Related Teamwork course.

Writing the Master´s Thesis

Degree programme	MME
Semester	4
Course methods	SO
Language	English
ECTS Credits	28.00
Incoming places	Limited

Innovation and Technology Management (MTM)

Agile Softwareentwicklung & Lean UX

Degree programme	MTM
Semester	2
Course methods	ILV

Language	English
ECTS Credits	4.00
Incoming places	Limited

Course description	This course shows students the interaction between agile project management, user experience design and its efficient and effective integration, the so-called "Lean UX". The acquired knowledge is put into practice in several exercises and a final project.
Teaching methods	self-study, lecture, discussion, group work, practical examples, online tutorials, project work
Learning outcome	After passing this course successfully students are able to ... - apply methods of agile project management (e.g. effort estimation, user stories, software requirements specification) - Build and coordinate project teams in an agile environment - explain the essential features of state-of-the-art user experience design and apply the most important methods in practice (e.g. expert reviews, UI prototyping, discount usability evaluation) - to plan and implement projects under consideration of the "Lean UX" aspect
Course contents	- Agile project management (Scrum, Kanban etc.) - user experience - software development - User Stories - Cost estimation in software projects - Software Requirements Specification - Relevant standards - Proband and expert based methods - Personas - Prototyping - Eye Tracking - Usability Lab - Minimum Viable Product - Discount Usability - UX Canvas
Prerequisites	Basics of computer science and basics of project management literature
Assessment Methods	immanent performances (30%) + project work (70%)
Recommended Reading	- Gothelf, Lean UX: Applying Lean Principles to Improve User

and Material	Experience, current edition - Richter/Flücker, Usability and UX compact: Products for people, current edition - Roock/Wolf, understanding and successfully using Scrum, current edition
Attendance	Mandatory
Comments	Further information and teaching materials are provided through the accompanying Moodle course.

Change Management

Degree programme	MTM
Semester	2
Course methods	ILV
Language	English
ECTS Credits	4.00
Incoming places	Limited

Course description	In the course of the module, students will acquire basic competences in the area of organizational change management.
Teaching methods	Presentation, self-study, group work, case study
Learning outcome	After passing this course successfully students are able to ... - distinguish types of change - anticipate internal and external barriers to successful change - identify success factors for succesful change - define the most important steps and measures for a concrete change project - understand reasons for resistance to change
Course contents	- Types of change - Phases of change - Barriers to change - Success factors for change - Change Management - Organizational learning and renewal - Agile organizations
Prerequisites	Basics of Economics
Assessment Methods	- •Case Work 1 (30 %) + Case Work 2 (Group Work, 40%) + Case

	Work 3 (30%) There will be no written exam.
Recommended Reading and Material	- •Stouten, J., Rousseau, D. M., de Cremer, D. (2018) Successful organizational change: Integrating the management Practice and scholarly articles . Academy of Management Annals, 12 (2), 752-788.
Attendance	Live Introduction (MS Teams): 29.5.2020, 16:10-21:00Optional Coaching f. Single- and Group Work (by appointment only): 05.6.2020, 16:10-21:0019.6.2020, 16:10-21:00
Comments	Further materials will be provided in the related Moodle course.

Cost Management and Corporate Finance

Degree programme	MTM
Semester	2
Course methods	ILV
Language	English
ECTS Credits	4.00
Incoming places	Limited

Course description	During this course, students acquire further knowledge in the fields of financial analysis, cost management, financing and company valuation.
Teaching methods	lecture, exercises, discussion, e-learning, self-study, flipped classroom, business game
Learning outcome	After passing this course successfully students are able to ... - to assess the advantage of an investment project by means of static or dynamic investment calculation - outline the typical contents of an investment guideline - Identify and implement cost reduction measures - Identify and implement measures to variabilize fixed costs - Calculate key figures to analyze the asset, profitability and liquidity situation - distinguish between different types of financing - determine the value of a company using the discounted cash flow method
Course contents	- Accounting - Statement analysis - Cost management

	- capital budgeting - corporate financing - business valuation
Prerequisites	Basics of business administration, accounting, cost accounting
Assessment Methods	- written final examination (50%) + points for immanent performance business game (50%)
Recommended Reading and Material	- Berk, Jonathan, and Peter DeMarzo. Corporate Finance. Actual Edition. Harlow: Pearson Education Limited - Brealey, Richard A., Stewart C. Myers, und Franklin Allen. Principles of Corporate Finance. New York: McGraw-Hill Higher Education - Charles T. Horngren; Srikant M. Datar; Madhav V. Rajan, Cost Accounting, Global Edition, Pearson Education Limited - Eisl/Hofer/Losbichler, Grundlagen der finanziellen Unternehmensführung. Band IV: Controlling - Losbichler, Grundlagen der finanziellen Unternehmensführung. Band III: Cashflow, Investition und Finanzierung
Attendance	Block 1 is generally not subject to compulsory attendance, Block 2 is subject to compulsory attendance
Comments	Further information on the course and the teaching materials used will be provided in the accompanying Moodle course.

Enterprise Simulation

Degree programme	MTM
Semester	4
Course methods	UE
Language	English
ECTS Credits	4.00
Incoming places	Limited

Course description	In this course, students gain experience in strategic decisions of technology management as well as in operational questions of corporate management in the context of a business simulation. Through the use of a business simulation, students can directly experience the effects of their own decisions (with a focus on investment in research and development) and try out different strategies. Decision making in small groups promotes critical

	discourse.
Teaching methods	Business simulation, individual and team work, written elaborations (individual and group work), short presentation, regular feedback, discussion
Learning outcome	After passing this course successfully students are able to ... - Understanding of strategic technology decisions (investments, timing of change, etc.), - active use of the S-curve concept, - make fundamental business (and above all operational) decisions (price, production quantity, etc.), - act and react independently in a competitive, technology-driven competitive environment - understand fundamental relationships in technology-driven markets, - to conduct negotiations if necessary (within the company as well as with regard to technological cooperations), - the independent and active trying out and experiencing of different strategic options for action
Course contents	- Technology management in particular technology development - S-curve concept - fundamental business management decisions (DB etc.) - selected interrelationships of innovation and technology management
Prerequisites	Fundamentals of business administration as well as innovation and technology management are required
Assessment Methods	- Due to the course concept, continuous attendance is absolutely necessary and a prerequisite for positive completion of the entire course - Success in the evaluation game (20%) + written individual work (40%) + written group work (40%) - Plagiarism in at least one of the partial performances means that the course cannot be completed positively.
Recommended Reading and Material	Recommended additional literature: Foster, R., Innovation: The technological offensive, Wiesbaden 1986.
Attendance	Attendance is mandatory
Comments	Detailed information and additional teaching materials are made available via the learning platform moodle.

Sports Technology (MST)

Start-up management

Degree programme	MST
Semester	4
Course methods	VO
Language	English
ECTS Credits	3.00
Incoming places	Limited

Digital Leadership and New World of Work

Degree programme	MST
Semester	4
Course methods	VO
Language	English
ECTS Credits	2.00
Incoming places	Limited