Course Descriptions General Engineering – Winter Semester 2026/27

18 June 2026

English in Technical Contexts B2

Course title	English in Technical Contexts B2
ECTS	2
Course type	Language training course
SWS	2
Semester	Winter and summer
Course level	B2 • Can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialization • Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party • Can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options
Lecturer	Neal O'Donoghue, MA
Course objectives	This course aims to deepen students' encounter with the English language in a technical context by giving practical training in specialized vocabulary, grammar and language usage. The four cardinal language skills – listening, speaking, reading, and writing – will play an integral role in this training. The course is designed to be relevant and interesting for engineering students and will be adapted to their learning needs and study areas. By the end of the course, participants should have a more

	comprehensive understanding of, and enhanced fluency in, the English language in an engineering context.
Course contents	*Obligatory topics (60 %):* • Numbers and mathematical operations • Shapes and dimensions • August 2017 • Basic physics and the scientific worldview • Materials and their properties • Case study on an area related to technology • /physics/engineering • Grammar/ communication skills *Variable content (40 %):* Variable content will be determined on the basis of a student survey conducted in the first session. Current world events (including news events and popular culture) and recent technological innovations may be used as a basis for discussions.
Teaching methods	Teaching methods focus on improving the four cardinal language skills and include group discussions and group projects; individual work; mini-presentations; role-plays; close reading and listening activities; dictation; grammar games; and various follow-up viewing and writing activities. Work not completed in class should be done at home. Self-study assignments will be set on a weekly basis.
Assessment method	Written exam (60 min) No dictionaries are allowed. Exam structure: • Part 1: Listening comprehension(s) • Part 2: Reading comprehension(s) • Part 3: Vocabulary and technical content • Part 4: Grammar (maximum 10% of total exam points, excluding writing exercise) • Part 5: Writing composition (150-200 words) The exam will be based on topics covered during the semester.

Recommended Literature	Astley, Peter, and Lewis Lansford. Engineering 1: Student's Book. Oxford: Oxford UP, 2013. Print. Bauer, Hans-Jürgen. English for Technical Purposes. Berlin: Cornelsen, 2000. Print. Bonamy, David. Technical English 4. Harlow, England: Pearson Education, 2011. Print. Bonamy, David, and Christopher Jacques. Technical English 3. Harlow: Pearson Longman, 2011. Print. Brieger, Nick, and Alison Pohl. Technical English: Vocabulary and Grammar. Oxford: Summertown, 2002. Print. Dummett, Paul. Energy English: For the Gas and Electricity Industries. Hampshire: Heinle, Cengage Learning, 2010. Print. Dunn, Marian, David Howey, and Amanda Ilic. English for Mechanical Engineering in Higher Education Studies Coursebook. Reading: Garnet Education, 2010. Print. engine: Englisch für Ingenieure. <www.engine-magazin.de> (Darmstadt). Various issues. Print. Foley, Mark, and Diane Hall. MyGrammarLab. Harlow: Pearson, 2012. Print. Glendinning, Eric H., and Norman Glendinning. Oxford English for Electrical and Mechanical Engineering. Oxford: Oxford UP, 1995. Print. Glendinning, Eric H., and Alison Pohl. Technology 2. Oxford: Oxford UP, 2008. Print. Heidenreich, Sharon. English for Architects and Civil Engineers. Wiesbaden: Vieweg + Teubner Verlag, 2008. Print.

	Ibbotson, Mark. Cambridge English for Engineering. Cambridge: Cambridge UP, 2008. Print. Ibbotson, Mark. Professional English in Use. Engineering: Technical English for Professionals. Cambridge: Cambridge UP, 2009. Print. Markner-Jäger, Brigitte. Technical English: Civil Engineering and Construction. Haan-Gruiten: Verl. Europa-Lehrmittel, 2013. Print. Murphy, Raymond. English Grammar in Use. Cambridge: Cambridge UP, 2004. Print. Schäfer, Wolfgang. Construction Milestones: Englisch Für Bau-, Holz- Und Anlagenberufe. Stuttgart: Klett, 2013. Print. Wagner, Georg, and Maureen Lloyd. Zörner. Technical Grammar and Vocabulary: A Practice Book for Foreign Students. Berlin: Cornelsen, 1998. Print.
Language of instruction	English
Prerequisites	B1 / Abitur (A-levels/ school leaving certificate giving right of entry to higher education) / 7-9 years of English

German (different course levels)

Course title	see schedule Language Centre
ECTS	4
Course type	Seminar
SWS	4
Semester	Winter and Summer
Workload in hours	60 hrs
Assessment method	Written examination, 90 min.
Language of instruction	German

Please find here the course descriptions for German language courses at all course levels:
https://th-deg.de/language-centre#semester-courses

Intercultural Training for Germany and Bavaria

Course title	Intercultural Training for Germany and Bavaria
ECTS	1
Course type	Elective
SWS	1
Semester	Winter and summer
Name of Instructor	Lisa Werner
Course objectives	Participants get an understanding of the different theories of "culture" and learn about stereotypes and traditions in Bavaria. Furthermore, the participants get information on Germany and Bavaria as well as the Deggendorf Institute of Technology.
Course contents	I. Culture (theroies) II. Customs and Rituals in Germany/Bavaria III. Information on Germany and Bavaria and the DIT IV. Quiz and Presentation V. Culture Shock
Recommended literature	Bolten J. und Ehrhardt C., Interkulturelle Kommunikation, Verlag Wissenschaft & Praxis 2003; Bolten J, Einführung in die interkulturelle Wirtschaftskommunikation, Vandenhoeck & Ruprecht 2007
Teaching methods	The course is organized according to four pillars:

	1. Culture 2. Customs and Rituals 3. Information on Germany/Bavaria 4. Culture Shock Whereas hard facts are taught in a classical lecture style, students will do lots of role-plays, critical incidents, short movies and do a quiz.
Assessment method	Paper
Language of instruction	English/German
Prerequisites	None

Social Responsibility and Initiative in a University Context

Course title	Social Responsibility and Initiative in a University Context
Course ID	344
ECTS	2
Course type	Elective
SWS	2
Semester	Winter and summer
Lecturer	Matthias Koeppen
Course objectives	Students who take an active role in university association, committee, or similar, or assume social responsibility within the university context can earn ECTS points for their outstanding contributions. Developing a deeper understanding of the importance of social engagement and responsibility in society, particularly in the university environment. Acquisition of practical skills in organising and implementing projects within student associations, committees, etc. Personal development through the promotion of responsibility, teamwork, communication, and leadership skills via active participation in association activities, meetings, committees, etc. Reflection on personal and professional development through engagement during studies and the application of theoretical concepts in practice.

Course contents	Students explore the topic of social responsibility and engagement within the university context. The course offers a unique opportunity to gain practical experience through active participation in student associations, committees, etc., and to achieve outstanding accomplishments, which will be rewarded with ECTS points. • Introduction to the concepts of social responsibility and civic engagement. • Analysis of successful projects and initiatives both within and beyond the university walls. • Planning and implementation of individual projects within the university context. • - Regular reflection and discussion of experiences and their significance for personal and professional development.
Recommended literature	Bierhoff, H.-W., & Rohmann, E. (2020). Soziale Verantwortung im Organisationskontext. In A. Seibert-Fohr (Hrsg.), Springer VS. Hochschulrecht – Satzungen und Verordnungen der THD (zu finden auf der Webseite der THD: https://th-deg.de/de/studierende/antraege-und-organisatorisches#hochschulrecht) Genenger-Stricker, M. (Hrsg.). (2019). Hochschule und soziale Heterogenität: Anforderungen und Impulse für eine diversitätssensible und -gerechte Hochschulentwicklung. Springer VS. Hans-Böckler-Stiftung. (2009). Hochschule in gesellschaftlicher Verantwortung: Unser Vorschlag für das Leitbild Demokratische und Soziale Hochschule. Hans-Böckler-Stiftung. Springer, C., & Struß, B. (2018). Hochschule mit Verantwortung: Engagementförderung durch universitäre Lehre. Newsletter des Bundesnetzwerks Bürgerschaftliches Engagement (BBE), Nr. 15, 26. Juli 2018.
Teaching methods	Projects, group work, active involvement

Assessment method	Written assignment (German or English)
Language of instruction	English
Prerequisites	For further information, please get in contact with the International Office.

Simplified Microcontroller Programming

Course title	Simplified Microcontroller Programming
ECTS	2
Course type	Lecture with practical exercises
SWS	2
Semester	Winter and summer
Workload in hours	Total: 60 / In-class: 30 / Self-study: 30
Lecturer	Johann Gerner
Course objectives	In almost all areas of technical installations, microcontrollers constitute the core of control and regulating engineering. By means of various university initiatives, systems have been developed that are both inexpensive and easy to program and therefore they are especially suitable for students who do not have an extensive basic knowledge in the field of electrical engineering. Based on the simple development system "Arduino", students will learn how can be solved technical problems in the various engineering disciplines with the aid of software and hardware. Here, the handling of hardware-based programming is exercised and solution approaches are developed that are presented in the various sensors and actuators.
Course contents	• Introduction: presentation of the development system Arduino and its sub-systems • Testing and analysis of existing sample programs under consideration of special problem cases • Reading and implementing Fritzing diagrams and wiring diagrams

	• Inclusion and application of external program libraries • Application programming of different sensors and their characteristics • Control of different actuators and introduction to the applied technology • Program development for simple measurement and control applications • Information about current development trends in microcontroller engineering
Recommended literature	Massimo Banzi, Arduino für Einsteiger (2012); O'Reilly Simon Monk, Programming Arduino Next Steps: Going Further with Sketches
Teaching methods	Seminar-like lessons and practical tasks in the laboratory
Assessment method	Presentation of project results
Language of instruction	English
Prerequisites	Fundamentals of Informatics, experience with Windows

Lean Management

Course title	Lean Management
ECTS	5
Course type	Lecture
SWS	4
Semester	Winter
Workload in hours	Total: 150 / In-class: 60 / Self-study: 90
Lecturer	Prof. Dr.-Ing. Gerd Maurer
Course objectives	Basic understanding of LEAN MANAGEMENT Application of Last Planner System ® for Construction
Course contents	Lectures on LEAN MANAGEMENT Introduction into the Last Planner System ® Method Workshops for practical usage of LEAN MANAGEMENT methods Lean Project Delivery Practices in Construction
Recommended literature	Ballard, G. (2000). *The last planner system of production control*. Birmingham, UK: University of Birmingham *Lean Project Delivery and Integrated Practices in Modern Construction,* Syed M. Ahmed, Lincoln H. Forbes, EAN: 9780429859342
Teaching methods	Lecture / presentation / practical work in case studies
Assessment method	Assignment - Paper
Language of instruction	English

Prerequisites	None

Selected Topics in Control Engineering

Course title	Selected Topics in Control Engineering
ECTS	5 ECTS
Course type	Lecture/ practical exercises
SWS	4 SWS
Semester	Winter
Workload in hours	Time of attendance: 60 hours self-study: 90 hours Total: 150 hours
Lecturer	Prof. Dr.-Ing. Nikolaus Müller
Course objectives	Students will be enabled to design suitable controllers and observers for challenging dynamic plants by means of the state-space method and implement it as a program. The students achieve the following learning objectives: Professional Skills • They can formulate dynamic systems in state-space • They name the most important properties and can calculate them • They can compute controllers and observers for low system order according to the pole-placement method • They can describe how observers work and what is their benefit • They can determine a discrete time description of a plant • They can implement a program for observer and controller

	• They know how to depict a system description within Matlab/Simulink
Course contents	1. Description of dynamic systems in state space a. Physical Modelling b. Set-up of State-Space Description from Other Models c. Methods for Solution of the Differential Equations 2. Properties a. Stability b. Controllability and Observability c. Canonical Forms 3. Design of Controllers a. Pole-Assignment Method for SISO Systems b. Pole-Assignment Method for MIMO Systems c. Other Design Methods 4. Design of Observers 5. Discrete-time description
Recommended literature	– R. Dorf / R. Bishop: Modern Control Systems. 13. edition. Pearson, 2017. – K. Ogata: Modern Control Engineering. 5. edition. Pearson, 2010. – N. Nise: Control Systems Engineering. 6. edition. Wiley, 2011. – S. Chapman: Matlab® Programming with Applications for Engineers. Cengage Learning, 2013.
Teaching methods	Lecture with exercises / presentations / computer simulations in lab
Assessment method	Written examination, 90 min.

Language of instruction	English
Prerequisites	Basic knowledge of control engineering

Automotive Drive Systems

Course title	Automotive Drive Systems
ECTS	2
Course type	Lecture
SWS	2
Semester	Winter
Workload in hours	Total: 75 / In-class: 30 / Self-study: 45
Lecturer	Prof. Dr.-Ing. Nikolaus Müller
Course objectives	Advanced knowledge in control methods of speed variable drive systems Design of a sensorless field oriented control Characterize features of different accumulator technologies Knowledge about necessary infrastructure steps for electrical power supply of vehicles
Course contents	1. Electrical Power Train 1.1. Motors 1.2. Inverter Control with Space Vector Modulation 1.3. Batteries 1.4. Charging Concepts 2. Fuel-assisted Electric Cars 2.1. Fuel-Cells 2.2. Hybrid Vehicles 3. Sustainable Combustion Engine Concepts 3.1. Alternative Fuels 3.2. Alternative Combustion Engines

Recommended literature	Schröder D.: Elektrische Antriebe - Regelung von Antriebssystemen. Springer Verlag, 3. Auflage, 2009 Quang N. P., Dittrich J.-A,: Vector Control of Three-Phase AC Machines: System Development in the Practice. Springer-Verlag, 1. Auflage, 2008. H. Wallentowitz et. al.: Strategien zur Elektrifizierung des Antriebstranges. Vieweg+Teubner, 2009 Th. Becks et al.: Wegweiser Elektromobilität. VDE-Verlag, 2010
Teaching methods	Lecture with exercises/ presentations
Assessment method	Written examination, 45 min.
Language of instruction	English
Prerequisites	Basic knowledge of electrical engineering
Miscellaneous	Students can choose if they want to take part in the second part of the course (Industrial Drive Systems) as well (only possible upon request!). There is the possibility to write a complete exam (90 min.) or just one part of the exam (45 min.)

Advanced Circuits Lab

Course title	Advanced Circuits Lab
ECTS	5
Course type	Practical Exercises
SWS	4
Semester	Winter and summer
Workload in hours	Total: 150 / In-class: 60 / Self-study: 90
Lecturer	Michael Benisch
Course objectives	In the subject Advanced Circuits Lab students obtain an insight into analogue electronic circuits. The students achieve the following learning objectives: Professional Skills: The students know and understand the functionality of different typical analogue electronics circuits. They understand the importance of the bias point and are able to dimension the bias point for various circuits. They can dimension and analyze the small signal behavior of semiconductor circuits as well as the transient behavior. They have the ability to analyze and apply analogue semiconductor circuits for AF and RF. The students know oscillator circuits and dimension and analyze them.The students have the ability to design analogue semiconductor circuits.

	Methodological Skills: The students are able to dimension and optimize electronic analogue circuits with the help of theoretical considerations and simulation. The students are able to differentiate between various circuits and can assess the advantages and disadvantages of different amplifiers and oscillators. The students have the ability to independently research and develop existing basic knowledge. Students can evaluate the properties of electronic circuits by measurements. Soft Skills: Students are able to reasonably justify and critically evaluate the basic properties of analogue electronic circuits. In lab teams the students learn to substantiate their simulation and measurement results. The students are able to present and explain their measurement results and theoretical findings in a convincing, informative and comprehensible way.
Course contents	• Lessons for introduction of specific topics - Applications of analogue circuits - Diodes and Transistors - Amplifiers - RF circuits (Oscillators, PLL) • Lab Experiments - optional: Introduction to circuit simulation - optional: Introduction to basic electronics measurement equipment - Diode circuits: voltage doubler (Villard and Greinacher circuit), voltage cascade, diode as switch - integrated circuits: Timer circuit NE555 - Design of AF-amplifier according to specification

	- Differential amplifier: Characteristics, current source, application - Operational Amplifier - Quasi-linear AF-power-amplifier: Class A, B, AB operation, biasing, output power, efficiency - Phase locked loop ? PLL - RF-Oscillators: Phase-shift oscillator, Wien-bridge oscillator, Colpitts-oscillator, LC-oscillators, Franklin-oscillator - optional: RF-measurements: S-Parameter and time domain reflectometry
Recommended literature	Tietze / Schenk: Electronic Circuits: Handbook for Design and Application, 2nd edition, Springer Verlag, 2008. Streetman / Banerjee: Solid State Electronic Devices, 6th edition. Prentice Hall, 2006. Comer / Comer: Fundamentals of electronic circuit design. Wiley, 2002. Comer / Comer: Advanced electronic circuits design. Wiley, 2003. Scherz / Monk: Practical electronics for inventors. McGraw Hill, 2016. Horowitz / Hill: The art of electronics. 3rd edition. Cambridge University Press, 2015.
Teaching methods	Practical work and lesson style lectures for introduction of specific topics
Assessment method	Project and written examination (90 min.)
Language of instruction	English

Prerequisites	Formally: Admission test Lab seats will be assigned based on the test. Content of the test: General basics of electrical engineering, basics of semiconductor devices, and basics of electronic networks. In terms of content: Fundamentals of electrical engineering, basic knowledge of solid state devices (bipolar junction transistors, diodes), basics of electronic networks

Renewable Energies (Generation and Distribution)

Course title	Renewable Energies (Generation and Distribution)
ECTS	5
Course type	Lecture
SWS	4
Semester	Winter
Workload in hours	Total: 150 / In-class: 60 / Self-study: 90
Lecturer	Prof. Dr.-Ing. Otto Kreutzer
Course objectives	- Forms of renewable energies - Transport and storage of renewable energies - Potential and limits of a 100 % renewable energy supply - Possibilities to actively stop and reverse the effect of global warming
Course contents	The goal of the course is to find ways to supply all worldwide energy demands with renewable energies and realize a carbon-neutral society. To achieve this goal, the different forms of renewable energies are evaluated and necessary technologies to store and transport those renewable energies are explored. After knowing possible forms of energy supply, the energy demand in the different sectors is evaluated and technical solutions to supply industry, transport (cars, aircrafts, planes, ships) and households with 100 % renewable energies are depicted. In addition solutions are revealed to reduce the atmospheric temperature to pre-industrial levels.

Teaching methods	Lecture / project
Assessment method	Portfolio
Language of instruction	English
Prerequisites	Interest in renewable energies, background in electrical engineering

Introduction to the Finite Element Method

Course title	Introduction to the Finite Element Method with NASTRAN & PATRAN
ECTS	4
Course type	Lectures with workshops
SWS	4
Semester	Winter and summer
Workload in hours	Total: 120 / in-class: 40 / Self-study: 80
Lecturer	Prof. Dr. Christian Bongmba
Course objectives	The main aim is to introduce students to the direct stiffness method. They learn how to derive the stiffness matrices for springs, bars, beams, two- and three-dimensional finite elements. The workshops introduce students to MSC NASTRAN and PATRAN. Students learn how to use PATRAN for pre- and post-processing and NASTRAN as a solver. They learn how to import geometry into PATRAN, carry out the discretization, define material and section properties and boundary conditions and set up a finite element analysis.
Course contents	1. Introduction – What is the Finite Element Method? 2. Discretization examples 3. Development of truss element 4. Development of beam element 5. Two-dimensional elements 6. Three-dimensional elements 7. Workshops with MSC NASTRAN und PATRAN linear static, normal modes and buckling

Recommended literature	Logan, Daryl L.: A First Course in the finite Element Method, CENGAGE Learning 2012.
Teaching methods	Lectures, workshops and videos
Assessment method	Workshops and term paper
Language of instruction	English
Prerequisites	Statics, Strength of Materials

MATLAB in Engineering Applications

Course title	MATLAB in Engineering Applications
ECTS	2
Course type	Lecture with computer exercises (computer lab)
SWS	2
Semester	Winter term
Workload in hours	Total: 60 / In-class: 24 / Self-study: 36
Lecturer	Prof. Dr. Mathias Hartmann
Course objectives	Students are able to handle the MATLAB Desktop and are aware what MATLAB can do or can't do. They are prepared to solve simple and advanced numerical problems in MATLAB and can transfer these capabilities to basic engineering applications. To solve more sophisticated problems, participants of the course are up to formulate programs in the MATLAB m-file language.
Course contents	1. An Overview of MATLAB ® 2. Numeric, Cell, and Structure Arrays 3. Functions and Files 4. Programming with MATLAB 5. Advanced Plotting 6. Model Building and Regression 7. Statistics, Probability, and Interpolation 8. Linear Algebraic Equations 9. Numerical Methods for Calculus and Differential Equations 10. Simulink 11. Symbolic Math: MuPAD

Recommended literature	Palm, W. J.: Introduction to MATLAB for Engineers
Teaching methods	Lecture with integrated MATLAB exercises
Assessment method	Written examination, 60 min.
Language of instruction	English
Prerequisites	Calculus, basic computer knowledge

Chemistry

Course title	Chemistry
ECTS	4
Course type	Lecture
SWS	4
Semester	Winter and summer
Workload in hours	Total: 150 / In-class: 60 / Self-study: 90
Lecturer	Prof. Dr. Jeff Wilkesmann
Course objectives	On successful completion of this module, students should • know the basic concepts and terms of general chemistry (Knowledge) • understand the language of chemistry (symbols, formula, • equations, solution, concentrations). (Knowledge) • be able to sketch basic inorganic reactions (Comprehension) • integrate know-how with importance and application of chemistry for every day's life (skills • Ability to understand chemical problems and translate them into equations and apply the principles of chemistry to solve the problems (skills) • Understand possible material-dependent challenges that arise in product and process development (competences) • develop social skills to communicate with peers about a complex topic and find a common solving-oriented approach (competences)

Course contents	atomic structure: atoms, elements and compounds, atomic models; periodic table of elements.; chemical bond: covalent, ionic, metal; definition of the chemical equilibrium; acid and base chemistry: pH-values, strong and weak acids and bases, neutralization, calculation of buffer solutions; redox reactions: definition of oxidation und reduction, making-up redox reactions, corrosion processes; electrochemistry: standard reduction potentials, electrolysis, electrolytic cells. Chemical reactions, reaction kinetics. Principles of organic chemistry.
Recommended literature	Petrucci's General Chemistry: Principles and Modern Applications; (2023) ISBN: 978-1-292-45786-4 Robert C. Fay, John E. McMurry, Jill Kirsten Robinson Atoms First Chemistry, Global Edition (2020) ISBN: 978-1-292-33626-8 Brown, Chemistry: The Central Science (2017)
Teaching methods	Lectures / Course teaching / exercises /tutorials / experimental demonstrations
Assessment method	Written examination, 90 min.
Language of instruction	English
Prerequisites	None

Enzyme Technology

Course title	Enzyme Technology
ECTS	2
Course type	Lecture
SWS	2
Semester	Winter and summer
Workload in hours	Total: 75 / In-class: 30 / Self-study: 45
Lecturer	Prof. Dr. Jeff Wilkesmann
Course objectives	• Discover and apply the potential of enzyme catalysis in industrial biotechnology. • Learn exemplary industrial processes involving enzymes. • Analyse the main influence factors affecting enzymatic rate. • Dominate the basics of enzyme immobilisation methods. • Understand screening approaches for finding and improving industrial enzymes.
Course contents	• Introduction to enzymes: structure, classes and enzyme assays • Enzyme kinetics and data interpretation • Enzymes with incomplete selectivity: E-value • Kinetic racemic resolution • Dynamic kinetic racemic resolution • Process stability • Non-conventional reaction media • Enzyme immobilisation • Configuration and choice of enzyme reactors

Recommended literature	• Klaus Buchholz, Volker Kasche and Uwe T. Bornscheuer: Biocatalysts and Enzyme Technology, Wiley-VCHVerlag, 2005. • Andreas S. Bommarius und Bettina R. Riebel: Biocatalysis, Wiley-VCH-Verlag, 2004. • Levenspiel, O., Chemical Reaction Engineering • Doran, P. M., Bioprocess Engineering Principles, 2nd edition • Liese, A., Seelbach, K., Wandrey, C., Industrial biotransformations
Teaching methods	Lecture with exercises / presentations / workshops / case studies
Assessment method	Written examination / paper analysis
Language of instruction	English
Prerequisites	None

Biobased Materials Engineering

Course title	Biobased Materials Engineering
ECTS	4
Course type	Lecture
SWS	4
Semester	Winter and summer
Workload in hours	Total: 150 / In-class: 60 / Self-study: 90
Lecturer	Prof. Dr. Jeff Wilkesmann
Course objectives	After successful completion, students will be able to: • Explain the organic chemistry of amino acids, peptides, proteins, monosaccharides, and polysaccharides. • Relate molecular structure to material properties. • Compare major natural biopolymers such as cellulose, starch, chitin, alginate, gelatin, collagen, and silk. • Describe physical and chemical modification strategies for biobased materials. • Evaluate sustainability aspects of biomaterials using life-cycle and circular economy principles. • Select appropriate protein- or carbohydrate-based materials for engineering applications. • Critically analyze emerging biomaterial technologies from scientific literature.
Course contents	• Introduction to Biomaterials • Organic Chemistry applied to biomaterials • Proteins as Engineering Materials • Enzymes and biocatalysis • Carbohydrates as Engineering Materials • Biomaterial Processing and Technologies

	• Sustainable Design of Biomaterials. Green Chemistry Principles • Emerging Applications. Biofabrication. Engineered protein materials. Nanocellulose
Recommended literature	• Ashby, M. F. (2021). Materials and the environment: Eco-informed material choice (3rd ed.). Elsevier. • Ratner, B. D.(Eds.). (2013). Biomaterials science: An introduction to materials in medicine (3rd ed.). Academic Press. • Niaounakis, M. (2015). Biopolymers: Applications and trends. William Andrew Publishing/Elsevier. • Agrawal, C. M., Ong, J. L., Appleford, M. R., & Mani, G. (2014). Introduction to biomaterials: Basic theory with engineering applications. Cambridge University Press. • Pilla, S. (Ed.). (2011). Handbook of bioplastics and biocomposites engineering applications. Wiley. • Inamuddin, Ahamed, M. I., & Boddula, R. (Eds.). (2021). Biobased materials and bioenergy. CRC PressKlaus Buchholz, Volker Kasche and Uwe T. Bornscheuer: Biocatalysts and Enzyme
Teaching methods	Lecture with exercises / presentations / workshops / case studies
Assessment method	Written examination, 90 min / paper analysis
Language of instruction	English
Prerequisites	None

Projects in Science and Engineering

Course title	Projects in Science and Engineering
ECTS	6
Course type	Project
SWS	4
Semester	Winter and summer
Workload in hours	180
Lecturer	Prof. Dr. Thomas Stirner
Course objectives	Knowledge of project management; analysis, distribution and solution of the tasks in a small team; obtaining and presenting results; practical application of the theoretical knowledge base; communication and team skills; strategic planning; time-management skills; problem-solving skills
Course content	Projects or part of a project may be of a theoretical nature (e.g. literature review, software development, data mining, etc.) or of an experimental nature (e.g. design of experiment, measurements, etc); project descriptions will be made available at the beginning of the semester; teams will be built to solve the tasks; each team will work on project results, which will be presented in written form and orally
Recommended literature	Specific to the project

Teaching methods	Supervision
Assessment method	Written report and oral presentation
Language of Instruction	English
Prerequisites	None

Advanced Projects in Science and Engineering

Course title	Advanced Projects in Science and Engineering
ECTS	6
Course type	Project
SWS	4
Semester	Winter and summer
Workload in hours	180
Lecturer	Prof. Dr. Thomas Stirner
Course objectives	Deeper knowledge of project management; further analysis, distribution and solution of advanced tasks in a small team; obtaining and presenting results; extensive practical application of the theoretical knowledge base; enhanced communication and team skills; strategic planning; time-management skills; problem-solving skills
Course content	Advanced projects or part of an advanced project may be of a theoretical nature (e.g. literature review, software development, data mining, etc.) or of an experimental nature (e.g. design of experiment, measurements, etc.); project descriptions will be made available at the beginning of the semester; teams will be built to solve the advanced tasks; each team will work on project results, which will be presented in written form and orally
Recommended literature	Specific to the project

Teaching methods	Supervision
Assessment method	Written report and oral presentation
Language of Instruction	English
Prerequisites	Projects in Science and Engineering

Relativity

Course title	Relativity
ECTS	5
Course type	Lecture
SWS	4
Semester	Summer and Winter
Workload in hours	150
Name of lecturer	Prof. Dr. Thomas Stirner
Course objectives	Knowledge of Albert Einstein's theory of special relativity; applications arising from the theory of relativity; experimental observations; solution of exercises; logical thinking; problem-solving skills
Course content	Introduction to space-time; length contraction and time dilation; relativistic dynamics; mass-energy equivalence; paradoxes; basics of general relativity and cosmology
Recommended literature	Gabriel Barton, Introduction to the relativity principle, Wiley, 1999
Teaching methods	Lectures with exercises
Assessment method	Written examination 60 min.

Language of Instruction	English
Prerequisites	None

Projects in Industrial Engineering

Course title	Projects in Industrial Engineering
ECTS	6
Course type	Project
SWS	4
Semester	Winter and summer
Workload in hours	180
Lecturer	Prof. Dr. Jutta Stirner
Course objectives	Knowledge of project management; analysis, distribution and solution of the tasks in a small team; obtaining and presenting results; practical application of the theoretical knowledge base; communication and team skills; strategic planning; time-management skills; problem-solving skills.
Course content	Projects or part of a project may be of a theoretical nature (e.g. literature review, data mining, etc.) or of analytical nature (e.g. business plan, etc.); project descriptions will be made available at the beginning of the semester; teams will be built to solve the tasks; each team will work on project results, which will be presented in written form.
Recommended literature	Specific to the project

Teaching methods	Supervision
Assessment method	Written report
Language of instruction	English
Prerequisites	None
Miscellaneous	Max. 10 participants

Advanced Projects in Industrial Engineering

Course title	Advanced Projects in Industrial Engineering
ECTS	6
Course type	Project
SWS	4
Semester	Winter and summer
Workload in hours	180
Name of lecturer	Prof. Dr. Jutta Stirner
Course objectives	Deeper knowledge of project management; further analysis, distribution and solution of advanced tasks in a small team; obtaining and presenting results; extensive practical application of the theoretical knowledge base; enhanced communication and team skills; strategic planning; time-management skills; problem-solving skills
Course content	Advanced projects or part of an advanced project may be of a theoretical nature (e.g. literature review, data mining, etc.) or of a statistical nature (e.g. data analysis etc.); project descriptions will be made available at the beginning of the semester; teams will be built to solve the advanced tasks; each team will work on project results, which will be presented in written form.
Recommended literature	Specific to the project: Google Scholar, Science Direct via THD library

Teaching methods	Supervision
Assessment method	Written report
Language of Instruction	English
Prerequisites	Projects in Industrial Engineering

International Business Frameworks

Course title	International Business Frameworks: Managing Enterprise Growth, Geopolitics, and Complex Operations
ECTS	5
SWS	4
Semester	Winter
Workload in hours	Total: 150 / In-class: 60 hrs / Self-study: 90 hrs
Lecturer	Mr. Jack Romero
Course objectives	Key Skills You Will Master • Enterprise Architecture: Frameworks for structuring and running complex business processes across multiple international markets. • Cross-Cultural Intelligence: The psychological and strategic skills required to lead international teams and close cross-border deals. • Operational Scaling: Step-by-step methods to drive business expansion, manage international networks, and maintain peak efficiency. • Corporate Turnaround & Turnkey Success: Practical tactics to restructure underperforming global business units and secure market victory.

Course contents	Designed and delivered directly by Jack Romero—a highly successful international business entrepreneur and academic operating with a reputable, global network of multinational organisations and major industries. This cross-disciplinary elective strips away outdated legacy theories to teach you exactly how international enterprises operate in real-time today. Managing an international business requires far more than standard academic textbook models; it demands the sharp operational intelligence needed to sync complex business processes across borders, lead diverse global teams, and navigate intense cultural environments without losing momentum whilst keeping a sharp look out for geopolitical developments. Whether your primary focus is Entrepreneurship, AI, Engineering, Tech, or Business Administration, this course bypasses time-wasting fluff to deliver raw, actionable execution strategies. You will learn what is working in the global market right now, positioning you the moment this course is complete to confidently tackle the complex operational challenges of tomorrow and succeed.

Teaching methods	Module Content & Weekly Breakdown Phase 1: Scaling the Global Enterprise with Emerging Geopolitical Challenges • Mapping out modern international expansion models and cross-border business setups despite geopolitical tensions e.g. Iran/USA, Lebanon/Israel, China/Taiwan, Venezuela/USA etc. • Aligning complex operational processes and maintaining strategic direction during rapid growth. • Cross-Disciplinary Focus: Scaling tech, engineering, and product frameworks into new international markets. Phase 2: Mastering Cross-Cultural Operations & Networks • Navigating the human and cultural complexities of international enterprise management. • Building, maintaining, and supporting high-performance global teams and corporate networks. • Cross-Disciplinary Focus: Leading cross-border project teams and managing diverse stakeholder expectations. Phase 3: Business Optimisation & Turnaround Mastery • Diagnosing operational friction and re-engineering underperforming international business units. • Defensive and offensive positioning strategies when meeting fierce competition from global incumbents. • Live Simulation: Participating in a real-world enterprise growth and corporate turnaround process.

Recommended literature	n.a.
Assessment method	Portfolio (100% Coursework / Zero Final Exam)
Language of instruction	English

IT Skills for Project Managers

Course title	IT Skills for Project Managers
ECTS	5
Course type	Lecture
SWS	4
Semester	Winter
Workload in hours	Total: 150 / In-class: 60 / Self-study: 90
Lecturer	Reijo Koivula
Course objectives	This course is suitable not only for students who are planning to specialize in project management, but also for students who plan to become operating, product, marketing and general managers.
Course contents	The emphasis is not on becoming an IT specialist but rather on how to use information systems and software applications in the context of efficiently managing projects.
Teaching methods	In-class lectures and virtual sessions
Assessment method	Written paper
Language of instruction	English
Prerequisites	None