Faculty of Engineering
Course Descriptions – Aschaffenburg UAS

(As of July 2021)

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TH Aschaffenburg
university of applied sciences

Course Overview of English-taught Courses

(All courses are subject to demand)

1 Exchange Programmes

1.1 Advanced Technical Sales Management

The English-taught semester International Technical Sales is available in our winter semester as well as in our summer semester. As each semester features different courses, it is possible to combine them into a full year of intensive studies in the field.

As international competition becomes ever fiercer, the areas of marketing and sales will grow in importance, especially in the case of technically demanding industrial goods that require detailed explanation to customers. Therefore, companies with a strong technological position will need sales staff who are as equally qualified in technology as they are in sales management.

On the one hand, such employees should have sound knowledge of engineering sciences in order to provide professional advice to potential customers, who generally have a high level of technical understanding. On the other hand, they also require a sound knowledge of management and marketing to position complex technical products successfully on the market. Finally, the ability to negotiate securely in a foreign language is essential for performance at an international level.

Our International Technical Sales programme focuses on precisely these areas. This programme is open to all interested engineering students as well as to double degree students from ESTA Belfort and Turku University of Applied Sciences.

Winter Semester			
Course Code	**Name of Course**	**ECTS**	**Total**
6017	Project Management	5	
6026	Logistics and Production	5	
6317	Engineering Basics III: Principles of Electrical Engineering	6	
	or		
6314	Engineering Basics I: Principles of Technical Optics & Practice	6	
6320	English III (ITV)	2	
8668/69/70	German as a Foreign Language	5	
			23 ECTS

Summer Semester			
Course Code	**Name of Course**	**ECTS**	**Total**
6316	Engineering Basics II: Basics of Mechanical Engineering	6	
6067	Conflict and Negotiation Management (International Negotiations)	5	
	or		
6074-1	International Sales – Conflict and Negotiation Management	3	
6074-3	International Sales– Strategic Sales	3	
6048	Quality Management	5	

8669/70	German as a Foreign Language	5	
			22 or 24 ECTS

You may choose additional courses from the regular course offer of the Faculty of Engineering to reach 30 ECTS per semester / 60 ECTS per academic year. Double degree students are to take a minimum of 60 ECTS.

1.2 EPA - Engineering Programme Aschaffenburg

The English-taught semester programme is available in our winter semester as well as in our summer semester. As each semester features different courses, it is possible to combine them into a full year of intensive studies in the field.

Mechatronics is a multidisciplinary area of engineering sciences that is extremely relevant to modern industry developments and needs. The subject is founded in traditional engineering sciences but also includes electrotechnology and, in particular, information technology.

This programme includes lectures as well as units that focus on learning by doing. We recommend it to you if you are an engineering student interested in the field or if you are a double degree student from Seinäjoki University of Applied Sciences.

Winter Semester			
Course Code	**Name of Course**	**ECTS**	**Total**
6317	Engineering Basics III: Principles of Electrical Engineering	6	
8013	Technical English III	2	
5648	TRIZ - Systematic Innovation for New Product Development	5	
7249	EEP - Development and Testing of Prototypes	5	
1201	Digital Signal Processing with MATLAB and Python	3	
(5651) 7224	(Robotics Lab not offered in 2021/22) Instead: Automation with Siemens S7 PLC	(3) 5	
5638	Engine Testing	2	
8668/69/70	German as a Foreign Language	5	
			33 ECTS

Summer Semester			
Course Code	**Name of Course**	**ECTS**	**Total**
6316	Engineering Basics II: Basics of Mechanical Engineering	6	
7220	Simulation Methods I	5	
1281	Engineering Project	5	
5640	Technology and Innovation Management	3	
5670	Simulation of Flight Dynamics and Airplane Operation with MatLab-Simulink	5	
5650	Experimental Methods in Mechanical Vibrations	3	
			27 CTS

2 Overview of All English-taught Courses

2.1 Winter Term

Course No.	Course Name	ECTS	Semester Hours
7224	Automation with Siemens S7 PLC	5	4
8807	Behavioral Economics: Above and Beyond	2	2
1201	Digital Signal Processing with MATLAB and Python	3	2
7249	EEP - Development and Testing of Prototypes	5	4
5638	Engine Testing	2	2
5674	Engine Simulation (only offered in German in 2021/2022)	2	2
6314	Engineering Basics I: Principles of Technical Optics & Practice	6	6
6317	Engineering Basics III: Principles of Electrical Engineering	6	6
8771	Intercultural Communication	2.5	2
4750	Introduction to International Management	2	2
6026	Logistics and Production	5	4
5653	Mathematics III and Simulation	5	4
5664	Mechatronic Systems Lab (not offered in 2021/2022)	3	2
7248	PrA - Engineering of Systems	3	3
6017	Project Management	5	2
5651	Robotics Lab (not offered in 2021/2022)	3	2
7240	Simulation Methods II	5	4
5648	TRIZ - Systematic Innovation for New Product Development	5	4

The language courses offered across our two faculties notwithstanding, each faculty also offers language courses specific to their degree programmes.

Course No.	Course Name	ECTS	Semester Hours
8003	English III	2	2
6320	English III (ITV)[1]	2	2
5510	Technical English I	2	2
8013	Technical English III[2]	2	2

Learning the language can be very useful when it comes to connecting with the locals. We offer German courses for all levels – whether you are starting out as a beginner or at a more advanced level.

Course No.	Course Name	ECTS	Semester Hours
8668	German as a Foreign Language I	5	4
8669	German as a Foreign Language II	5	4
8670	German as a Foreign Language III	6	4
8671	German as a Foreign Language IV	6	4
8672	Business German	2.5 / 5	2

[1] Not to be taken with Technical English III.
[2] Not to be taken with English III (ITV).

2.2 Summer Term

Course No.	Course Name	ECTS	Semester Hours
6067	Conflict and Negotiation Management (International Negotiations)	5	2
5666	Digital Manufacturing (FabLab) (not offered in 2021/2022)	3	2
7249	EEP - Development and Testing of Prototypes	5	4
7252	Engineering and Commissioning of Renewable Power Systems	3	3
6316	Engineering Basics II: Basics of Mechanical Engineering	6	6
1281	Engineering Project	5	4
5650	Experimental Methods in Mechanical Vibrations	3	2
8771	Intercultural Communication	2.5	2
6074-1	International Sales – Conflict and Negotiation Management	3	2
6074-2	International Sales– International Contracting	3	2
6074-3	International Sales– Strategic Sales	3	2
6076	International Sales – Seminar / Case Study International Sales	6	4
6327	International Seminar	4	
4354	Lab Material Sciences	2	2
7227	Programmable Logic Controller S7-1200 for Industrial Automation and Renewable Energy Field	5	4
6333	Quality Management	5	2
6325	Seminar Advanced Topics in Marketing and Sales	7	4
7220	Simulation Methods I	5	4
5670	Simulation of Flight Dynamics and Airplane Operation with MatLab-Simulink Simulation of Flight Dynamics and Airplane Operation with MatLab-Simulink	5	4
6042	Technical Systems	5	4
5640	Technology and Innovation Management	3	2

4753	The Fascination of Nanotechnology (not offered in 2021/22)	2	2

The language courses offered across our two faculties notwithstanding, each faculty also offers language courses specific to their degree programmes.

Course No.	Course Name	ECTS	Semester Hours
5520	Technical English II	2	2

Learning the language can be very useful when it comes to connecting with the locals. We offer German courses for all levels – whether you are starting out as a beginner or at a more advanced level.

Course No.	Course Name	ECTS	Semester Hours
8668	German as a Foreign Language I	5	4
8669	German as a Foreign Language II	5	4
8670	German as a Foreign Language III	6	4
8671	German as a Foreign Language IV	6	4
8672	Business German	2.5 / 5	2

3 Course Descriptions

Automation with Siemens S7 PLC	
Course number	7224
Hours per week:	4
ECTS:	5
Scheduled:	Winter Term
Format:	Lecture/ seminar presentations / lab practice
Examination:	Written/Oral exam/Project Presentations
Lecturer:	Dodiek Ika Candra
Objectives:	Understanding the basics of functions, programs, configuration, maintenance, and diagnostics of PLC S7-1200 Ability to create and manage projects in STEP7 integrated in the modern TIA Portal
Contents:	• Introduction to PLC S7-1200 and TIA Portal • Hardware configuration of S7-1200 systems • PLC components symbols • Binary and digital operations (incl. timers and counters) • Analog values processing • Concept of Data Blocks (DB), Organization Blocks (OB), Function Block (FB), and Function (FC) • Variables management PLC • Generate a program using LAD/FBD/SCL languages • Introduction to basics of the PROFINET network • Project management – documentation, archiving and saving the program. • Identifying basic errors of the user • Practical exercises
Pre-requisites	General technical knowledge especially basic knowledge of relay control systems
Recommended Reading:	• Berger, H.: Automating with SIMATIC S7-1200 Hardware Components, Programming with STEP 7 Basic in LAD and FBD, Visualization with HMI Basic Panels (PRINT and E-BOOK), PUBLICIS, 2013. • Berger, H.: Automating with SIMATIC: Controllers, Software, Programming, Data Communication Operator Control and Process Monitoring, PUBLICIS, 2009. • Kraftan, J.: PLC-Basic Course with SIMATIC S7, Vogel Business Media GmbH, 2011.

Behavioral Economics: Above and Beyond	
Course number	8807
Hours per week:	2
ECTS:	2
Scheduled:	Winter Term
Format:	Seminar presentations
Examination:	60% Oral exam (20 min.) & 40% active cooperation during the seminar
Lecturer:	Prof. Dr. Roetzel, LL.M.
Objectives:	Participants know cognitive biases and managers' behavior in economic decision situations.
Contents:	Decision making process / Information processing / Cognitive biases / Prospect Theory
Pre-requisites	Basics of Business Administration
Recommended Reading:	Kahneman, D. (2012): Thinking, Fast and Slow. Chapman, C./Hopwood, A./Shields, M. (2007): Handbook of Management Accounting Research.

Business German	
Course number:	8672
Hours per week:	2
ECTS:	2.5 / 5 (bachelor) / 6 (master)
Scheduled:	Every summer and winter term
Format:	Lecture
Examination:	• 2.5 ECTS: Written exam (90 min.) • Additional oral exam and term paper for exchange students requiring 5 ECTS (bachelor) / 6 ECTS (master)
Lecturer:	Prof. Dr. Link
Objectives:	Competence of using the German language in a professional context; training of Business German skills in the four areas of listening, reading, speaking and writing according to the CEFR (Common European Framework of Reference for Languages) based on the level of B2+: - The student is able to identify, name and apply relevant terms and vocabulary in level-adequate Business German. - The student is capable of level-adequate a) listening (e.g. to business news) b) reading (e.g. of business press articles) c) speaking (examples see below) d) writing (e.g. of business correspondence) - The student is enabled to prepare level-adequate language assignments in teams with other students. - The student is able to engage in simulations of typical business situations in level-adequate Business German (e.g. job interviews, presentations, telephone calls, meeting, negotiations). - The student is capable of effectively interacting with other students in level-adequate Business German more confidently. - The student is prepared for international business dealings with Germans in his future professional life.
Contents:	Selected areas of Business German suitable for the level of the students (CEFR B2+).
Prerequisites:	At least German as a Foreign Language II or comparable skills. Only open to non-native speakers of German.
Recommended Reading:	Selected areas of Business German suitable for the level of the students (CEFR B2+).

Conflict and Negotiation Management (International Negotiations)

Course number	6067
Hours per week:	4
ECTS:	3
Scheduled:	Summer Term
Format:	seminar
Examination:	Homework with presentation
Lecturer:	Prof. Dr.-Ing. Schneider-Störmann
Objectives:	Knowledge Students are able to classify conflicts and to prepare and conduct negotiations, especially for technical products. They recognize and address these conflicts systematically. Skills This module enables students to strengthen their communication skills and competencies for negotiations of technical products. They are able to systematically analyze the negotiation situation and to find solutions for the negotiations. Competencies Students are able to prepare and carry out negotiations. They go before strategically, anticipate responses and choose the appropriate tactics in order to achieve the objectives.
Contents:	Negotiations and conflicts (Overview) - Types of conflict and origins, complexity of conflicts (development and training for in-depth understanding) - Structural analysis of the negotiating landscape (Overview) - Basics of negotiation techniques (Full Development and training for in-depth understanding) - Consideration of technical aspects in offers and negotiations for technical goods (development and training for in-depth understanding) - Practical examples and role plays to understand and explore the theory (Full development and training for in-depth understanding)
Pre-requisites	
Recommended Reading:	Bühring-Uhle, C., Eidenmüller, H., Nelle, A.: Verhandlungsmanagement: Analyse - Werkzeuge - Strategie, Deutscher Taschenbuch Verlag Hedge, Jason; The Essential DISC Training Workbook: Companion to the DISC Profile Assessment; DISC-U.org Rothlauf, J.: Interkulturelles Management: Mit Beispielen aus Vietnam, China, Japan, Rußland & Golfstaaten, Oldenbourg Wissenschaftsverlag Schneider-Störmann, Ludger: Technische Produkte verkaufen mit System, Hanser.Technik, 2015 Tries, J., Reinhardt, R.: Konflikt- und Verhandlungsmanagement: Konflikte konstruktiv, Springer-Verlag

	Ury, Fischer: Getting to Yes Ury, Fischer, Betting beyond no Watzlawick, Paul; Pragmatics of Human Communication: A Study of Interactional Patterns, Pathologies and Paradoxes; WW Norton & Co All literature in most recent edition.

Digital Manufacturing (FabLab) (not offered in 2021/2022)	
Course number	5666
Hours per week:	2
ECTS:	3
Scheduled:	Summer Term
Format:	Lab class including team work
Examination:	Presentation of Lab results Course will be graded: passed/not passed
Lecturer:	Prof. Dr.-Ing. Alexander Czinki, B. Eng. Roberto Hamidi
Objectives:	Understanding: - the workflow of digital manufacturing: from 3D-Modelling to printing; - business and innovation opportunities coming along with Digital Manufacturing - the disruptive character of digital prototyping and manufacturing and is impact on future product development processes - the digital tools with their specific capabilities and possible drawback; Gain practical experiences with: - digital manufacturing machines Exploring the individual creativity and the ability to transform ideas into real-world prototypes
Contents:	Generating and Transforming CAD-Models for the use in Digital Manufacturing Typical Machines in Digital Manufacturing(3D-Printing, Laser-Cutting, 3D-Milling,…) - Technology and Hands-on Experiences Applying Knowledge in a small design challenge
Pre-requisites	- independent work style - good team abilities - proper knowledge of the English language, enabling to participate in technical discussions within the student teams
Recommended Reading:	Course slides or course reader will be provided.

Digital Signal Processing with MATLAB and Python	
Course number	1201
Hours per week:	2
ECTS:	3
Scheduled:	Winter Term
Format	Lecture and Lab
Examination:	Oral exam (15 min.)
Lecturer:	Prof. Dr.-Ing. Hinrich Mewes
Objectives:	**Knowledge:** The students know various algorithms of digital signal processing and their applications. They can specify examples of application fields. **Skills:** The Students can implement digital signal processing techniques in MATLAB and Python. They are able to interpret the results of their calculations and simulations. **Competences:** Students can apply digital signal processing techniques to practical tasks and develop solutions. They are able to apply digital filters to real world signals, improve signals and analyze signals using spectral estimation techniques.
Contents:	• Discrete time signals und systems • Sampling theorem • MATLAB and Python for signal processing • Digital filters: analysis, description, design • Discrete Fourier transform and spectral estimation • Projects: Filtering and spectral estimation of real world signals
Pre-requisites	Engineering Mathematics I & II, Computer Science I & II
Recommended Reading:	Mark Wickert: Signals and Systems for Dummies, John Wiley and Sons James Mc Clellan, Ronald W. Schafer, Marl A. Yoder: DSP First Pearson Education Monson H. Hayes: Digital Signal Processing, McGraw Hill All books in the current edition

EEP - Development and Testing of Prototypes

Course number	7249
Hours per week:	4
ECTS:	5
Scheduled:	Every Winter and Summer Term
Format	Lecture and Lab The students may decide whether to perform the presentations and exams in German or English.
Examination:	Presentations and written report
Lecturer:	Prof. Dr. Kilian Hartmann, Prof. Dr.-Ing. Michael Mann
Objectives:	**Knowledge:** The students know the development and testing of prototypes in theory and by examples in practice. **Skills:** The students independently acquire theoretical basics and methods. They command various planning tools, apply them in realization and analyze prototypes for errors methodically. **Competences:** The students build technological concepts in teams and evaluate them. Those concepts can be realized into prototypes. Prototypes are analyzed and optimized. Failures are analyzed methodically and potentials for solutions are generated.
Contents:	- Theory of project planning tools - Planning and building of prototypes - Testing and failure analysis of prototypes - Writing of project reports and presentations
Pre-requisites	none
Recommended Reading:	Depending on the current project: Engineering Design, A Systematic Approach: Gerhard Pahl, Wolfgang Beitz, Jörg Feldhusen, Karl-Heinrich Grote , ISBN: 978-1-84628-318-5 (Print) 978-1-84628-319-2 (Online) Das Ingenieurwissen: Entwicklung, Konstruktion und Produktion: Karl-Heinrich Grote, Frank Engelmann, Wolfgang Beitz, Max Syrbe, Jürgen Beyerer, Günter Spur ISBN: 978-3-662-44392-7 (Print) 978-3-662-44393-4 (Online) Pahl/Beitz Konstruktionslehre, Methoden und Anwendung erfolgreicher Produktentwicklung Jörg Feldhusen, Karl-Heinrich Grote ISBN: 978-3-642-29568-3 (Print) 978-3-642-29569-0 (Online) All books in the current edition.

Engine Testing

Course Number	5638
Hours per week:	2
ECTS:	2
Scheduled:	Winter Term
Format:	Lecture including some exercises on engine test bench if possible
Examination:	Written exam
Lecturer:	Prof. Dr.-Ing. Kai Borgeest
Objectives:	knowing and understanding how to use engine test benches and measurement equipment to test and improve internal combustion engines and hybrid drives
Contents:	Basic Principles of internal combustion engines Overview of engine test benches Brakes and dynos Speed and torque measurement Exhaust gas analysis Measurement of Pressures and Temperatures NVH testing Hybrid testing Test bench automation Design of Experiments Data evaluation Test bench buildings
Pre-requisites:	Engineering Fundamentals
Recommended Reading:	A.J. Martyr, M.A. Plint: “Engine Testing”, Butterworth-Heinemann, 2007, ISBN 978-0750684392 K. Borgeest: “Messtechnik und Prüfstände für Verbrennungsmotoren”, 2016, ISBN 978-3-658-10117-6

Engine Simulation (only offered in German in 2021/22)	
Course Number	5674
Hours per week:	2
ECTS:	2
Scheduled:	Winter Term
Format:	Lecture including some computational exercises in German language
Examination:	Oral exam
Lecturer:	Prof. Dr.-Ing. Kai Borgeest
Objectives:	Combustion engines are complex devices where many thermodynamic and mechanic properties cannot be described analytically. The course introduces to the art of engine simulation.
Contents:	Mechanical multibody simulation Mixed mode simulation with Simulink including thermodynamcis CFD (Computational Fluid Dynamics) Select fields of simulation
Pre-requisites:	Engineering Fundamentals
Recommended Reading:	

Engineering and Commissioning of Renewable Power Systems

Course number	7252
Hours per week:	3
ECTS:	3
Scheduled:	Summer Term
Format	Lecture and Lab
Examination:	Study Work with oral examination The students may decide whether to perform the presentations and exams in German or English.
Lecturer:	Prof. Dr.-Ing. Michael Mann
Objectives:	**Knowledge:** The students know the engineering of complex sytsems in theory and practice at the example of a photovoltaic power station. **Proficiencies:** The students autonomously acquire theoretical fundamentals and methods. They command a variety of planning tools, apply the tools in practice and check for errors. **Skills:** The students are empowered to conceptualize assemblies and subassemblies of complex systems, e.g. photovoltaic power stations in teams. The definition and handling of interfaces can be implemented taking the impact on the entire system into account. The commissioning and partial commissioning of a complex system is planned methodically and realized methodically. In order to transpose the curriculum in theory and practice, visits to the environmental station of the city of Aschaffenburg (Umweltstation Aschaffenburg) are an integral part of the curriculum.
Contents:	- Theory of planning tools - Planning and realization of systems - Safety at Work - Installation and Commissioning
Pre-requisites	none
Recommended Reading:	Depending on the current project: Engineering Design, A Systematic Approach: Gerhard Pahl, Wolfgang Beitz, Jörg Feldhusen, Karl-Heinrich Grote , ISBN: 978-1-84628-318-5 (Print) 978-1-84628-319-2 (Online) Das Ingenieurwissen: Entwicklung, Konstruktion und Produktion: Karl-Heinrich Grote, Frank Engelmann, Wolfgang Beitz, Max Syrbe, Jürgen Beyerer, Günter Spur ISBN: 978-3-662-44392-7 (Print) 978-3-662-44393-4 (Online) Pahl/Beitz Konstruktionslehre, Methoden und Anwendung erfolgreicher Produktentwicklung Jörg Feldhusen, Karl-Heinrich Grote ISBN: 978-3-642-29568-3 (Print) 978-3-642-29569-0 (Online)

	Frank Konrad Planung von Photovoltaik-Anlagen Ismail Kasikci Planung von Elektroanlagen K. W. Helbing Handbuch Fabrikprojektierung Thomas Bindel• Dieter Hofmann Projektierung von Automatisierungsanlagen All books in current edition.

Engineering Basics I: Principles of Technical Optics & Practice	
Course number	6314
Hours per week:	6
ECTS:	6
Scheduled:	Winter Term
Format:	seminaristic teaching + practice exercises
Examination:	Written exam: 90 minutes
Lecturer:	Prof. Dr. Thorsten Döhring; Prof. Dr.-Ing. Ludger Schneider-Störmann
Objectives:	Knowledge: After the lecture, the students know the physical and technical terms of technical optics in English language, the basic laws of geometrical optics and the particle-wave-dualism. Skills: The students are able to apply calculation methods of geometrical optics and they are able to analyze optical problems, to abstract them and to select the suitable calculation method. In combination with the lectures in mechanics and electronics, the students are able to solve interdisciplinary problems. Competencies: The students are enabled to analyze optical problems and to simplify them for corresponding calculations. Therefore, they are able to access unknown problems of technical optics and deduce corresponding sales solutions.
Contents:	Units and metric prefixes Photometric and Radiometric Values Polarization Reflection Refraction Projections Lens Errors Cylindrical Lenses Fresnel-Type Lenses Lens Systems Cameras The Optic Norm ISO 10110
Recommended Reading:	Galen C. Duree: Optics For Dummies, John Wiley & Sons Grant R. Fowles: Introduction to Modern Optics, Dover Pubn Inc. Werner Geafer: Grundlagen der Optik, print systems Medienverlag

Engineering Basics II: Basics of Mechanical Engineering	
Course number	6316
Hours per week:	4 lecture + 2 practice session
ECTS:	6
Scheduled:	Summer Term
Format:	Lecture and team work
Examination:	Written exam: 90 Minutes
Lecturer:	Prof. Dr.-Ing. Jochen Krieger
Objectives:	(4 lecture + 2 practice session)
Contents:	**Engineering Mechanics: Statics** – Introduction Mechanics, Newton's laws – Statics of particles – Rigid Bodies and Equivalent Systems – Equilibrium of Rigid Bodies – Friction – Analysis of Structures – Distributed Forces, Centroids and Center of Mass – Forces in Beams) **Mechanics of Materials** – Concept of Stress Stress and Strain: Axial Loading Deflection of Beams
Recommended Reading:	Vector Mechanics for Engineers: Statics by Ferdinand Beer , Wiley Engineering Mechanics: Statics by J. L. Meriam, Wiley Mechanics of Materials by Ferdinand Beer, Wiley (all books in current edition)

Engineering Basics III: Principles of Electrical Engineering	
Course number	6317
Hours per week:	6
ECTS:	6
Scheduled:	Winter Term
Format:	lecture + practice
Examination:	Written exam (90 min)
Lecturer:	Prof. Dr.-Ing. Schneider-Störmann; Prof. Dr. Thorsten Döhring
Objectives:	Knowledge: The course provides a general basic knowledge in the field of electrical engineering and shows practical applications. Students get to know the english physical and technical terms of electrical engineering. The calculation methods of linear networks can identify and represent the students. Skills: Students are able to apply the best method of calculation of electrical problems. They are able to analyze electrical problems and to abstract those. Based on this, they will find the necessary method for calculating the problem. In the context of the other lectures in engineering, students have knowledge, which enables them to handle problems interdisciplinary. Competency: Students are able to analyze electrical problems, to simplify and to calculate them. They can interpret signals and characteristics and compare these.
Contents:	Topics are selected chapters from the fields: • AC/DC networks • Materials in Electrical Engineering • Electrostatic fields, capacitors, dielectric materials • Magnetic fields, coils, magnetic materials, magnetic force • AC networks and sinusoidal operations • Filters
Pre-requisites	Engineering Basics I-II, Mathematics I-II
Recommended Reading:	Clausert, H., Wiesemann, G.: Grundgebiete der Elektrotechnik Band I und II, Oldenbourg-Verlag Hagmann, G.: Grundlagen der Elektrotechnik, AULA-Verlag Hagmann, G.: Aufgabensammlung zu den Grundlagen der Elektrotechnik, AULA-Verlag Weißgerber, W.: Elektrotechnik für Ingenieure Band I und II, Vieweg-Verlag Reuter, M., Zacher, S.: Regelungstechnik für Ingenieure, Vieweg + Teubner, 2008 Zacher, S.: Übungsbuch Regelungstechnik, Vieweg -und Teubner-Verlag All literature in most recent edition

Engineering Project	
Course number	1281
Hours per week:	4
ECTS:	5
Scheduled	Summer Term
Format:	Project Work
Examination:	Project Documentation
Lecturer:	Different
Objectives:	Learn to solve a complex problem in the field of engineering sciences
Contents:	Different
Pre-requisites	
Recommended Reading:	Depending on project

English III	
Course number	8003
Hours per week:	2
ECTS:	2
Scheduled:	Winter Term
Format:	Online course
Examination:	Written exam (90 min.)
Lecturer:	Prof. Dr. Sylvana Kraußе
Objectives:	The primary goal of this course is to introduce students to the course subjects, renewable energy, smart buildings and electric mobility (e-mobility) with a focus on enabling students to subsequently participate in more advanced courses instructed in English. This course will not only deepen their knowledge of the subject material in English, but provide participants with the language skills to succeed in more advanced English academic courses of a related nature. This course is only offered as an online course.
Contents:	Introduce the course subjects through video, audio and textual elements. Students regularly may evaluate their knowledge through a variety of online quizzes. Grammar aspects include: Review all tenses Refresh adjectives, adverbs, prefixes and prepositions Practice and deepen use of linking vocabulary and conjunctions Review if conditionals and related forms Evaluate use of gerunds and infinitives Expand written skills, sentence and paragraph composition to level of short articles (200+ words) As an e-course students will have active participation in: Forum and Wiki contributions Glossaries to be completed Exercises to be submitted Practice giving a presentation Review and practice listening skills in a business context The use of interviews, case studies, audio-video (AV) or audio resources will increase relevant knowledge of best-in-practice industry. This knowledge should allow students to actively participate in these industry sectors whether in an engineering or business role.
Pre-requisites:	(Technical) English I and (Technical) English II
Recommended Reading:	moodle course English for Sustainable Technologies at www.vhb.org > Kursprogramm > Sprachen > English

English III (ITV)	
Course number	6320
Hours per week:	2
ECTS:	2
Scheduled:	Winter Term
Format:	Lecture + practice
Examination:	Oral examination (15 min.)
Objectives:	• Students acquire knowledge on the topic of presenting technical content • Students will master the typical phrases of presentation language and will be able to present subject-specific information effectively • Students will be able to apply presentation techniques in the foreign language
Contents:	Main characteristics of effective presentations, importance of body language, visualization techniques, dealing with questions, written vs. spoken language, preparation of a technical topic for an English presentation. (Development and practice for deeper understanding)
Pre-requisites:	English II
Remarks:	Not to be taken with Technical English III. For the practical part of the lecture, students can bring their own projects, prototypes, ideas for projects or start-up concepts to the lecture.

Experimental Methods in Mechanical Vibrations

Course number	5650
Hours per week:	2
ECTS:	3
Scheduled:	Summer Term
Format:	Lecture / lab practice
Examination:	Written Exam (90 min.)
Lecturer:	Prof. Dr.-Ing. Georg Wegener
Objectives:	Having accomplished this lab course, students should … – have an overview of the specific challenges of measurement of mechanical vibration – be able to select suitable equipment and methods for such measurements – have some basic experience in performing and evaluating vibration measurements
Contents:	Theoretical fundamentals: – working principles of vibration sensors – theory of vibration with multiple degrees of freedom – basic theory of frequency analysis – experimental modal analysis Application and laboratory exercises: Complementing the theory-based part of the course, the participants will perform practical laboratory experiments illustrating the effects studied in the theoretical part in small teams. Subjects covered: – vibration excitation and vibration measurement – evaluation of vibration measurements applying up-to-date software (time domain evaluation, determination of frequency response functions, modal analysis)
Prerequisites:	Basic knowledge in electrical measurement and physics.
Recommended Reading:	– Mechanical Vibrations: Modeling and Measurement, T.L. Schmitz, K.S. Smith, Springer (available as an eBook for Students of UAS Aschaffenburg) – Signals and Systems, Wikibooks, open books for an open world, http://en.wikibooks.org/wiki/Signals_and_Systems – Measurement and Instrumentation: Theory and Application, A. S. Morris, R. Langari (Elsevier) Theory and Design for Mechanical Measurements, R.S. Figliola, D.E. Beasley (Wiley)

German as a Foreign Language I

Course number:	8668
Hours per week:	4
ECTS:	5
Scheduled:	Every summer and winter term
Format:	Lecture
Examination:	Written Exam (90 min.)
Lecturer:	Prof. Dr. Link
Objectives:	Competence of using the German language in an everyday-life and professional context; training of German skills in the four areas of listening, reading, speaking and writing according to the CEFR (Common European Framework of Reference for Languages) level of A0/A1-A2: - The student is able to identify and name relevant terms and vocabulary in level-adequate German (depending on the course of study). - The student is capable of level-adequate a) listening b) reading c) speaking d) writing - The student is enabled to prepare level-adequate language assignments in teams with other exchange students. - The student is able to engage in classroom discussions as well as simulations of typical everyday-life and business situations in level-adequate German. - The student is capable of effectively interacting with other students in level-adequate German more confidently. - The student is prepared for German-taught lectures and for academic studies/international business dealings in his future academic/professional life.
Contents:	Selected areas of everyday-life language and business/economic terminologies suitable for the level of the students (CEFR A0/A1-A2).
Prerequisites:	Only open to non-native speakers of German.
Recommended Reading:	Schritte International, Hueber; the current edition will be communicated in the first session.

German as a Foreign Language II

Course number:	8669
Hours per week:	4
ECTS:	5
Scheduled:	Every summer and winter term
Format:	Lecture
Examination:	Written Exam (90 min.)
Lecturer:	Prof. Dr. Link
Objectives:	Competence of using the German language in an everyday-life and professional context; training of German skills in the four areas of listening, reading, speaking and writing according to the CEFR (Common European Framework of Reference for Languages) level of A2-B1: - The student is able to identify and name relevant terms and vocabulary in level-adequate German (depending on the course of study). - The student is capable of level-adequate a) listening b) reading c) speaking d) writing - The student is enabled to prepare level-adequate language assignments in teams with other exchange students. - The student is able to engage in classroom discussions as well as simulations of typical everyday-life and business situations in level-adequate German. - The student is capable of effectively interacting with other students in level-adequate German more confidently. - The student is prepared for German-taught lectures and for academic studies/international business dealings in his future academic/professional life.
Contents:	Selected areas of everyday-life language and business/economic terminologies suitable for the level of the students (CEFR A2-B1).
Prerequisites:	German as a Foreign Language I or comparable skills. Only open to non-native speakers of German.
Recommended Reading:	Schritte International, Hueber; the current edition will be communicated in the first session.

German as a Foreign Language III

Course number:	8670 (International Management)
Hours per week:	4
ECTS:	6
Scheduled:	Every summer and winter term
Format:	Lecture
Examination:	• Written Exam (90 min.) • Additional Oral Exam or Term Paper for Master students
Lecturer:	Prof. Dr. Link
Objectives:	Competence of using the German language in an everyday-life and professional context; training of German skills in the four areas of listening, reading, speaking and writing according to the CEFR (Common European Framework of Reference for Languages) level of B1-B2: The student is able to identify and name relevant terms and vocabulary in level-adequate German (depending on the course of study). - The student is capable of level-adequate a) listening b) reading c) speaking d) writing - The student is enabled to prepare level-adequate language assignments in teams with other exchange students. - The student is able to engage in classroom discussions as well as simulations of typical everyday-life and business situations in level-adequate German. - The student is capable of effectively interacting with other students in level-adequate German more confidently. - The student is prepared for German-taught lectures and for academic studies/international business dealings in his future academic/professional life.
Contents:	Selected areas of everyday-life language and business/economic terminologies suitable for the level of the students (CEFR B1-B2).
Prerequisites:	German as a Foreign Language II or comparable skills. Only open to non-native speakers of German.
Recommended Reading:	Sicher! Hueber; the current edition will be communicated in the first session.

German as a Foreign Language IV

Course number:	8671 (International Management)
Hours per week:	4
ECTS:	6
Scheduled:	Every summer and winter term
Format:	Lecture
Examination:	• Written Exam (90 min.) • Additional Oral Exam or Term Paper for Master students
Lecturer:	Prof. Dr. Link
Objectives:	Competence of using the German language in an everyday-life and professional context; training of German skills in the four areas of listening, reading, speaking and writing according to the CEFR (Common European Framework of Reference for Languages) level of B2-C1: - The student is able to identify and name relevant terms and vocabulary in level-adequate German (depending on the course of study). - The student is capable of level-adequate a) listening b) reading c) speaking d) writing - The student is enabled to prepare level-adequate language assignments in teams with other exchange students. - The student is able to engage in classroom discussions as well as simulations of typical everyday-life and business situations in level-adequate German. - The student is capable of effectively interacting with other students in level-adequate German more confidently. - The student is prepared for German-taught lectures and for academic studies/international business dealings in his future academic/professional life.
Contents:	Selected areas of everyday-life language and business/economic terminologies suitable for the level of the students (CEFR B2-C1).
Prerequisites:	German as a Foreign Language III or comparable skills - Only open to non-native speakers of German
Recommended Reading:	Sicher!,Hueber; the current edition will be communicated in the first session.

Intercultural Communication

Course number	8771
Hours per week:	2
ECTS:	2.5
Scheduled:	Every Winter and Summer Term
Format:	interactive lecture
Examination:	oral presentation
Lecturer:	Prof. Dr. Sylvana Kraußе
Objectives:	This course investigates basic concepts of intercultural competence. The students will gain a deeper understanding of cultural diversity and subsequent conflicts that can originate from misunderstandings. They are able to reflect on their own culture and apply strategies to deal with intercultural challenges.
Contents:	concept of culture, concept of intercultural competence, iceberg model, Hofstede's 6 cultural dimensions, different culture standards, stereotypes, communication styles, critical incidents, country profiles
Pre-requisites	successful completion of the required English courses
Recommended Reading:	Richard D. Lewis (2006): When cultures collide – Leading across cultures. 3rd edition, Nicolas Brealey International, Boston, etc. Geert Hofstede, Gert J. Hofstede and Michael Minkov (2010): Cultures and Organizations: Software of the Mind. Revised and expanded 3rd Edition. New York: McGraw-Hill

International Sales	
Course number	6074 International Sales 6076 Seminar/ Case Study International Sales
Remark	The module consists of Seminar / Case Study International Sales (6076, 6 ECTS) and International Sales (6074, 9 ECTS). In turn, the course International Sales (6074) consists of three parts (3 ECTS each) that can be taken individually. If you decide to take the full 15 ECTS, the module will be shown as “International Sales” on your transcript of records.
Hours per week	10
ECTS	15
Scheduled	Summer Term
Format	• Seminar • Workshops • Task-based learning
Examination	• 6074: Written Exam • 6076: Oral presentation with handout/written assignment (“mini” project)
Lecturer	Prof. Dr. Balleis / Fr. Brehm / Prof. Dr. Schneider-Störmann / Prof. Dr. Wiggenhorn / Prof. Dr. Krieger
Prerequisites	Min. of English C1 (European Common Language Framework)
Objectives	International Contracting Knowledge: Students do have basic knowledge of the UN Convention on the international Sale of Goods (CISG). Students are able to better understand terms of international contracts as well as to support the process of designing and closing new contracts. Personal Competence: Students are able to discuss complex international legal matters with the teacher and other students. The student knows to weight arguments for the application of international sales law. Strategic Sales After visiting the lectures students should understand the complexity of b2b sales and to know and execute several techniques and strategies for successfully offering products and services in those markets. Conflict and Negotiation Management Knowledge: The students will be able to prepare negotiations of (technical) goods and products in B2B relations. They will know how to judge about important issues and to be specific about quantitative issues. Personal Competences: Students will be able to perform negotiations with improved communication skills in terms of strategic behavior and

	related tactics. Students will be able to analyse situations within the entire process of negotiations – from customers request until the given order. <u>Seminar/ Case Study International Sales</u> Intercultural Project Management International projects that reach beyond national boundaries are ubiquitous in all organizations around the globe. This is why competence in the management of international projects and teams is central to the strategic competences of today's organizations. In this seminar students will enhance their knowledge, skills and competences particularly in the following areas Knowledge: Comprehend the specific characteristics of an international project (as opposed to standard projects) Analyse and discuss key success criteria for the management of international projects Understand the concept of stakeholder management in an international context Comprehend the main components of a project lifecycle in an international context (including Work Breakdown Structure/milestones) Define and create milestones and apply a WBS and conceive the main Understand the concept of cultural diversity and cultural frameworks as well as the impact culture can have on the design and implementation of an international project Personal Competence: Students will be able to engage and interact effectively with international students in project related discussions and team sessions. They will be capable of following this English-taught seminar and process relevant academic and project management related sources, structure their work in teams and assign team roles, and deliver the results of their team work in a final project presentation.
Content	<u>International Contracting</u> More than 70 countries, accounting for more than two-thirds of all world trade, have ratified the Convention on Contracts for the International Sale of Goods (CISG), in Germany well known as "UN-Kaufrecht" (UN Sales law). In Europe even around 80 % of all imports and nearly all exports are governed by UN Sales law. This lecture gives an introduction to the basic principles of the CISG in terms familiar to European lawyers. Students will get to know the most significant CISG decisions reported. Concrete examples are provided throughout. <u>Strategic Sales</u> After an introduction about the nature of sales, including key components like products, players, competitors etc., the typical elements of sales organisations will be shown. Based on that

	knowledge, cornerstones of effective acting in the sales field, e.g. sales strategies and techniques, pricing strategy and psychological aspects, will be discussed. Conflict and Negotiation Management Identify conflicts, set-up strategies and tactics for negotiations. Manage conflict situation in negotiations. Active role-playing as so to find arguments and to use them to improve the negotiation results. Prepare negotiations for conflict avoidance and with specific targets. Seminar/ Case Study International Sales International project management and working in international teams more efficient and effective on a global scale will be the emphasis of this seminar. Students will explore the stages of international project management and identify major critical success criteria for working across cultures. The different approaches and sessions will be structured around the following topics: • International Project Management • The Cultural Context of Global/International Management • Organizational Frameworks and Strategy for International Operations/Projects • Defining International Projects • Planning and Organizing International Projects • Communicating in International Projects • Cooperating in International Projects • Learning in and Learning from International Projects
Bibliography	International Contracting • Huber/Mullins, The CISG. A new text book for students an practitioners, Sellier 2007 • Lookofsky, Understanding the CISG. Kluwer Law International 2008. • Schlechtriem/Schwenzer: Commentary on the UN Convention on the international sale of goods (CISG). 3rd edition, Oxford University Press 2010. Strategic Sales • Calvin, R. J. (2001): Sales Management: The McGraw Hill MBA. New York: McGraw Hill • Heiman, S. E. (2004): The New Strategic Selling, 3rd Ed. London: Kogan Page • Thull, J. (2003): Mastering the Complex Sale. Hoboken (N. J.): John Wiley & Sons

	Seminar/ Case Study International Sales Main Course books: • Kathrin Köster. International Project Management. Sage Publications. London. 2010. 1st edition. • Let your projects fly. Next level consulting. Goldegg Verlag. 2009. ISBN: 978-3-901880 57-5. More: • L.H. Chaney and J.S. Martin. Intercultural Business Communication. New Jersey. 2011. • Helen Deresky. International Management. Managing across Boarders and Cultures. New York, 7th edition. Pearson.Longman. 2011 • L. Mc Dermott et al. World Class Teams – working across borders. Wiley. 2010. • D. Cleland/R. Garies, Global Project Management Handbook. Mc Graw Hill Professional. 2nd edition. 2006. • Geert Hofstede. Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations across Nations. Sage. 2nd Edition. 2001. • R. Schmidt. In Search of Intercultural Understanding. Vienna. 2007. • R. Trompenaar. Riding the waves of culture. Understanding diversity in global business. 2000. • R. Gesteland. Cross-Cultural Business Behaviour. 4th edition. Copenagen Business School. 2008. Essential course material will be available on the e-learning platform for this seminar.
Workload per Course Unit	International Sales (6 SWS) / (9/15 ECTS) – International Contracting (2 SWS)/ (3 ECTS) – Strategic Sales (2 SWS)/ (3 ECTS) – Conflict and Negotiation Management (2 SWS)/ (3 ECTS) Seminar/ Case Study International Sales (4 SWS) / (6/15 ECTS)

International Seminar	
Course number	6327
Hours:	8 hours intensive introductory seminar + participation in International Project Week
ECTS:	4
Scheduled:	Summer Term
Format:	Seminar and project work
Examination:	Passed/not passed
Lecturer:	Prof. Dr. Sylvana Kraußе
Objectives:	The students gain an understanding of basic intercultural concepts and develop strategies to work in multicultural teams on projects.
Contents:	concept of culture, concept of intercultural competence, culture dimensions and standards, further concepts depend on the chosen project during the International Project Week (www.th-ab.de/ipw)
Pre-requisites	none
Recommended Reading:	Depends on chosen project

Introduction to International Management	
Course number	4750
Hours per week:	2
ECTS:	2
Scheduled:	Winter Term
Format:	Lecture / Case Studies / Exercises
Examination:	Written exam
Lecturer:	Prof. Dr. Kemmerer
Objectives:	Intended learning outcomes: • Understanding of the importance and subject matter of international management • Working knowledge of the fundamental terminology of international management as well as the frameworks and approaches that comprise the international management toolset • Ability to choose correct analysis framework and analyze international business situations and propose an appropriate course of action
Contents:	1. Introduction to international business 2. The global economy and drivers of internationalization 3. International strategy 4. International marketing 5. International operations 6. International financial management 7. International human resource management
Pre-requisites	Knowledge of fundamentals of business administration
Recommended Reading:	tba

Lab Material Sciences

Course number	4354
Hours per week:	2
ECTS:	2
Scheduled:	Summer Term
Format:	Practical course
Examination:	Oral proof of academic achievement
Lecturer:	Timo Schreck, Prof. Dr. Michael Kaloudis
Objectives:	Lab course focuses on the investigation of the structure of matter, the selection of materials for electric, electronic and mechanical applications, the correct usage materials testing methods, planning experiments in material sciences, interpretation of experimental results, as well as improving communication abilities by presenting data and test reports.
Contents:	Students learn to know a variety of test methods and applications in the field of material science and engineering. These include xray crystal structure analysis, elastic and plastic deformation of metals and polymers (tensile testing, hardness tests, impact testing), non-destructive testing (Ultrasonic), metallography, spectroscopic methods (IR, UV, VIS), thermal analysis of materials, optical microscopy, scanning electron microscopy
Recommended Reading:	Depending on project

Logistics and Production

Course number	6026
Hours per week:	4
ECTS:	5
Scheduled:	Winter Term
Format:	Lecture
Examination:	Written exam
Lecturer:	Prof. Dr. Jochen Krieger
Objectives:	Knowledge about fundamental concepts in the planning, design and control of production and logistics
Contents:	– Fundamentals of production systems – Principles of Manufacturing Systems – Tolerances and Surfaces – Fundamentals of Modern Manufacturing (Solidification Processes, Metal Forming, Material Removal Processes, Welding Processes, Assembly) – Lean Production, Toyota Production System – Warehouse Systems – Material Handling and Equipment – Inventory Management – Transportation Logistics
Recommended Reading:	Groover, Mikell, P.: Fundamentals of modern manufacturing, Wiley

Mathematics III and Simulation

Course Number	5653
Hours per week:	4
ECTS:	5
Scheduled:	Winter Term
Format:	Lecture (2 hours) and computer exercises (2 hours)
Examination:	Written exam
Lecturer:	Prof. Dr. Michael Möckel
Objectives:	Knowledge of basic calculus, linear algebra and analysis of one variable
Contents:	Topics are chosen from: Fourier analysis Introduction to Matlab Numerical methods, including for example linear and nonlinear systems quadrature interpolation and approximation differential equations finite difference method applications and simulations
Recommended Reading:	A. Gilat and V. Subramaniam, Numerical Methods for Engineers and Scientists, Wiley 2014 J Hass, M. Weir and G. Thomas, University Calculus, Pearson 2009 Riley, Hobson, Bence, Mathematical methods for physics and engineering, Cambridge University Press 2006

Mechatronic Systems Lab (not offered in 2021/2022)

Course number	5664
Hours per week:	(2 practice session)
ECTS:	3
Scheduled:	Winter Term
Format:	Lab class including team work
Examination:	Presentation of Lab results - Course will be graded: passed/not passed
Lecturer:	Prof. Dr.-Ing. Alexander Czinki
Objectives:	All participants are enabled to develop mechatronic systems using various different components, such as controllers sensors and actuators. The main focus of this class is set on the practical realisation/control of the above mentioned systems.
Contents:	Structure, functionality and programming of microcontrollers, mathematical description and simulation of mechatronic systems, computer-based tools for the operation and control of mechatronics systems.
Prerequisites:	Basic knowledge of C computer language
Recommended Reading:	Getting started with Labview, www.ni.com MATLAB and Simulink for Engineers, Agam Kumar Tyagi, Oxford Higher Education

PrA - Engineering of Systems

Course number	7248
Hours per week:	3
ECTS:	3
Scheduled:	Winter Term
Format	Lecture and Lab The students may decide whether to perform the presentations and exams in German or English.
Examination:	Study Work with oral examination
Lecturer:	Prof. Dr.-Ing. Michael Mann
Objectives:	**Knowledge:** The students know the engineering of complex systems in theory and practice. **Skills**: The students autonomously acquire theoretical fundamentals and methods. They command a variety of planning tools, apply the tools in practice and check for errors. **Competences:** The students are empowered to conceptualize assemblies and subassemblies of complex systems in teams. The definition and handling of interfaces can be implemented taking the impact on the entire system into account. The individual assemblies can be analyzed and optimized. Inconsistencies can be analyzed and evaluated methodically to generate solutions.
Contents:	- Theory of planning tools - Planning and realization of prototypes - Testing and failure analysis - Authoring of project reports and presentations
Pre-requisites	none
Recommended Reading:	Depending on the current project: Engineering Design, A Systematic Approach: Gerhard Pahl, Wolfgang Beitz, Jörg Feldhusen, Karl-Heinrich Grote , ISBN: 978-1-84628-318-5 (Print) 978-1-84628-319-2 (Online) Das Ingenieurwissen: Entwicklung, Konstruktion und Produktion: Karl-Heinrich Grote, Frank Engelmann, Wolfgang Beitz, Max Syrbe, Jürgen Beyerer, Günter Spur ISBN: 978-3-662-44392-7 (Print) 978-3-662-44393-4 (Online) Pahl/Beitz Konstruktionslehre, Methoden und Anwendung erfolgreicher Produktentwicklung Jörg Feldhusen, Karl-Heinrich Grote ISBN: 978-3-642-29568-3 (Print) 978-3-642-29569-0 (Online)

	Frank Konrad Planung von Photovoltaik-Anlagen Ismail Kasikci Planung von Elektroanlagen K. W. Helbing Handbuch Fabrikprojektierung Thomas Bindel• Dieter Hofmann Projektierung von Automatisierungsanlagen All books in the current edition.

Programmable Logic Controller S7-1200 for Industrial Automation and Renewable Energy Field	
Course number	7227
Hours per week:	4
ECTS:	5
Scheduled:	Summer Term
Format:	Lecture/ seminar presentations / lab practice
Examination:	Written/Oral exam/Project Presentations
Lecturer:	Dodiek Ika Candra
Objectives:	• Describing automation process of sample plants • Configuring hardware-software of sensors and actuators in sample plants • Ability to work with PLC Siemens S7 in industrial and renewable energy cases
Contents:	• Problem definitions, simulations, and control solutions for industrial automation and renewable energy fields • Introduction to Industrial automation • Process description of sample plants • Hardware -software configurations • S7-1200 instructions • S7-1200 extended instructions • Applying PLC S7-1200 for some industrial automation cases • Applying PLC S7-1200 for some renewable energy cases • Project management – documentation and archiving
Pre-requisites	Proficiency in working with Windows OS, basic knowledge of PLC
Recommended Reading:	• Berger, H., "Automating with SIMATIC: Controllers, Software, Programming, Data Communication Operator Control and Process Monitoring", Publicis; 3 edition (December 13, 2006), ISBN-10: 3895782769 • Müller, Jürgen, "Controlling with SIMATIC: Practice Book for SIMATIC S7 and SIMATIC PCS7 Control Systems ",Wiley VCH; 1 edition (10 Aug. 2005), ISBN-10: 3895782556

Project Management	
Course number	6318
Hours per week:	2
ECTS:	5
Scheduled:	Winter Term
Format:	seminar
Examination:	Homework with presentation
Lecturer:	Prof. Dr. Jochen Krieger
Objectives:	Students are familiar with the basics of project management. They can set up and structure a project and they use the principle tools of project management. Moreover they are able to carry out a concrete project (LEGO Mindstorms Robot system) with MSProject.
Contents:	Depending on the project phase, they communicate selected content addressing an audience. The cost calculation and finally the hardware and software realization of a robot system is focusing on both, economical and engineering fundamentals. The students work in groups. At the same time they are able to work in interdisciplinary teams and act solution-oriented when difficulties arise. Students create project reports and analyze them. From the assessments they derive measures and identify potential for improvement. Topics covered in the seminar: – Definition of projects – Project Management – Planning and organization of projects – Communication and cooperation in projects – Programming and design of a Lego ™ Mindstorms ™ robot – Project Management with MSProject
Pre-requisites	Laptop with english version of MSProject (workaround with university PC pool is offered)
Recommended Reading:	-

Quality Management	
Course number	6333
Hours per week:	2
ECTS:	5
Scheduled:	Summer Term
Format:	Lecture
Examination:	Written (90 min)
Lecturer:	Prof. Dr. Jochen Krieger
Objectives:	Knowledge about fundamental concepts, methods and procedures in the field of Quality Management
Contents:	– Definitions and principles of quality management – Management aspects of Quality Management – Seven basic tools of Quality Management – Standards, audits and customer satisfaction – APQP: Advanced product Quality Planning – QFD: Quality Function Deployment – FMEA: Failure Mode and Effects Analysis – MSA: Measurement System Analysis – SPC: Statistical Process Control PPAP: Production Part Approval Process
Pre-requisites	-
Recommended Reading:	-

Robotics Lab (not offered in 2021/2022)	
Course number	5651
Hours per week:	2
ECTS:	3
Scheduled:	Winter Term
Format:	Lab Course will be graded: passed/not passed
Examination:	students contribution during the term and the result of their practical work is evaluated, proof of academic achievement/attendance certificate
Lecturer:	Prof. Dr.-Ing. Alexander Czinki, B.Eng. Christian Rudolf
Objectives:	Students shall gain: - a general understanding of the abilities and operation modes industrial robot systems - general abilities that allow them to program a robot system (offline simulation, classical programming) - gain experience in practical use of industrial robot systems
Contents:	Introduction to robotics Programming industrial robots in virtual environments (Lab practice) Programming industrial of robots in a real-world environments (Lab practice) Fields of application for industrial robots
Pre-requisites	- proper knowledge of english - basic programming abilities
Recommended Reading:	Springer Handbook of Robotics, Jun 27, 2008 by Bruno Siciliano and Oussama Khatib

Seminar Advanced Topics in Marketing and Sales	
Course number:	6325
Hours per week:	4
ECTS:	7
Scheduled:	Summer Term
Format:	seminaristic teaching + practice exercises
Examination:	Study Work (5-15 pages) with presentation (5-15 min)
Lecturer:	Prof. Dr. Gregor Weiche
Objectives:	Objective of this course is to familiarize students with selected marketing and sales topics in both theory and practice. Characteristic of this course is a comprehensive and interdisciplinary view of marketing and sales. Subject-specific knowledge and methodical knowledge acquired in previous courses of study are deepened and extended.
Contents:	• Introduction to Marketing and Sales • Introduction to our selected topic (e.g. business plan writing, marketing research, international marketing) • Term project
Pre-requisites	• Principles of Marketing and Sales • Project Management • Principles of Finance or Accounting • Basic German language skills (easy conversation) e.g. to interact with Focus Groups or to research external information.
Recommended Reading:	Depending on project All books in the current edition

Simulation Methods I

Course number	7220
Hours per week:	4
ECTS:	5
Scheduled:	Summer Term
Format	Lecture
Examination:	Written exam (90 min.)
Lecturer:	Prof. Dr. Sautter
Objectives:	**Knowledge:** The students have an overview of the most important basic numerical methods and of the simulation software MATLAB. They know pros and cons of numerical methods and the necessity of numerical methods in the field of simulation. **Skills:** The students can use numerical solvers available in MATLAB to solve technical problems and they can implement basic numerical methods in MATLAB themselves. **Competences:** The students are able to choose, apply and parameterize appropriate MATLAB solvers. They question numerical results and scrutinize them with respect to the underlying physical or technical problem.
Contents:	Introduction to numerical methods and simulation: - complexity of algorithms - vector- and matrix norms - linear and nonlinear systems - interpolation - quadrature - ordinary differential equations - finite difference method in 1D - optimization MATLAB for numerical computing and simulations Simulations from various fields of application
Pre-requisites	Engineering Mathematics I & II, Computer Science I & II
Recommended Reading:	Chapra, S.: Applied Numerical Methods with MATLAB for Engineers and Scientists, McGraw-Hill Chattot, J.-J.: Computational Aerodynamics and Fluid Dynamics, Springer-Verlag Moler, C.: Numerical Computing with MATLAB, SIAM Munz, C.-D./Westermann, T.: Numerische Behandlung gewöhnlicher und partieller Differenzialgleichungen – Ein interaktives Lehrbuch für Ingenieure, Springer-Verlag All books in the current edition

Simulation Methods II

Course number	7240
Hours per week:	4
ECTS:	5
Scheduled:	Winter Term
Format	Lecture
Examination:	Oral exam (15 min.)
Lecturer:	Prof. Dr. Sautter
Objectives:	**Knowledge:** The students have an overview of modelling processes in the fields of thermodynamics and fluid dynamics and applications thereof. They know basic numerical methods and simulation software to simulate such processes. **Skills:** The students can simulate fundamental processes in the fields of thermodynamics and fluid dynamics with MATLAB and they can use application-specific simulation software. **Competences:** The students are able to simulate time dependent heat transfer and incompressible fluid flow in simple geometries and can interpret and analyze the results. They are able to solve a simulation problem independently and present the results.
Contents:	Elliptic and parabolic problems in 1D and 2D Finite difference method in 1D and 2D Computational thermodynamics: - principles of heat transfer: conduction, convection, radiation - heat equation and its numerical solution Introduction to COMSOL Multiphysics Wind- and Hydropower Computational fluid dynamics: - introduction to fluid dynamics - modeling fluid flow - numerical simulation of incompressible fluid flow - applications of CFD Introduction to FEM Simulation project: - project planning - problem solving - documentation and presentation of the results
Pre-requisites	Engineering Mathematics I & II, Computer Science I & II, Simulation Methods I
Recommended Reading:	Andersson B./et al.: Computational Fluid Dynamics for Engineers, Cambridge University Press Cebeci/et al.: Computational Fluid Dynamics for Engineers, Springer-Verlag Chapra, S.: Applied Numerical Methods with MATLAB for Engineers and Scientists, McGraw-Hill Chattot, J.-J.: Computational Aerodynamics and Fluid Dynamics, Springer-Verlag

	Griebel, M./et al.: Numerical Simulation in Fluid Dynamics: A Practical Introduction, SIAM Munz, C.-D./Westermann, T.: Numerische Behandlung gewöhnlicher und partieller Differenzialgleichungen – Ein interaktives Lehrbuch für Ingenieure, Springer-Verlag Polifke, W./Kopitz, J.: Wärmeübertragung – Grundagen, analytische und numerische Methoden, Addison-Wesley Verlag All books in the current edition

Simulation of Flight Dynamics and Airplane Operation with MatLab-Simulink	
Course number	5670
Hours per week:	4
ECTS:	5
Scheduled:	Summer Term
Format:	Seminar / Practical course
Examination:	Presentation and oral exam
Lecturer:	Prof. Dr. -Ing. Alexander Czinki
Objectives:	The class provides the participants with the ability to: apply and operate Matlab-Simulink such that they can build models of sophisticated technical systems. Students learn major basics of flight dynamics and aircraft operation and how to model them in MatLab-Simulink. Students will also elaborate and hold a presentation on specific flight-related-engineering problems.
Contents:	Introduction to Simulink (basic and advanced functionalities) Airplane systems and airplane design basics Weight, balance and aerodynamic stability Aerodynamic Forces and Moments Controls for Pitch, Roll and Yaw Aircraft equations of motion - Translation and rotation Aircraft performance: Cruising flight Aircraft performance: Gliding and climbing Aircraft performance: Extreme flight conditions Radio navigation and avionics Air traffic and air traffic control Flight-, crew- and team-management in aviation
Pre-requisites	Basic Knowledge of Mathematics and Physics
Recommended Reading:	Mechanics of Flight, R. H. Barnard, A. C. Kermode Pearson Education Limited (2012)

Technical English I

Course number	5510
Hours per week:	2
ECTS:	2
Scheduled:	Winter term
Format:	Lecture
Examination:	Written exam, 90 minutes
Lecturer:	Karine Schubert
Objectives:	to improve English language skills in reading , writing, speaking and listening and to consolidate previously acquired knowledge of the language. to develop the ability to understand and work with specialized English texts in the field of mechatronics/electrical engineering. developing an understanding of English-speaking countries.
Contents:	familiarity with the essential specialized technical vocabulary. grammar revision reading and understanding current technical texts. general communications skills such as -greetings and introductions -writing about technical systems, processes, instructions, problem solving in the fields of communication, manufacturing, automobile technology, electronic systems introduction to cultural aspects in the English-speaking world
Prerequisites:	based on English at university entrance level
Recommended Reading:	Course book: Bonamy, David: Technical English 3, Pearson Longman ISBN: 978-1-4082-2947-7 (all books in current edition)

Technical English II

Course number	5520
Hours per week:	2
ECTS:	2
Scheduled:	Summer Term
Format:	Lecture
Examination:	Written exam, 90 minutes
Lecturer:	Karine Schubert
Objectives:	To consolidate the four language skills previously trained in Technical English I. Dealing with authentic texts, solving technical problems in the target language.
Contents:	Handling technical requirements, describing performance, processes. Working with texts from related fields of technology (electrical systems, energy, materials, civil engineering); writing e-mails and job applications
Pre-requisites	Technical English I
Recommended Reading:	Course book: Bonamy, David: Technical English 3, Pearson Longman ISBN: 978-1-4082-2947-7 (all books in current edition)

Technical English III	
Course number	8013
Hours per week:	2
ECTS:	2
Scheduled:	Winter Term
Format:	seminar presentations
Examination:	Oral exam (15 min.)
Lecturer:	Prof. Dr. Sylvana Kraußе
Objectives:	Further development of the communication skills learned in Technical English I and Technical English II, reading, writing, listening and speaking. The latter skill is emphasized and tested by means of a short presentation in English.
Contents:	- Use of visuals - Summaries - Presentation techniques - Preparing a presentation - Presentation before an audience
Pre-requisites	Technical English I and II
Recommended Reading:	www.ted.com, DVD Dynamic Presentations published by Cambridge University Press
Remarks:	Not to be taken with English III (ITV).

Technical Systems

Course number	6042
Hours per week:	4
ECTS:	5
Scheduled:	Summer Term
Format:	seminar
Examination:	Written exam (90 min)
Lecturer:	Prof. Dr.-Ing. Schneider-Störmann
Objectives:	The course provides the skills to understand technical systems from the perspective of technical and sales department to understand the role and function of system parts. Learns will be a systematic approach to technical systems using system-theoretical methods in sub-functions and sub-components to modularize the systems.
Contents:	- Fundamentals of selected technical systems: these will be systematically disassembled into individual components, groups and sub-functions - Signals and signal processing - Systems theory, cybernetics, metrology, sensors and mechatronic systems - In addition to technical systems, new technologies and their application discussed - Examples of outstanding innovations and their commercial application will be given
Pre-requisites	Engineering Basics I-III, Mathematics I-II
Recommended Reading:	Frey, T.: Signal- und Systemtheorie, Vieweg+Teubner Verlag Orlowski, P.: Praktische Regeltechnik, Springer-Verlag Ohm, J.-R., Lüke, H.-D.: Grundlagen der digitalen und analogen Nachrichtenübertragungssysteme, Springer-Verlag Günter Ropohl, Allgemeine Technologie, Eine Systemtheorie der Technik, Universitätsverlag Karlsruhe all books in current edition

Technology and Innovation Management

Course number	5640
Hours per week:	2
ECTS:	3
Scheduled:	Summer Term
Format:	Lecture/Exercises
Examination:	Oral exam + assignments
Lecturer:	Prof. Dr. Ing. Alexander Czinki
Objectives:	The class „Technology and Innovation Management“ focuses on the effective integration of strategic technological and business targets in current- and new product development. The course is presented with a combination of traditional lectures and numerous student-lead exercises.
Contents:	Fundamentals Sources of Innovation Types of Innovation Patterns of Innovation Strategic Aspects of innovation Technology Management Technology Life Cycles Foresight Tools Technology Forecasting Organizing for Innovation
Pre-requisites	• independent workstyle • creative attitude • team skills
Recommended Reading:	Course slides or course reader covering all relevant topics will be provided.

The Fascination of Nanotechnology (not offered in 2021/22)

Course number	4753
Hours per week:	2
ECTS:	2
Scheduled:	Winter Term
Format:	Lecture /seminar
Examination:	Written exam (English/German)
Lecturer:	Prof. Dr. Riethmüller
Objectives:	Nanomaterials are being used in a wide range of applications e.g. as strengthening additives for composites, conductive additives for coatings, antimicrobial additives for textiles, UV-absorbing additives for cosmetics or as active agents in cancer therapy. According to their dimensionality they are classified as nanoparticles (0D), nanowire or nanotubes (1D) and nanolayers (2D). The lecture will give an overview over the physical and chemical effects occurring at the nanoscale. The students will learn about the most important methods for nanomaterial characterization. Beside an introduction into modern synthesis and nanofabrication processes a particular focus lies on the discussion of various applications of nanomaterials. Furthermore, selected current material developments will be covered.
Contents:	- Introduction (definitions, classification of nanomaterials, nanotechnology in nature and history, size effects in nano structures) - Characterization tools (e.g. electron microscopy, scanning probe microscopy) - Synthesis and nano structuring methods (Top-down and bottom-up strategies in nanotechnology) - Selected applications of nanomaterials (e.g. carbon nanomaterials, metallic nanoparticles and nanowires) - Risks and challenges of nanotechnology
Pre-requisites	Basics of materials science; for IW students (3rd semester and higher) and incoming international student with interest in materials science
Recommended Reading:	Will be announced during the lectures

TRIZ - Systematic Innovation for New Product Development	
Course number	5648
Hours per week:	4
ECTS:	5
Scheduled:	Winter Term
Format:	Lecture /seminar / project
Examination:	Project + Project presentation + (short) oral exam
Lecturer:	Prof. Dr. -Ing. Czinki
Objectives:	Ability to: Analyse sophisticated technical problems Identify a suitable methodology for systematic problem solving and systematic innovation, preferably from the TRIZ innovation tool set Successfully apply systematic innovation tools to engineering problems
Contents:	Selected problem solving and innovation tools involving: Multi-Screen-Approach Function analysis Solving technical contradictions Solving physical contradictions Inventive principles Product Optimisation by Trimming Term project to be elaborated and presented by student teams
Pre-requisites	Knowledge and/or interest in product development and product innovation subjects
Recommended Reading:	G.S. Altshuller, .Creativity as an exact science Michael A. Orloff, Inventive Thinking through TRIZ