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# **ENGLISH TAUGHT COURSES**

## FACULTY OF ENGINEERING AND MATHEMATICS



**FH Bielefeld**  
University of  
Applied Sciences

## ENGLISH TAUGHT COURSES

### FACULTY OF ENGINEERING AND MATHEMATICS

#### WINTER TERM

Course Code	Title	ECTS
FDE	Vehicle Dynamics/Electromobility	5
ME	Materials Engineering	5
EDwP	Engineering Design with Plastics	5
PR2	Project 2 (Industrial Engineering; subject to availability)	5
FSE1	Technical English 1	5
<b>German course offered by the International Office during freshers weeks before lecture period</b>		
5 SP ZO	German Intensive Course	3

## SUMMER TERM

Course Code	Title	ECTS
TEX	Textile Technologies	5
QM	Quality Management	5
MEMS	Microsystems	5
FEM	Finite Element Analysis for Engineers	5
PR1	Project 1 (Industrial Engineering; subject to availability)	5
FSE2	Technical English 2	5
WEN	Business English	5

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**German course offered by the International Office  
during freshers weeks before lecture period**

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German Intensive Course	3
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**Status:** 06/2020

**Information:** students with German skills (level B 2 required) can participate in German taught courses in the following degree programmes: Bachelor: Applied Mathematics, Biotechnology and Instrumentation Engineering, Computer Engineering, Electrical Engineering, Industrial Engineering, Mechanical Engineering, Mechatronics, Renewable Energies, Master: Electrical Engineering, Mechanical Engineering, Optimisation and Simulation

Link to course catalogues: <https://www.fh-bielefeld.de/en/international-office/incoming-exchange-students/students-information>

FDE

### Vehicle Dynamics/Electromobility

5 ECTS

#### Learning outcomes

The students have in-depth knowledge of the power and energy requirements of motor vehicles depending on their respective usage profiles and real cycles. They understand the various theoretical driving cycles and have mastered the simulation tools for the evaluation of energy requirements for both theoretical and real driving cycles of motor vehicles.

The students are familiar with the various drive configurations and components of electrically powered vehicles as well as the different drive concepts of hybrid vehicles and understand in particular the differences between the energy conversion systems of conventional and electric power train systems. They can simulate driving cycles of electric vehicles based on the characteristics of energy storage and energy converters through well-founded knowledge of the vehicle's longitudinal dynamics and can design the power train of electrically driven vehicles as required.

The students can evaluate the possibilities and limitations of electromobility with regard to the respective application profile of the particular vehicle and know the requirements of electric vehicles when connecting to the electrical power supply.

#### Content

- Longitudinal vehicle dynamics: power and energy requirements
- Vehicle power train of conventional drive systems
- Vehicle power train of alternative drive systems
- Energy converter in the vehicle power train
- Hybrid drive systems
- Driving cycles: theoretical driving cycles / real driving cycles
- Recording and evaluation of real driving cycles
- Energy balance based on a self-driven driving cycle
- Comparison of mobile energy storage systems
- Storage of electrical energy
- Charging and running down characteristics
- Requirement-based design of electric vehicles
- Primary energy supply / energy flows
- Potential contribution of electric vehicles to networked energy storage, to offset peak loads in electricity grids

#### Requirements

A general knowledge of mechanics & dynamics is assumed.

ME

## Materials Engineering

5 ECTS

### Learning outcomes

The students understand the correlation between the structure of metallic materials and their properties materials, due to:

- learning about the structure of materials and their modification by the use of alloying elements
- understanding the deformation behaviour as well as the transformation and the phase reaction
- developing skills to apply and evaluate specific material properties for different service loadings, and to use them for dimensioning of components
- getting knowledge to measure properties of materials by different testing methods and to evaluate the results
- inducing changes of material behaviour due to heat treatments and mechanical deformation
- using the attained knowledge for choosing suitable materials for different application

### Content

- Structure of metallic materials
- Lattice defects and their impact on the behaviour of materials
- Deformation and failure: strength, ductility, deformability
- Alloying: phase diagram and iron-carbon-diagram
- Time-Temperature-Transformation and – Time-Temperature-Austentization (TTT, TTA)
- Effect of selected alloying elements
- Heat treatments: annealing, quench-hardening
- Notation for steels
- Properties and behaviour of selected steels for specific applications, e.g. fatigue, casting, welding, high temperature

Fundamental test of metallic materials will be carried out in the laboratory.

### Requirements

None

EDwP

## Engineering Design With Plastics

5 ECTS

### Learning outcomes

Students can design plastic parts with respect to the special behaviour of the material and the possibility to mold the part. They can select the proper material for a dedicated application with the knowledge of their behaviour in the process and the later use. They know special mold techniques and can engineer a simple mold.

### Content

- Plastics as engineering materials, special properties
- Production process to mold plastic parts
- Process simulation
- Injections molds (general design, heat control, demolding techniques)
- General design of plastic parts

### Requirements

None

PR2

## **Project 2 (Industrial Engineering)**

5 ECTS

### **Learning outcomes**

Students have a good command of methods and tools for the methodical solving of a technical or/and economic problem from various business processes. They acquire the competence to work effectively in small organisational units by negotiating the task sharing and to present their project outcomes using suitable software tools (MS Project and MS PowerPoint). Students gain key competences like the ability to work in a team and communication skills.

### **Content**

- Principles of task descriptions
- Task structuring
- Project management techniques
- Problem-solving processes
- Presentation techniques
- Problem solving procedure for basic technical or/and economic operational tasks from the professional field of industrial engineers

### **Requirements**

None

FSE1

## Technical English 1

5 ECTS

### Learning outcomes

- Professional competence: The students show that they have extended their active general language skills of B1 and reached a B2.1 level. They possess a sound specialist vocabulary of Technical English and master context-related grammar. In engineering job situations, they communicate spontaneously and fluently and formulate issues in an assured, clear and detailed manner in English, both in writing and orally.
- Social competence: Students try out and consolidate key communicative skills in English presentations, teamwork and project work.
- Methodological competence: Students use targeted strategies for a content-related appreciation and critical examination of specialist texts and for the solution of contextual tasks. They can present technical issues in a manner appropriate to the target audience.
- Personal competence: Students are able to resume responsibility for their learning process, to research and structure authentic material, organize workloads and meet deadlines.

### Content

- The students have expertise in describing relevant engineering branches.
- They master the technical terminology (e.g., base units in engineering; dimensions and shapes; mathematical operations; forces and mechanisms; properties of materials; manufacturing and automation; energy and electricity; logistics: data processing and transmission).
- Students possess interdisciplinary skills (emailing; project work; presentation techniques; discussing diagrams).

### Requirements

English skills: B1 (Common European Framework of Reference for Languages)

### Note

Requirements for obtaining ECTS: Regular attendance (70%) and active participation. Passed semester project and written exam.



## COURSE DETAILS SUMMER TERM

TEX

### Textile Technologies

5 ECTS

#### Learning outcomes

Describing the textile chain, comparing different textile fabrics and materials, indicating the most important textile testing procedures and recent research topics. Students describe, analyse and assess a topic from the textile chain independently.

#### Content

Textile chain: primary spinning, secondary spinning, weaving, warp and weft knitting, braiding, narrow textiles, finishing, manufacture; textile machines; sustainability in the textile chain; intelligent/functional textiles; physical and other properties of textiles; standards; textile testing instruments. Recent research topics along the textile chain.

#### Requirements

None

QM

## Quality Management

5 ECTS

Lecture and seminar, supplemented by workshops, project work, company visits, guest lectures

### Learning outcomes

- are able to define basic terms of quality thinking.
- are able to explain the fundamental structure of a quality management system.
- are able to implement standard requirements for a quality management system in a familiar working environment.
- are able to apply basic methods out of the sub-disciplines statistics, methodological working, quality and economic efficiency.
- are able to classify the industrial application of quality methods and techniques within the product development process.
- master the significant quality methods and techniques, such as FMEA, QFD, Poka Yoke, SPC, inspection planning.
- are able to apply the above-mentioned quality methods and techniques in the relevant phases of the product development process.
- are able to detect, eliminate and prevent failure causes systematically by selecting and applying appropriate quality methods (data collection, data analysis, root cause analysis) to solve quality problems.
- are able to assess the role of quality management in development, purchasing and production processes.
- are able to analyse key factors and risks concerning their effect on quality level within a manufacturing facility.
- are able to evaluate and analyse quality data from production to identify measures for process optimization in production.
- are able to highlight legal aspects of warranty and liability.

### Content

The overall aim of this module on quality management is to develop the students' understanding of quality management, its role and its implementation in process management. Furthermore, the module covers the fundamentals of product development processes as well as the quality methods and tools used within the different phases of series preparation, purchasing, production and field application.

### Requirements

None

# MEMS

## Microsystems

5 ECTS

### Learning outcomes

Knowledge of the materials and technologies of microelectronic and microelectromechanical systems (MEMS)

- Knowledge of the main application fields of MEMS
- Skills to systematise data sheet information of micro-electromechanical systems (MEMS)
- Knowledge of system integration of MEMS
- Knowledge and skills for simulation techniques
- Practical expertise in the realization of sensor systems with MEMS

### Content

1. Materials and technologies of MEMS and microelectronics
2. Sensors
  - Acceleration sensors
  - Angular rate sensors
  - Pressure sensors
3. System Integration
4. Simulation

### Requirements

None

FEM

## Finite Element Analysis for Engineers

5 ECTS

### Learning outcomes

Knowledge and understanding of the basic principles of the finite element method (FEM), knowledge of FEM application areas, building of FEM models; derivation and modelling of loads and boundary conditions, knowing and applying relationships between element functions, displacements (deformations), strains and stresses. Understanding the fundamentals of the numerical computations of FEM simulation programs, fundamentals in the application of simulation programs (for example ANSYS) for FEM.

### Content

- Fields of application of the FEM
- Structure of the finite element method
- Geometry, nodes and elements of a FEM Model
- Forming functions, deformation approach
- Element stiffness matrix, total stiffness matrix
- Boundary conditions (forces and constraints)
- Principle of minimum potential energy
- Different element types
- Isoparametric element formulation
- Numerical integration

### Requirements

None

PR1

## **Project 1 (Industrial Engineering)**

5 ECTS

### **Learning outcomes**

Students have a good command of methods and tools for the methodical solving of a technical or/and economic problem from various business processes. They acquire the competence to work effectively in small organisational units by negotiating the task sharing and to present their project outcomes using suitable software tools (MS Project and MS PowerPoint). Students gain key competences like the ability to work in a team and communication skills.

### **Content**

- Principles of task descriptions
- Task structuring
- Project management techniques
- Problem-solving processes
- Presentation techniques
- Problem solving procedure for basic technical or/and economic operational tasks from the professional field of industrial engineers

### **Requirements**

None

FSE2

## Technical English 2

5 ECTS

### Learning outcomes

- Professional competence: Students possess an extended active upper B2 language competence. They increase their specialist vocabulary of Technical English and can combine it with expressions of Business English.
- Social competence: Students acquire a sensitivity to differences in intercultural communication, especially in English-speaking business environments.
- Methodological competence: Students are able to skim specialist texts for essential information, present this shortly and concisely both in speaking and writing, establish wider contexts and give a critical assessment.
- Personal competence: Students show English fluency and a pro-active approach to managing English sources.

### Content

- The students can actively participate in international conferences.
- They master the core terminology for dealing with problem-oriented case studies (e.g., Industry 4.0; automated systems; discussing readings and trends).
- Students possess interdisciplinary skills (e.g. project management; business plan and marketing; economic sectors; manufacturing processes; pitching technical products; designing conference posters; academic writing; persuasion strategies).

### Requirements

English skills: B1 (Common European Framework of Reference for Languages)

### Note

Requirements for obtaining ECTS: Regular attendance (70%) and active participation. Passed semester project and written exam.

WEN

## Business English

5 ECTS

### Learning outcomes

- Professional competence: The students have extended their active general language skills of B1 and reached a B2.1 level. They possess a sound specialist vocabulary of Business English and master context-related grammar. They communicate spontaneously and fluently about different business functions and can present these issues in an assured, clear and detailed manner in English, both in writing and orally.
- Social competence: Students try out and consolidate key communicative skills in English presentations, teamwork and project work.
- Methodological competence: Students use targeted strategies for a content-related appreciation and critical examination of specialist texts and for the solution of contextual tasks. They can present economic issues in a manner appropriate to the target audience.
- Personal competence: Students are able to resume responsibility for their learning process, to research and structure authentic material, organize workloads and meet deadlines.

### Content

- Students master the specialist terminology used in various entrepreneurial functional areas (e.g., entrepreneurship; marketing; finance; sales; company formats).
- Students possess the interdisciplinary skills to perform job-related tasks (Emailing; presentation techniques; negotiating; leadership; problem-solving).

### Requirements

English skills: B1 (Common European Framework of Reference for Languages)

### Note

Requirements for obtaining ECTS: Regular attendance (70%) and active participation. Passed semester project and written exam.

**Status:** 05/2021

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