



## English-Taught Bachelor Courses Faculty of Engineering and Mathematics

# English Taught Courses

## Faculty of Engineering and Mathematics

### WINTER SEMESTER

Course Code	Title	ECTS
FDE	Vehicle Dynamics/Electromobility	5
PM	Project Mechatronics	5
PR2	Project 2 (Industrial Engineering; subject to availability)	5
FSE1	Technical English 1	5
CHM	Change Management	5
<b>German course offered by the International Office during freshers weeks before lecture period</b>		
	German Intensive Course	3

Additionally it is possible to choose courses from the new English-taught Bachelor's degree programme "Industrial Engineering". Please consider that since the programme just started in winter term 24/25 in summer term 25 only 2nd semester courses, in winter term 25/26 only 1st and 3rd semester courses will be available and so on.

Upon request and availability international students can take part in Research Projects offered by the Faculty of Engineering and Mathematics. For that purpose, please contact the faculty international coordinator, Maria Kobert (maria.kobert@hsbi.de).

### SUMMER SEMESTER

Course Code	Title	ECTS
TEX	Textile Technologies	5
QM	Quality Management	5
MEMS	Microsystems	5
WEN	Business English	5
PR1	Project 1 (Industrial Engineering; subject to availability)	5
FSE2	Technical English 2	5
<b>German course offered by the International Office during freshers weeks before lecture period</b>		
	German Intensive Course	3

Additionally it is possible to choose courses from the new English-taught Bachelor's degree programme "Industrial Engineering". Please consider that since the programme just started in winter term 24/25 in summer term 25 only 2nd semester courses, in winter term 25/26 only 1st and 3rd semester courses will be available and so on.

Upon request and availability international students can take part in Research Projects offered by the Faculty of Engineering and Mathematics. For that purpose, please contact the faculty international coordinator, Maria Kobert (maria.kobert@hsbi.de).

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:**  
 ↗ [hsbi.de/iium/internationales](https://hsbi.de/iium/internationales)



## Course Details **Winter Semester**

# 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.

# Project Mechatronics

5 ECTS

## LEARNING OUTCOMES

The students apply methods and tools for the creation of a sophisticated product or the development of an engineering mechatronic solution. They use project management methods in a self-organised team to distribute tasks and track the progress of work. In the team, work packages of the individual participants are identified, divided up and the interrelationships are shown. The students continuously document project steps and results. They develop a basis for decision-making, evaluate and make decisions. They compile the project result and draw a critical conclusion.

## CONTENT

Structuring of tasks in mechatronic product development. Optimisation of tasks and workflows in product development and project work. Target-oriented project management techniques, presentation techniques, technical communication and documentation channels. Practical application of study basics.

## 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: B2 (Common European Framework of Reference for Languages)

### NOTE

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

# Change Management

5 ECTS

## LEARNING OUTCOMES

The students know the change management aspects of corporate development. They understand how strategic realignments can be implemented in organisations. Students are able to analyse corporate situations in change and define change strategies. They have insights into leadership behaviour in change situations. The students know and understand the phase models of change management, according to which change projects are structured and implemented, and on the basis of which typical behaviour patterns are explained. Students will be able to apply systemic analysis and diagnosis approaches to determine the need for action and to prepare e.g. change coalitions and communication measures. The students know the essential methods and instruments that e.g. facilitate the handling of resistance, conflicts and power games or which, for example, set up new structures and processes. They will acquire the skills to identify quality criteria for successful change projects and to derive change measures for them..

## CONTENT

- Shaping organisational change: Phase models of corporate development, fields of action of change management, conceptual approaches to change management
- Procedures and techniques for planning, steering and controlling revolutionary and evolutionary change processes
- Stakeholder analysis
- Ethical reflection of change management issues in the corporate development process
- Dealing with resistance/exercises to develop social skills for managers in change situations
- Key figures/change controlling
- Process Evaluation/Continuous Improvement Process and Lessons Learned

## REQUIREMENTS

English skills: B2 (Common European Framework of Reference for Languages)

## NOTE

Requirements for obtaining ECTS: Regular attendance (70%) and active participation. Passed semester project and written exam. software tools as well as basic economic knowledge is also desirable.

Course Details  
**Summer Semester**

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

## LEARNING OUTCOMES

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

- 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

## 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: B2 (Common European Framework of Reference for Languages)

### NOTE

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

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: B2 (Common European Framework of Reference for Languages)

### NOTE

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

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