Hochschule Kempten
University of Applied Sciences

Module Handbook

Degree programme:

International Engineering

(Bachelor of Engineering)

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1 General information

The module handbook for the degree programme in **International Engineering** serves as a comprehensive guide for students, lecturers and prospective students. It provides a transparent and structured overview of the content, requirements and learning objectives of the individual modules together with the structure of the degree programme.

The degree programme in International Engineering is designed to provide students with the technical and cross-cutting skills that will prepare them for a successful career in an international and interdisciplinary environment. In addition to technical expertise, the degree programme nurtures skills in communication, intercultural collaboration and sustainable engineering.

General information about the degree programme:

- Name of the degree programme: International Engineering
- Award: Bachelor of Engineering
- Standard duration of studies: 7 semesters
- ECTS: 210
- Starts: Winter semester
- Restricted admission: No
- Eligibility criteria
  - University entrance qualifications (“HZB”)
  - German A1 in accordance with the Common European Reference Framework for Languages (CEFR)
  - English B1 in accordance with the Common European Reference Framework for Languages (CEFR)
- Taught in : English (in justified exceptional cases: German)

1.1 Degree programme objectives

The aim of this degree programme is to enable students to apply scientific findings and methods independently and autonomously, based on a profound understanding of the underlying principles and broad methodical knowledge. Comprehensive training in the modules covering the basic principles of natural sciences, technology and specialist subjects in an international context enables students to recognise vital correlations and to achieve the flexibility required to meet the demands placed on engineers in a globalised world. Great importance is placed on a practical focus in teaching the subject matter. Graduates from this degree programme are flexible and can work in an interdisciplinary manner. Their primary skillset includes:

- Analysing technical and specialist systems and refining them in a team
- Project management and working in international and interdisciplinary teams
- Using cutting-edge information technologies for precise analyses or as planning tools
- Acquiring relevant knowledge independently and using it to solve problems that arise, also including international aspects
- Implementing the integration, communication and leadership skills that they have acquired to ample effect throughout their subsequent career.

The specialist training encourages systematic thinking, in particular, and is complemented by conveying knowledge of engineering and foreign languages. Special classes are offered to develop teamwork skills.

The didactic concept of this degree programme is based on project-based learning, which specifically promotes transferrable and teamwork skills.

Whichever specialisations are chosen, this degree programme equips students with the skills to perform engineering activities in any of the following fields of work:

- Developing new technologies, systems and products
- Managing and coordinating international projects
- Optimising production processes in global production plants
- Offering technical advice for international customers
- Procuring materials and components from global markets
- Maintaining and repairing complex technical systems worldwide
- Training international teams or customers in handling machinery and equipment

This bachelor's degree programme leads to a first, professional entry-level qualification. It provides the basis and eligibility for admission to second-level master's degree programmes.

The bachelor's degree programme in "International Engineering" can also be studied in a dual format, as either a "degree programme with extended practice" or a "combined degree programme". These formats include significantly longer practical internship phases, many modules that link topics with tasks in the partner companies, and special modules specifically tailored to the requirements of dual study programmes, which means that students develop highly refined general practical skills, but also specific to their company, specialist subject and industry.

Learning outcomes

For the Bachelor degree programme ‘International Engineering the following learning outcomes are defined. The Learning outcomes are divided into professional competence (knowledge, skills) and personal competence (social and autonomy),based on the German Qualification Framework (DQR)

Graduates ….

Knowledge	
W1	Possess broad knowledge of engineering science in the fields of mechanical engineering, electrical engineering and computing, including the fundamental principles of natural sciences.
W2	Understand the framework conditions for international business relations.
W3	Understand the global challenges and trends in engineering.
W4	Possess profound knowledge in key technical engineering skills and applications.

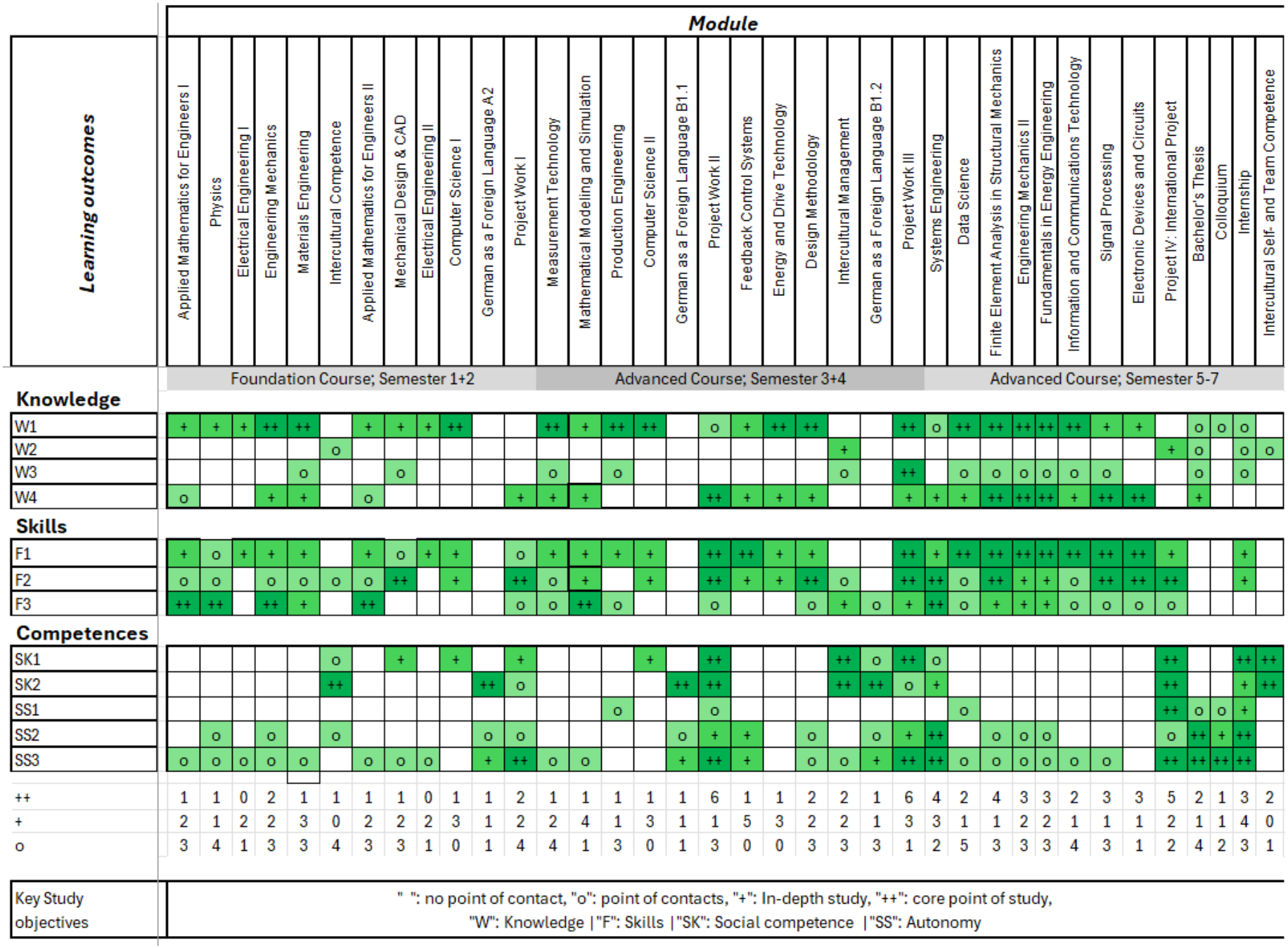
Skills	
F1	Are capable of applying scientific engineering methods to analyse and solve problems.
F2	Are capable of implementing theoretical knowledge and skills in practical projects and real-life application scenarios.
F3	Are capable of using analytical and critical thought processes to solve technical, organisational and social challenges.

Social competences	
SK1	Are capable of collaborating effectively in international teams and interdisciplinary projects.
SK2	Are able to behave and communicate appropriately and effectively in intercultural situations.

Autonomy	
SS1	Are aware of the social and ecological effects of scientific engineering decisions.
SS2	Are capable of dealing with change, learning from experiences and pursuing life-long professional development.
SS3	Are able to organise and motivate themselves independently and allocate their working hours efficiently.

Legend learning outcomes
"W": Knowledge |"F": Skills |"SK": Social competence |"SS": Autonomy

In the following learning outcomes matrix, the main focus of the individual modules from the basic and specialisation courses are assigned to the knowledge, skills and competences.



Learning outcomes	Module																																				
	Applied Mathematics for Engineers I	Physics	Electrical Engineering I	Engineering Mechanics	Materials Engineering	Intercultural Competence	Applied Mathematics for Engineers II	Mechanical Design & CAD	Electrical Engineering II	Computer Science I	German as a Foreign Language A2	Project Work I	Measurement Technology	Mathematical Modeling and Simulation	Production Engineering	Computer Science II	German as a Foreign Language B1.1	Project Work II	Feedback Control Systems	Energy and Drive Technology	Design Methodology	Intercultural Management	German as a Foreign Language B1.2	Project Work III	Systems Engineering	Data Science	Finite Element Analysis in Structural Mechanics	Engineering Mechanics II	Fundamentals in Energy Engineering	Information and Communications Technology	Signal Processing	Electronic Devices and Circuits	Project IV: International Project	Bachelor's Thesis	Colloquium	Internship	Intercultural Self- and Team Competence
	Foundation Course; Semester 1+2												Advanced Course; Semester 3+4												Advanced Course; Semester 5-7												
Knowledge																																					
W1	+	+	+	++	++		+	+	+	++			++	+	++	++		o	+	++	++			++	o	++	++	++	++	++	+	+		o	o	o	
W2						o																+											+	o		o	o
W3					o			o					o		o							o		++		o	o	o	o	o	o			o		o	
W4	o			+	+		o					+	+	+				++	+	+	+			+	+	+	++	++	++	+	++	++		+			
Skills																																					
F1	+	o	+	+	+		+	o	+	+		o	+	+	+	+		++	++	+	+			++	+	++	++	++	++	++	++	++	+			+	
F2	o	o		o	o	o	o	++		+		++	o	+		+		++	+	+	++	o		++	++	o	++	+	+	o	++	++	++			+	
F3	++	++		++	+		++					o	o	++	o			o			o	+	o	+	++	o	+	+	+	o	o	o	o				
Competences																																					
SK1						o		+		+		+				+		++				++	o	++	o								++			++	++
SK2						++					++	o					++	++				++	++	o	+								++			+	++
SS1															o			o								o							++	o	o	+	
SS2		o		o		o					o	o					o	+	+		o		o	+	++		o	o	o				o	++	+	++	
SS3	o	o	o	o	o		o	o	o		+	++	o	o			+	++	+		o	o	+	++	++	o	o	o	o	o	o		++	++	++	++	
++	1	1	0	2	1	1	1	1	0	1	1	2	1	1	1	1	1	6	1	1	2	2	1	6	4	2	4	3	3	2	3	3	5	2	1	3	2
+	2	1	2	2	3	0	2	2	2	3	1	2	2	4	1	3	1	1	5	3	2	2	1	3	3	1	1	2	2	1	1	1	2	1	1	4	0
o	3	4	1	3	3	4	3	3	1	0	1	4	4	1	3	0	1	3	0	0	3	3	3	1	2	5	3	3	3	4	3	1	2	4	2	3	1

Key Study objectives	" ": no point of contact, "o": point of contacts, "+": In-depth study, "++": core point of study, "W": Knowledge | "F": Skills | "SK": Social competence | "SS": Autonomy

1.2 Programme structure

The Bachelor of International Engineering (IE) programme allows to pursue a diverse range of specialisations and career paths without prematurely limiting the students' options. The curriculum encompasses the essentials of electrical and mechanical engineering, along with the international dimensions of engineering practice.

Standard duration of studies

The standard duration of studies is seven semesters including the final bachelor's thesis. Besides six semesters spent studying theory, the fifth semester of study is conducted as a practical study semester. The bachelor's degree programme is worth a total of 210 Credit Points (in accordance with the European Credit Transfer System – ECTS). In accordance with the European Credit Transfer System (ECTS), the students' workload is determined as 60 Credit Points (CP) per year of study.

Didactic concept

The didactic concept of the degree programme is based on project-based learning. Students work in group projects in which the curricular content of the respective semester is applied and deepened. The fifth semester is an industrial placement.

Programme structure

The degree programme is structured according to the applicants' level of German when they start studying on the programme. Students who can prove that they have completed level B1 of the Common European Framework of Reference for Languages (CEFR) when they apply shall be placed in Track B and must select general elective study modules worth 15 Credit Points from the module catalogue stipulated for Track B. Students who do not provide this proof shall be placed in Track A and complete the corresponding compulsory modules in "German as a foreign language" (module numbers IE25A, IE35A, IE45A).

- The **foundation course** spans the first and second semesters of theoretical studies, teaching the basic principles of engineering sciences, mathematics, natural sciences, information technology and international studies.
- The **advanced course** initially spans two further semesters of theoretical studies and the practical semester of study, which is conducted in the fifth semester in close collaboration with industry. The practical semester of study lasts for 24 weeks in total, which includes a three-week block of teaching relating to practice.
- Starting in **semester six**, students are offered subject-specific compulsory elective modules worth 30 Credit Points (CPs). If modules worth 15 Credit Points are selected in relation to a specific major, this will be stated explicitly in their official academic record.
    - The following majors are offered to create profiles:
    - Electrical Engineering and Information Technology
    - Mechanical Engineering
    - International Studies
- The degree is rounded off by writing the **bachelor's thesis**. Upon successfully completing the programme, the university of applied sciences will award you the academic degree of Bachelor of Engineering (B.Eng.).

The diagram on the following page shows an overview of the curriculum.

Overview of the International Engineering degree program(Track A)

Semester	Modules (CP)							hrs	CP
7	Subject-Specific Compulsory Elective Modules *** (15)	Bachelor's Thesis (Bachelorarbeit) (12)	Colloquium (3)					14	30
6	Systems Engineering (5)	Data Science (5)	Subject-Specific Compulsory Elective Modules *** (15)	Project IV: International project (5)				24	30
5	Intercultural Self- and Team Competence (5)	Internship / internship seminar (25)						6	30
4	Feedback Control Systems (5)	Energy and Drive Technology (5)	Design Methodology (5)	Intercultural Management (5)	German as a Foreign Language B1.2 ** (5)	Project Work III (5)		25	30
3	Measurement Technology (5)	Mathematical Modeling and Simulation (5)	Production Engineering (5)	Computer Science II (5)	German as a Foreign Language B1.1 ** (5)	Project Work II (5)		25	30
2	Applied Mathematics for Engineers II (5)	Physics (1)	Mechanical Design & CAD (5)	Electrical Engineering II (5)	Computer Science I (5)	German as a Foreign Language A2 ** (5)	Project Work I (5)	26	31
1	Applied Mathematics for Engineers I * (5)	Physics (4)	Electrical Engineering I * (5)	Engineering Mechanics * (5)	Materials Engineering (5)	Intercultural Competence (5)		24	29
								Total	210

CP scale: 2 4 6 8 10 12 14 16 18 20 22 24 26 28

* Basic and orientation examinations (BOE)

**If the German level is fulfilled, the student is assigned to Track B (general elective subjets)

*** If all subjects of a specialisation (15 CP) are taken, the specialisation will be named on the graduation certificate

The following specialisations are offered:
- Electrical Engineering and Information Technology
- Mechanical Engineering
- International Studies

Legend:
- Technical modules
- Integrative modules
- International modules
- Subject-Specific Compulsory Elective Modules

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1.3 Terms and definitions

ECTS – European Credit Transfer System

The **European Credit Transfer and Accumulation System** (**ECTS**) is designed to ensure that the achievements of students at universities of applied sciences in the field of European higher education are comparable and can be recognised when moving from one university to another, even across borders. This is made possible by accumulating Credit Points, which are performance-based units of credit earned in the scope of higher education. The expected average workload is calculated for each study-related achievement and credited towards the volume of study. The workload includes attendance time, independent study and the time required for examinations.

Workload and Credit Points (ECTS)

Students' workload is specified in Credit Points within the ECTS. In German, the terms "ECTS-Leistungspunkt" ("LP") or "ECTS-Punkt" might be used. One CP corresponds to an average workload of 30 hours. In the dual-track programme, one CP corresponds to an average workload of 25 hours (Colloquium Dual Internship I to IV). The workload for full-time students corresponds to 60 Credit Points per academic year, or 30 Credit Points per semester. That equates to 1,800 hours per year, or 45 weeks per year at 40 hours per week.

The workload is made up of:

- Attendance time,
- Time for preparing and reviewing the lecture material,
- Time to prepare talks and presentations,
- Time to create a project,
- Time to write a research paper,
- Time required for independent study,
- Time to prepare for oral or written examinations.

Seven-semester bachelor's degree programmes certify successful students with 210 ECTS Credit Points; three-semester master's degree programmes with a further 90 ECTS Credit Points. This fulfils the requirement of 300 ECTS Credit Points for successfully studying through to completing a master's degree programme.

Contact hours per week and attendance time

Each contact hour per week is the periodically recurring teaching unit in a module, usually scheduled weekly or fortnightly. A "lecture hour" is counted as one actual hour in time.

Modules

This degree programme is made up of modules. A module represents a teaching and learning unit that is coherent in terms of content and time. Modules are usually completed in one semester.

A module is a unit for which an examination is taken within and at the end of a semester, and for which credit points are awarded.

Examinations accompanying studies

All examinations take place throughout the entire degree programme and are directly related to courses. Depending on the course, examination components may take place during or after completing the module, for example as a presentation, written examination, oral examination, research paper with colloquium, draft with colloquium, laboratory report, excursion report or a combination of these. **The examination format is defined in the programme and examination regulations and is specified in this module handbook.** A module examination may be repeated in the following semester if it is not passed. The State Examination Regulations stipulate how often an examination may be repeated. The following eligibility criteria govern general progression with studies.

Progression with studies

All examinations for the orientation modules in the basic subjects of the bachelor's degree programme must be completed by the end of the second semester, i.e. modules IE11 Applied Mathematics for Engineers I, IE13 Electrical Engineering I, IE14 Engineering Mechanics.

Only students who have achieved a final grade of sufficient or better in subjects totalling at least 40 ECTS credit points on the foundation course are entitled to embark upon the advanced course (starting in semester 3).

Only students who have successfully completed all modules on the foundation course are entitled to embark upon the practical semester, as well as having passed modules totalling at least 25 ECTS credit points on the advanced course. Students on Track A must also have successfully completed module IE35A.

Any student who has achieved a total of at least 150 ECTS Credit Points and has completed the practical semester can register for the bachelor's thesis.

Examination format

Abbreviations	German explanation	English explanation
M-P	Schriftliche Modul-Prüfung	Written module examination
PSA	Prüfungsstudienarbeit, studienbegleitend	Graded research paper during the course
TM-P	Schriftliche Teil-Modul-Prüfung	Written part-module examination
TN	Teilnahmenachweis	Proof of participation

Aids permitted in examinations

Abbreviations	German explanation	English explanation
	keine Hilfsmittel	None
OE	ohne Einschränkung, alle nicht elektronischen Hilfsmittel zugelassen	Open-book examination, no restrictions to non-electronic equipment; **electronic equipment prohibited**
OE-PC	kein programmierbarer Taschenrechner, ansonsten keine Einschränkung	**Programmable calculators are prohibited**; otherwise, open-book examination with other aids permitted
NPPC	nicht programmierbarer Taschenrechner	Non-programmable pocket calculator
PC	Taschenrechner	Pocket calculator

FPE	zur Verfügung gestellte Formelsammlung	Formulary provided by the examiner
FSL	erlaubte Formelsammlung entsprechend Literaturangabe	Allowed formulary, stating literature
NOTES*n*	Aufzeichnungen auf n DIN A4 Blättern (beidseitig beschrieben)	Own notes covering n pages (written on both sides)
LSN	Vorlesungsskript und Aufzeichnungen	Lecture script, own notes
*	siehe besonderen Aushang "Rechnerbenutzung bei Prüfungen" der Fakultät Elektrotechnik	See specific notice “Use of calculators in examinations” posted by the Faculty of Electrical Engineering
***	nach besonderem Aushang	According to specific notice
OF1	selbsterstellte Formelsammlung auf einem DIN A4-Blatt	Own formulary on 1 DIN-A4 page
HWF	handgeschriebene Formelsammlung	Handwritten formulary
PC only	nur Taschenrechner	Pocket calculator only
OLN	eigene Vorlesungsmitschriften	Own lecture notes

1.4 Recognition of study and examination performances and other skills

The recognition of study and examination achievements and other skills is governed by §17 APO (University Examination Regulations) for Kempten University of Applied Sciences. The Examinations Committee for the degree programme in International Engineering must justify any non-recognition of achievements that have been completed at other state or state-recognised universities in the Federal Republic of Germany or at foreign universities of applied sciences (reversal of the burden of proof).

1.5 University Student Advisory Service

- **Academic Registry** (whose technical unit is responsible for the degree programme in International Engineering) provides information about all administrative matters, such as enrolment, exmatriculation, admissions, leave of absence, internship contracts, examination matters, recognition of examination results, exemption from practical semester, deadline extensions, etc. You can find their contact details at https://www.hs-kempten.de/en/meine-hochschule/servicestellen/academic-registry.
  Please send enquiries by email to studienamt@hs-kempten.de
- **Faculty:**
  If you have any questions about the timetable or compulsory elective subjects, please contact the Faculty of Electrical Engineering, either by phoning the office on +49 (0)831-2523-171 or emailing sekretariat-el@hs-kempten.de.
- Each degree programme has a dedicated **academic advisor** – a professor appointed by the faculty – to handle any questions about the structure and content of the degree programme, offer tips on study techniques and preparing for exams, suggest career opportunities, and help with any problems relating to exams. The current contact person including telephone number, email address and office hours can be found at

https://www.hs-kempten.de/en/faculty-of-electrical-engineering/degree-courses/bachelor/international-engineering

- Supervision during the practical semester is provided by the **placements officer** responsible for this degree programme, who is also appointed by the faculty. Among other things, he/she checks whether the internship positions fulfil the requirements. Detailed information about the practical semester can be found in a leaflet posted in the download section of the webpages for Academic Registry.
- The **University Student Advisory Service** informs and advises prospective students about the content, requirements and demands of studying in Kempten, also offering support with your choice of degree programme and career. Students can also turn to them with any questions and problems that cannot be answered by their dedicated contact persons. The contact details for the University Student Advisory Service staff can be found at https://www.hs-kempten.de/en/studies/student-advisory-service.

1.6 Cooperative degree programmes

Two alternative dual study formats with a large proportion of practical work experience are offered in Bavaria on the "Hochschule Dual" scheme:

Combined degree programmes link a university degree with a vocational apprenticeship in a relevant subject and additional practical experience.

Degree programmes with extended practice combine a university degree with intensive practical work in a company.

These dual study formats offer the following tangible benefits, in particular:

- A robust academic education is provided at a state-run Bavarian university of applied sciences.
- In addition, practical work is undertaken in a company during the practical semesters and during the semester breaks – content taught at the university of applied sciences can be applied in practice straight away.
- Students on a combined degree programme complete a vocational apprenticeship certified by the Chamber of Industry and Commerce in addition to their academic education.
- The internship phases in the company are remunerated, thus securing financial support during the degree programme.
- Students are familiarised with operational processes, work on their own projects, and gain their first practical professional experience.
- The company gets to know the student, resulting in good chances of a permanent position as soon as they finish studying – many graduates basically have an employment contract in their pocket upon graduation.
- And best of all – this usually means a seamless transition between studying and embarking upon a career, with an attractive graduate salary straight away.

Either of these study formats can be chosen for the degree programme in Electrical Engineering and Information Technology.

1.6.1. Combined degree programme with integrated vocational apprenticeship

The combined degree programme ("Verbundstudium" in German) links a university degree programme in Electrical Engineering and Information Technology with the corresponding vocational apprenticeship and includes additional professional practice. This study format is suitable for motivated and goal-oriented prospective students who fulfil the following requirements:

- General university entrance certificate
- University entrance certificate from a technical college.

The process in brief:
Far enough ahead of starting vocational training (preferably up to 14 months in advance), the prospective student applies for an apprenticeship in a company (cooperating companies can be found in the database at https://www.hochschule-dual.de/ or directly via the university of applied sciences' website) and secures a training contract. Contract in hand, the next step is to apply for a place to study at the university of applied sciences.

The first stage involves starting an apprenticeship (Chamber of Industry and Commerce – abbreviated to "IHK" in German) in a company and at the vocational college in Kempten. Having completed the first year of their apprenticeship, it is in their second year that the student starts studying at Kempten University of Applied Sciences. As part of the co-operation with the vocational college in Kempten, a special class is set up there for these apprentices to reflect the content of the degree programme, thus avoiding duplicating coverage of the same subject matter. From then on, students alternate between university and internship phases (the latter timed primarily during the practical semester and lecture-free periods). After the third year of vocational training, Part II of the IHK examinations takes place during the practical semester. After successfully passing the exam, the student continues to work at the company during the lecture-free periods. This creates a smooth transition into the professional career. After a total of 4.5 years of vocational training and study, the cooperative degree programme earns the graduand both a vocational qualification from the Chamber of Industry and Commerce and a university degree (B.Eng.).

1.6.2. Degree programme with extended practice

Degree programmes with extended practice ("Studium mit vertiefter Praxis" in German) combine a university degree with intensive practical work in a company. This study format is suitable for motivated, determined prospective students who fulfil the following requirements:

- General university entrance certificate
- University entrance certificate from a technical college
- Subject-specific university entrance certificate
- Qualified professionals.

The process in brief:
Approximately 6–12 months before the start of the degree programme, prospective students apply to a company (cooperating companies can be found in the database at https://www.hochschule-dual.de/ or directly on the university of applied sciences' website) for a practical placement that matches the content of the intended degree programme. The student, the company and the university of applied sciences sign a contract for the degree programme with extended practice, templates for which can be found in the cooperative study programme section on the university's website.

Having secured the training contract, it's time to apply for a place to study at the university of applied sciences. After two months of preliminary work experience, the degree programme begins. If the prospective student has not yet found a place in a company before starting to study, or if they only decide that the format with extended practice is of interest after they have already commenced their degree programme, it is possible to opt for this format up until the third semester.

From then on, students alternate between university and internship phases, with the latter timed primarily during the practical semester and lecture-free periods. During the contract-based collaboration, project work is carried out on specific tasks stemming from the company's operational practice, aiming at a smooth

transition into professional work in the interests of all parties. The cooperative degree programme is rounded off with the practically focused bachelor's thesis, written in the company, earning the associated university degree (B.Eng.).

1.6.3. Extended qualification objectives for dual degree programmes

On both kinds of cooperative study programme, students are contractually bound to a company. These formats include significantly longer practical internship phases, many modules that link topics with tasks in the partner companies, and (for students commencing their studies in Winter Semester 2023/24 or thereafter) special modules specifically tailored to the requirements of cooperative study programmes, which means that students develop highly refined general practical skills, but also skills specific to their company, specialist subject and industry. In addition to specialist skills, elements of personal development, e.g. confident presentation, teamwork and work organisation, are also nurtured and practised, meaning that graduates from these degree programmes can be deployed more quickly and effectively in companies' departments, projects and processes.

1.6.4. Structure of dual degree programmes

The following supporting organisational framework conditions serve to achieve the extended qualification objectives of the cooperative degree programmes:

- A cooperation agreement regulates the essential rights and obligations of the partner companies, the university of applied sciences and the students, and how the periods of study and practical work are organised.
- Responsibility for ensuring that experiences are well-shared and adherence to the content defined in the module descriptions lies with the supervisors in the partner companies, the placements officers at the university, the "Hochschule Dual" team and the faculty's cooperative degree programmes officer.
- The bachelor's degree programme is designed to ensure that the practical semester or the bachelor's thesis can also easily be completed abroad.
- Credit transfer procedures regulate how to organise a semester abroad at a foreign university of applied sciences without needing to extend the duration of study on the degree programme. The partner companies support any such periods spent abroad.
- Measures are in place to ensure that attendance at a vocational college can be integrated into the standard timetable on the combined degree programme. It is ensured that students can attend examinations at the Chamber of Industry and Commerce by granting the necessary leave from the company and the university of applied sciences.

Interlinking the university of applied sciences and the company as centres of learning

The curricula of both the "combined degree programme" and the "programme with extended practice" in Electrical Engineering and Information Technology are expanded in some modules and study periods compared to the standard degree programme, and the subject matter addressed is linked to topics in the partner companies. This applies to students on cooperative degree programmes commencing their studies in Winter Semester 2023/24 and thereafter. This interlinked structure enables students to establish a faster and more direct link between theoretical knowledge and practical application – not only by means of the specially adapted modules and the transfer module "Cooperative Internship Colloquium", but also due to most modules referring to applications in students' partner companies.

The following modules run specifically for the two kinds of cooperative degree programme:

Industrial placement

- The practical semester is spent in the partner company. Intensive exchange between supervisors in the company and the placements officers at the university of applied sciences ensures that practical and theoretical content is coordinated in a meaningful way.
- Additional internship phases during the lecture-free period intensify the contact between students and partner companies. These additional placements cover content in line with the corresponding module descriptions.
- On combined degree programmes, one year of vocational training at the partner company precedes studying at the university of applied sciences. The internship phases reflect the requirements of the Chamber of Industry and Commerce examination. It is common for students to attend a vocational college or in-house training courses during these placements.
- Practice-based partners take turns in getting involved in the concepts, content and didactics for the accompanying "Colloquium Dual Internship".

Modules adapted to the requirements of dual degree programmes:

- Compulsory elective module "Colloquium Dual Internship": A module that must be taken from the catalogue of compulsory elective modules, accompanying the first three to maximum six semesters of study. All students actively studying on cooperative degree programmes in the Faculty of Electrical Engineering – and, if applicable, other faculties – can share experiences in these seminars. The differences between the degree programmes provide insights into different companies and various sectors. The colloquia address practically relevant subject matter and aspects of personal development. The module thus makes a tangible contribution to developing the extended skills of students on cooperative degree programmes.
- Project work: The topic is usually drawn from the student's partner company – in agreement with the module convenor for the project – in order to ensure practical relevance and feedback from the company. The company is involved in preparing and presenting the results.
- Bachelor's thesis: The topic stems from the student's partner company, in agreement with the thesis supervisor at the university of applied sciences. Students are jointly supervised by the university of applied sciences and the company.
- Bachelor's seminars: Training and assistance is provided by supervisors at the university of applied sciences and the company in conducting and writing up scientific work.

Module descriptions for cooperative degree programmes

Module descriptions with individual, supplementary information for students on cooperative degree programmes

Practical semester ... Students on "combined" or "extended practice" cooperative degree programmes complete the practical semester in their partner company. ...	
Bachelor's thesis ... Students on "combined" or "extended practice" cooperative degree programmes are assigned a topic stemming from their partner company. ...	
Bachelor's seminars: ... Students on "combined" or "extended practice" cooperative degree programmes receive further specifications and support from their partner company with regard to preparing a scientific paper. ...	

2 Modules

2.1 Modules for the foundation course

2.1.1 IE11 Applied Mathematics for Engineers

Module title: **Applied Mathematics for Engineers I**	**Revision date:** 09.01.2026
Module code no.:	**Related component modules**
IE11	IE 111 IE 112

Part 1: **General Information**	
Degree programme: International Engineering (IE)	
Course level, semester: Foundation course, semester 1	**Taught in semester:** Winter
Module convenor: Prof. Dr. Bernd Pinzer	**Faculty/Department:** Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	3 hrs/w
Lab, Exercises:	1 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	45 hrs
Lab, Exercises:	15 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

See description in sub-modules IE 111 and IE 112.

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

School-level mathematics corresponding to the "Fachabitur" *(German advanced technical college certificate)*

Learning outcomes:

- "Development of basic skills to apply mathematical knowledge to technical problems.
- Proper handling of mathematical techniques.
- Recognition of mathematical context in technical or economical tasks."

Module content:

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Exercises are available on the Intranet.

Literature:

See literature in sub-modules IE 111 and IE 112.

Examination type – format and duration:	**Examination – permitted aids:**
See examination type in sub-modules IE 111 and IE 112.	See permitted aids in sub-modules IE 111 and IE 112.

2.1.2 IE111 Applied Mathematics for Engineers I

Module title:	**Revision date:**
Applied Mathematics for Engineers I	09.01.2026
Module code no.:	**Related component modules**
IE111	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 1	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr. Bernd Pinzer	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	3 hrs/w
Lab, Exercises:	1 hrs/w
ECTS Credit Points	4 CP

Workload:

Lectures:	45 hrs
Lab, Exercises:	15 hrs
Independent learning:	60 hrs
Total workload:	120 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

The course covers basic knowledge of mathematics and its application in engineering and technology. Motivated by real world examples, mathematical tools and techniques will be developed and applied in practical exercises, in order to strengthen the ability to work with mathematical laws.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

School-level mathematics corresponding to the "Fachabitur" *(German advanced technical college certificate)*

Learning outcomes:

This module provides basic knowledge of the formalism of modern mathematics. After successfully completing this course, students will understand the principle of mathematical reasoning and thus the basic structure of mathematical thought. Students should be able to translate physical, engineering and economic problems into the language of mathematics and solve them using formal methods. At the end of the course, students will be familiar with important fundamental mathematical concepts and will be able to familiarise themselves with more advanced questions in professional or scientific practice and thus turn to new topics with the help of mathematical literature.

Module content:

Basic structures (propositional logic, proofs, sets, mappings)
From natural numbers to complex numbers
Sequences, limits, series
Elementary functions
Calculus (derivatives and integrals)
Foundations of linear algebra (linear systems of equations, matrices, determinants, rank)
Rotations in R^3, coordinate transforms

Part 3:

Literature, permitted aids

Internet links, computer-based learning:

Exercises are available on the Intranet.

Literature:

- G. Baumann, „Mathematics for Engineers 1“, De Gruyter Oldenbourg, ISBN-13 978-3486590388
- T. Westermann, „Mathematics for Engineers“, World Scientific Publishing Company, ISBN-13 978-9811292347

Examination type – format and duration:	**Examination – permitted aids:**
Written Module Examination (“MP”) 90 minutes	Open book examination; non-programmable calculator

2.1.3 IE112 Basic Mathematics Test

Module title:	**Revision date:**
Basic Mathematics Test	11.03.2025
Module code no.:	**Related component modules**
IE 112	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 1	Winter
Module convenor:	**Faculty/Department:**
Norbert Grotz	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	0 hrs/w
Lab, Exercises:	0 hrs/w
ECTS Credit Points	1 CP

Workload:

Lectures:	0 hrs
Lab, Exercises:	0 hrs
Independent learning:	30 hrs
Total workload:	30 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

The basic mathematics test ensures an adequate level of mathematical competence for all first-year students so that, based on this foundation, technical subjects such as engineering mathematics, physics, electrical engineering, technical mechanics, etc., can be mastered without difficulty.

Accompanying the basic mathematics test, there are self-study materials available, and if necessary, tutoring support is also provided.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

- School-level mathematics corresponding to the "Fachabitur" *(German advanced technical college certificate)*

Learning outcomes:

The sub-module supports students in the 1st semester in equalising the differences in maths education between different school systems as well as when returning to learning after a longer period of professional activity. On the basis of a detailed evaluation of the personal test result students learn to assess their mathematical competences. They recognise any gaps that may exist, which they can close by means of customised exercises. After successfully completing the sub-module, students have solid mathematical tools and apply them precisely to tasks from other modules.

Module content:

The content is tailored to the requirements of the modules in the bachelor ‘s degree.

- Arithmetic: fractions, percentages, arithmetic with variables, rule of three, powers, binomial formulae, logarithms
- Plane geometry: rectangles, (right-angled) triangles, circles, Pythagorean theorem
- Properties of selected mathematical functions: Linear and quadratic functions, square root function, fractional rational functions, exponential and logarithmic functions, trigonometric functions
- Equations: Quadratic equations, absolute value equations, linear systems of equations with up to three unknowns, inequalities
- Differential calculus and application: Differential quotient, derivative, extreme values
- Vector calculus in plane and space: vector length, scalar and cross product

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Exercises are available on the Intranet.

Literature:

- "Basic Engineering Mathematics", John Bird, ISBN 9780367643676
  free PDF: https://nibmehub.com/opac-service/pdf/read/Basic%20Engineering%20Mathematics.pdf
- “Introducing Pure Mathematics”, Robert Smedley, Garry Wiseman, ISBN 978-0199148035
- “Cambridge International AS & A Level Mathematics: Pure Mathematics 1 Practice Book”, ISBN:9781108444880

Examination type – format and duration:	**Examination – permitted aids:**
(TN) Proof of participation Written examination, duration 60 minutes.	- No calculators. - One formulary – including arbitrary manual additions (even added pages), but no math textbook.

2.1.4 IE12 Physics

Module title: **Physics**	**Revision date:** 28.04.2026
Module code no.:	**Related component modules**
IE12	IE 121 IE 122

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester: Foundation course, semester 1	**Taught in semester:** Winter
Module convenor: Prof. Dr. Michael Layh	**Faculty/Department:** Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

IE121 Lectures:	4 hrs/w	4 CP
IE122 Lab, Exercises:	1 hrs/w	1 CP
IE12ECTS Credit Points		5 CP

Workload:

Lectures:	60 hrs
Lab, Exercises:	15 hrs
Independent learning:	75 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective: Compulsory subject	**Compulsory prerequisite modules** None

Short Description:

See description in sub-modules IE 121 und IE 122.

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

School-level mathematics corresponding to the "Fachabitur" *(German advanced technical college certificate)*

Learning outcomes:

Module content:

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Literature:

Examination type – format and duration:	**Examination – permitted aids:**
See examination type in sub-modules IE 121 and IE 122.	See examination type in sub-modules IE 121 and IE 122.

2.1.5 IE121 Physics

Module title:	**Revision date:**
Physics	28.04.2026
Module code no.:	**Related component modules**
IE121	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 1	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr. Michael Layh	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	4 hrs/w
Lab, Exercises:	0 hrs/w
ECTS Credit Points	4 CP

Workload:

Lectures:	60 hrs
Lab, Exercises:	0 hrs
Independent learning:	60 hrs
Total workload:	120 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

The course imparts basic knowledge of Physics and their applications in engineering and technology. Based on practical exercises the ability to apply physical laws will be expanded.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

School-level mathematics corresponding to the "Fachabitur" *(German advanced technical college certificate)*

Learning outcomes:

After successfully completing this module, students will be familiar with the basic physical laws of classical mechanics, the physics of vibrations and waves, and the physics of electrons in atoms and solids. Students will be able to apply physical laws to engineering problems. In addition, students are able to analyze and evaluate complex physical processes and systems.

Module content:
Mechanics
Kinematics and dynamics of translational and rotational motion, in particular: projectile motion, friction, rotating reference systems, Newton's axioms, energy, linear momentum and collisions, angular momentum, moment of inertia.
Oscillations and Waves
Free undamped and damped oscillation, torsional oscillation, mathematical and physical pendulum, forced oscillation, coupled oscillation, basics of wave theory, polarization, reflection, refraction, total reflection, interference, diffraction, frequency-time uncertainty.
Acoustics and Optics
Sound waves, intensities and levels, Doppler effect, human hearing, standing waves, spectrum of electromagnetic waves, dispersion.
Electrons in Atoms and Solids
Electrons in atoms (Bohr's atomic model, discrete energy levels, uncertainty principle), electrons in solids (band model, metals, semiconductors, insulators), conduction mechanisms in metals.

Part 3:

Literature, permitted aids

Internet links, computer-based learning:

Exercises are available on the Intranet.

Literature:

Physics for Scientists and Engineers with Modern Physics., 10th ed., Raymond A. Serway and John W. Jewett, ISBN: 978-337-55329-2

Examination type – format and duration:	**Examination – permitted aids:**
Written Module Examination (“MP”) 90 minutes	Non-programmable calculator, 2 handwritten DIN A4 sheets (front and back may be written on)

2.1.6 IE122 Physics Laboratory

Module title:	**Revision date:**
Physics Laboratory	28.04.2026
Module code no.:	**Related component modules**
IE122	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 2	Summer
Module convenor:	**Faculty/Department:**
Prof. Dr. Michael Layh	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	0 hrs/w
Lab, Exercises:	1 hrs/w
ECTS Credit Points	1 CP

Workload:

Lectures:	0 hrs
Lab, Exercises:	15 hrs
Independent learning:	15 hrs
Total workload:	30 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

This physics laboratory module enables students to independently apply and expand their existing physics knowledge to new fields. Through hands-on experiments—such as investigating energy conversion, wave phenomena, and gas laws—students learn to operate measurement instruments, plan and execute experiments, apply error analysis, and systematically document technical and scientific results in small groups. Experiments are conducted, analyzed at home, and presented in detailed reports.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

School-level mathematics corresponding to the "Fachabitur" *(German advanced technical college certificate)*

Learning outcomes:

After successful participation in this module, the students are able to apply their physical knowledge on typical engineering problems and are able to expand their knowledge into new areas of expertise. The students can handle measuring instruments and can plan and efficiently perform measuring task. In addition, students are able to apply suitable methods for error estimation and are able to present and document scientific experiments.

Module content:

A selection of 3 experiments are carried out in small groups of typically 3 students:
Maxwell wheel:
Conservation of energy, moment of inertia, forces in the accelerated reference frame
Torsional Pendulum:
Free, damped and excited torsional oscillations, decay behavior, resonance, phase shift
Microwaves:
Standing wave, single and double slit diffraction, absorption, polarization
Gas laws:
Laws of ideal and real gases, Van der Waals equation, critical point
Electric field:
Electric field lines, electrochemistry, electroplating, coating thickness measurement
The results of the experiments are documented, evaluated at home, and presented in a written report.

Part 3:

Literature, permitted aids

Internet links, computer-based learning:

Exercises are available on the Intranet.

Literature:

Physics for Scientists and Engineers with Modern Physics., 10th ed., Raymond A. Serway and John W. Jewett, ISBN: 978-337-55329-2

Examination type – format and duration:	**Examination – permitted aids:**
Certification of attendance Students have to turn in 3 written reports describing the 3 experiments carried out. Those reports are used to check the extent to which the physical relationships of the experimental set-up have been understood. In addition, the correctness of the execution and evaluation of the experiment, including the error calculation, is checked.	

2.1.7 IE13 Electrical Engineering I

Module title:	**Revision date:**
Electrical Engineering I	14.11.2025
Module code no.:	**Related component modules**
IE13	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 1	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr. Christoph Schmülling	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	2 hrs/w
Lab, Exercises:	2 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	30 hrs
Lab, Exercises:	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

The course covers the fundamentals of electrical engineering on a mathematical basis. Subjects are: Electric and magnetic fields, electrical current, DC circuits, network theory, induction law, magnetic circuits.

Part 2:
Prerequisites, learning outcomes, content

[1] hrs/w = contact hours per week during the semester

Prerequisite knowledge:

- Mathematical knowledge according to the education in highschools
- Algebra and functions
- Systems of equations
- Vectors and matrices
- Linear algebra
- Geometry
- Trigonometry
- Differential and integral calculus

Learning outcomes:

- Knowledge about physical and mathematical fundamentals of electric and magnetic fields, electrical currents, dc circuits and magnetic circuits.
- Methodical and scientific analysis of linear electrical and magnetic circuits.

Module content:

- Electrostatic field (Coulomb's law, electrical field intensity, voltage, electrical flux density and electrical flux, capacity, energy and energy density of the electrical field, forces at boundary surfaces).
- Current flow (electric current and current density, Ohm's law, temperature coefficient of resistance, electrical power and efficiency, Kirchhoff's laws, two-terminal networks, power matching, star-delta transformation, bridge circuits, calculation methods for linear circuits).
- Magnetic field (Ampere's law, Lorentz force, Hall effect, magnetic flux, inductance, law of Biot-Savart, energy of the magnetic field, magnetic circuits, forces at boundary surfaces, magnetic circuits with permanent magnets).

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Exercises are available on the Intranet.

Literature:

- J.R. Cogdell: Foundations of Electrical Engineering, Prentice Hall
- Course material is available on Moodle.
- Allan Hambley, Electrical Engineering - Principles and Applications, Pearson.

Examination type – format and duration:	**Examination – permitted aids:**
("MP") The final mark depends 100% on a written examination (90 minutes).	- Open book examination - All non-electronical aid is allowed - Non-programmable pocket calculator

2.1.8 IE14 Engineering Mechanics

Module title:	**Revision date:**
Engineering Mechanics	12.01.2026
Module code no.:	**Related component modules**
IE14	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 1	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr.-Ing. Hubert Mayr	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	2 hrs/w
Lab, Exercises:	2 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	30 hrs
Lab, Exercises:	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

The course provides fundamental knowledge about the principles and methods of statics for rigid and elastic bodies and will enable students to design and to dimension components in mechanical engineering.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

Basic knowledge of physics (school level)

Learning outcomes:

Students understand the principles and methods of statics for rigid and elastic bodies. They acquire these skills as a basis for the correct design and dimensioning of components in mechanical engineering:

- Idealization of real components and structures to create simplified mechanical models
- Applying impressed loads and create plane and spatial mechanical free body models
- Applying the cutting principle to determine bearing reactions, hinge reactions and internal loads
- Setting up equilibrium conditions and solving the equation systems of mechanical models
- Calculating stresses and strains in cross sections due to internal loads
- Analysing and evaluating uniaxial and plane stress and strain states
- Applying stress-strain relation to calculate the deformations of bars, beams and frames

Module content:

The module includes the following topics:

- Forces and moments: Central and general force systems
- Bearing and joint reactions: Equilibrium of force systems in simple and multi-part structures
- Trusses
- Centers of gravity of line, surface and volume structures
- Line, surface and volume loads
- Internal loads on plane and spatial structural systems consisting of beams, frames and arches
- Friction: adhesion, friction, rope adhesion and friction
- Uniaxial and plane stress and deformation states; stress-strain relation

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Course material is available on the Intranet (Moodle). Registration for the course is necessary.

Literature:

1. Russell C. Hibbeler, "Engineering Mechanics: Statics, SI Units", Pearson, 15th Edition (2022), Print-ISBN: 978-1-292-44404-8 E-ISBN: 978-1-292-44393-5.

2. Russell C. Hibbeler, "Mechanics of Materials, SI Units", Pearson, 11th edition (2023), Print-ISBN: 978-1-292-72573-4; E-ISBN: 978-1-292-45744-4

Examination type – format and duration:	**Examination – permitted aids:**
100% of the mark results from a written examination (90 minutes).	Open book examination; non-programmable calculator

2.1.9 IE15 Materials Engineering

Module title:	**Revision date:**
Materials Engineering	12.01.2026
Module code no.:	**Related component modules**
IE15	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 1	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr.-Ing. Magdalena Speicher	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	2 hrs/w
Lab, Exercises:	2 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	30 hrs
Lab, Exercises:	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

The course provides fundamental knowledge about the properties and applications of various materials and will enable students to select materials based on their specific characteristics for mechanics and mechatronic applications.

Part 2:
Prerequisites, learning outcomes, content

[1] hrs/w = contact hours per week during the semester

Prerequisite knowledge:

Basic knowledge of physics and chemistry (school level)

Learning outcomes:

The students are able to:
- name basic descriptions of the internal structure and properties of matter.
- name different classes of materials and their specific properties for useful applications.
- relate scientific relationships qualitatively and quantitatively.
- name the main classes of materials relevant to electrical engineering / mechatronics / optics / mechanical engineering and their properties and internal mechanisms.
- understand and name the applications and application limits for technical materials based on basic material properties.
- select materials according to given specifications and assess their service behaviour.
- analyse the ecological and economic effects of different or alternative technical materials and evaluate them in terms of sustainable use.

Particular emphasis is placed on ensuring that students learn to identify, comprehend, and utilize construction and electrical engineering materials

Module content:

The module includes the following topics:
- Structure of matter, periodic table of elements
- Types of bonding in solids and the resulting material classes and structures
- Crystal formation, crystal structure, crystal defects
- Thermally activated processes
- Phase transformations, alloy formation
- Iron-carbon system
- Elastic and plastic behavior, materials testing
- Technical materials and their properties and applications: metals, ceramics, glasses, plastics, composites, materials for electrical engineering
- Comparison of purely technical or functionally advantageous materials and their economic and ecological costs
- Approaches and criteria for use of materials.

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Course material is available on the Intranet (Moodle). Registration for the course is necessary.

Literature:

1. W. D. Callister and D. G. Rethwisch, "Materials Science and Engineering: An Introduction", John Wiley & Sons, 10th Edition (2018), ISBN: 978-1119405498.
2. K. G. Budinski and M. K. Budinski, "Engineering Materials: Properties and Selection", Pearson, 9th Edition (2009), ISBN: 978-0137128426.
3. W. D. Callister "Fundamentals of Materials Science and Engineering", John Wiley & Sons, 5th Edition (2018), ISBN: 978-1119127666.
4. J. Martin, "Materials for Engineering", Woodhead Publishing, 3rd Edition (2006), ISBN: 978-1845691608.
5. I. P. Jones, “Materials Science for Electrical and Electronic Engineers”, Oxford University Press (2007), ISBN: 978-0195691634.
6. M.V. Gandhi and B.S. Thompson, "Smart Materials and Structures", Chapman and Hall, (1992), ISBN: 978-0412370106.
7. S. M. Rezende, “Introduction to Electronic Materials and Devices”, Springer (2022), ISBN: 978-3030817725.
8. T. K. Basak, “Electrical Engineering Materials”, New Academic Science Limited (2012), ISBN : 978-1906574437.

Examination type – format and duration:	**Examination – permitted aids:**
100% of the mark results from a written examination (90 minutes).	Non-programmable calculator, 2 handwritten DIN A4 sheets (front and back may be written on)

2.1.10 IE16 Intercultural Competence

Module title: **Intercultural Competence**	**Revision date:** 12.01.2026
Module code no.:	**Related component modules**
IE16	
Part 1: **General Information**	
Degree programme: International Engineering (IE)	
Course level, semester: Foundation course, semester 1	**Taught in semester:** Winter
Module convenor: Rebecca Koch	**Faculty/Department:** Electrical Engineering
Teaching methods, hrs/w,[1] ECTS Credit Points (CP) Lectures: 2 hrs/w Lab, Exercises: 2 hrs/w ECTS Credit Points 5 CP	
Workload: Lectures: 30 hrs Lab, Exercises: 30 hrs Independent learning: 90 hrs Total workload: 150 hrs	
Taught in: English	
Compulsory subject / Compulsory elective: Compulsory subject	**Compulsory prerequisite modules** None
Short Description: The module aims to improve students ‘intercultural competence by raising their awareness of intercultural differences. Different Models and approaches to intercultural competence are presented and discussed. The aim is to sensitize students to intercultural contexts and their dynamics and to expand their practical intercultural skills.	

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

None
Desirable are interest in other cultures, openness to work in international teams and the willingness to think critically

Learning outcomes:

This course is designed to help students improve their ability to function in cross-cultural settings.

At the end of the course, students will
- Create empathy and understanding for the cultural imprint of each other.
- Develop intercultural communication skills as a necessity for working in a global business environment
- Develop cross-cultural skills (keen perception, changing perspective, suspending judgment) to manage the cross-cultural collaboration in team work.
- Increase cultural awareness (knowledge of one's own culture, foreign culture and of cultural differences).
- apply their knowledge and act in an interculturally competent manner

Module content:
The module aims to improve students' intercultural competence by raising their awareness of intercultural differences.
The following topics are discussed:

- Culture / Intercultural Awareness
- Cultural Differences
- Cultural Standards
- Cultural concepts and its dimensions like Iceberg Model / Norms / Rules / Values
- Cultural misunderstandings and culture shock
- Intercultural Communication
- International Business
- Orientation in foreign cultures

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Course material is available on the Intranet (Moodle). Registration for the course is necessary.

https://erinmeyer.com/
https://www.theculturefactor.com/
https://www.coe.int/de/web/interculturalcities/intercultural-competence
https://unesdoc.unesco.org/ark:/48223/pf0000219768

Literature:

- The Culture Map: breaking through the invisible boundaries of global business, Meyer, Erin 2014
- "Intercultural Communication: A Critical Introduction" Piller, Ingrid 2017
- The paradoxes of interculturality: a toolbox of out-of-the-box ideas for intercultural communication education; Dervin, Fred 2023
- Culture crossing: discover the key to making successful connections in the new global era, Landers, Michael, Berret-Koehler Publishers 2016
- "Bridging Differences: Effective Intergroup Communication" Gudykunst, William B. 2004

Examination type – format and duration:	**Examination – permitted aids:**
(“MP) The final grade results from a presentation 50% and a final examination 50% (60 minutes)	No auxiliaries permitted

2.1.11 IE21 Applied Mathematics for Engineers II

Module title:	**Revision date:**
Applied Mathematics for Engineers II	09.01.2026
Module code no.:	**Related component modules**
IE21	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 2	Summer
Module convenor:	**Faculty/Department:**
Prof. Dr. Bernd Pinzer	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	3 hrs/w
Lab, Exercises:	1 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	45 hrs
Lab, Exercises:	15 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

The course builds on “applied mathematics I” and continues to convey basic knowledge of mathematics and its application in engineering and technology. Motivated by real world examples, mathematical tools and techniques will be developed and applied in practical exercises, in order to strengthen the ability to work with mathematical laws.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

School-level mathematics corresponding to the "Fachabitur" *(German advanced technical college certificate)*

Learning outcomes:

Building on the “Applied mathematics I” module, advanced concepts of mathematics are taught. After completing the course, students will have mastered calculation techniques from the field of multidimensional calculus in order to solve more complex tasks in engineering.
At the end of the programme, students should be able to apply a structured way of thinking and approach to solving real-world problems.

Module content:
linear algebra: matrix inversion, eigenvalue problems, singular value decomposition
Series expansion of functions: Taylor series, Fourier series, Fourier transform
Functions of several variables
Partial Derivatives, application to extreme value determination
Multiple integral, coordinate transforms as substitution

Part 3:

Literature, permitted aids

Internet links, computer-based learning:

Exercises are available on the Intranet.

Literature:

- G. Baumann, „Mathematics for Engineers 1“, De Gruyter Oldenbourg, ISBN-13 978-3486590388
- T. Westermann, „Mathematics for Engineers“, World Scientific Publishing Company, ISBN-13 978-9811292347

Examination type – format and duration:	**Examination – permitted aids:**
Written Module Examination (“MP”) 90 minutes	Open book examination; non-programmable calculator

2.1.12 IE22 Mechanical Design & CAD

Module title:	**Revision date:**
Mechanical Design & CAD	24.02.2025
Module code no.:	**Related component modules**
IE22	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 2	Summer
Module convenor:	**Faculty/Department:**
Prof. Dr. Florian Besler	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	2 hrs/w
Lab, Exercises:	2 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	45 hrs
Lab, Exercises:	45 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

The course covers the fundamentals of mechanical design (MD) and computer aided design (CAD) such as, technical communication, technical drawing, machine elements, design calculation and applied exercises on the 3D CAD system SolidWorks

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Learning outcomes:

Ability of a technically communication in written, graphic and symbolic form.

Competence in the selection and calculation of machine elements and standard parts.

Ability to create standard-compliant technical drawings

Skills in using the 3D CAD system SolidWorks, to gain the ability to design volume models, create assemblies from them and derive drawings.

Module content:
Part A: Lecture
Written, graphic and symbolic communion methods
Creating projected views (three-panel views) from given models
Representation of components using technical freehand drawing
Standard-compliant technical representation of components and assemblies
Application of tolerances and fits in technical systems
Part B: CAD exercise
Design of parametric volume and surface models
Modification, variant creation and associativity
Derivation of 2D drawings from 3D models
Detailing associative drawings
Assembly design

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Moodle course with online exercises available.

Examination type – format and duration:	**Examination – permitted aids:**
Written Module Examination (“MP”) 90 minutes Prerequisites for admission: There is a mandatory submission of three certified tasks that must be completed and submitted during the semester.	All documents are permitted

2.1.13 IE23 Electrical Engineering II

Module title:	**Revision date:**
Electrical Engineering II	06.01.2026
Module code no.:	**Related component modules**
IE23	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 2	Summer
Module convenor:	**Faculty/Department:**
Prof. Dr. Christoph Schmülling	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	2 hrs/w
Lab, Exercises:	2 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	30 hrs
Lab, Exercises:	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	Electrical Engineering I

Short Description:

The course covers the theoretical background, analytical methods and practical skills to design and analyze AC circuits, three-phase system, switching and transient modes.

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

[1] hrs/w = contact hours per week during the semester

- Complex numbers and calculations
- Vector algebra and matrices
- Nodal and mesh analysis
- Differential and integral calculus

Learning outcomes:

- Analysis and design of AC circuits
- Application of AC currents in information and power transmission.

Module content:

- Alternating current and voltage description
- Resistors, capacitors and inductors in AC circuits
- Complex power and impedance matching
- Three-phase electrical systems
- Transient swtch on/off events
- RLC circuit and resonance
- Electronic filters: Low pass, high pass and bandpass

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Exercises are available on the Intranet.

Literature:

- Agrawal: Foundations of Analog and Digital Electronic Circuits
- Alexander, Sadiku: Fundamentals of Electric Circuits
- Bumiller et. al.: Electrical Engineering Textbook
- Albach: Elektrotechnik

Examination type – format and duration:	**Examination – permitted aids:**
The final mark depends 100 % on a written examination (90 minutes). (“MP”)	- Two hand or machine written DIN A4 sheets (both sides) - Non-programmable pocket calculator

2.1.14 IE24 Computer Science I

Module title:	**Revision date:**
Computer Science I	28.02.2025
Module code no.:	**Related component modules**
IE24	IE241 IE242

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 2	Summer
Module convenor:	**Faculty/Department:**
Prof. Dr. Matthias Kühnbach	Electrical Engineering /Mechanical Engineering/ Language Centre

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

IE241	Lectures:	2 hrs/w	3 CP
IE242	Lab, Exercises:	2 hrs/w	2 CP
IE 24	ECTS Credit Points		5 CP

Workload:

IE241 Lectures:	30 hrs
IE242 Lab, Exercises:	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

This course introduces fundamental concepts of computer science and programming using Python. Students will learn problem-solving and coding basics. The course also covers agile project management and basic data handling/data science and visualizations.

Part 2:
Prerequisites, learning outcomes, content

[1] hrs/w = contact hours per week during the semester

Prerequisite knowledge:

none

Learning outcomes:

- Understand fundamental concepts of computer science and computational thinking
- Write and execute simple Python programs using variables, control structures, functions, and data structures
- Systematically analyze algorithms and identify/resolve bugs
- Handle data efficiently, including basic data processing and science as well as visualization

Module content:

- Fundamentals of computer architecture, introduction to Computer Science & programming
- Coding basics – first steps in python: syntax, data types, simple operations
- Control flow and functions: loops and conditional statements
- Data structures, file handling & debugging
- Functions and modularization
- Algorithms and modeling
- Working with code editors
- Git and version control
- Introduction to agile project management
- Data science in Python: processing, data handling and visualization

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Additional learning materials are available on Moodle

Literature:

Examination type – format and duration:	**Examination – permitted aids:**
Written Module Examination (“MP”) 90 minutes No prerequisites for admission	handwritten notes, 1 DIN A4 page

2.1.15 IE25A German as a Foreign Language A2

Module title: **German as a Foreign Language A2**	**Revision date:** 18.12. 2025
Module code no.:	**Related component modules**
IE25A	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester: Foundation course/ semester 2	**Taught in semester:** Summer
Module convenor: Dr. Michael Märlein	**Faculty/Department:** Language Centre

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Seminars:	6 hrs/w
ECTS Credit Points	5 CP

Workload:

Seminar:	67,5 hrs
Independent learning:	82,5 hrs
Total workload:	150 hrs

Taught in:

German (English as required)

Compulsory subject / Compulsory elective: Compulsory subject	**Compulsory prerequisite modules** None

Short Description:

Seminars with exercises in class. Independent learning involves regular homework, preparing for and reviewing classes, and preparing for the examination.

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Completed Level A1 of German as a Foreign Language according to the Common European Framework of Reference for Languages

[1] hrs/w = contact hours per week during the semester

Learning outcomes:

After successfully completing this module, students will be able to:

- Understand sentences and common expressions about topics of personal relevance (e.g. family, shopping, work, surroundings) and the key information in short, clear and simple messages and announcements;
- Read short, simple texts and find information;
- Communicate in simple, routine situations about familiar, common things, and conduct short

Module content:

This module generally covers the following topics (including the required vocabulary and grammar):

- Holidays and celebrations
- Accommodation
- Sights
- Money and dealing with authorities
- Health
- Weather
- Travel and vacations
- Training and professions

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Posted in the Moodle Course Room for this module.

Literature:

Obligatory purchase(s):

- *DaF kompakt neu A2* (Kurs- und Übungsbuch mit Audios), ISBN 978-3-12-676314-1

or

- *DaF kompakt neu A2 – Digitale Ausgabe allango* [digital edition]

Examination type – format and duration:	**Examination – permitted aids:**
• Written examination with listening comprehension lasting 90 min. during the examination period at the end of the semester	No aids permitted

2.1.16 IE26 Project Work I

Module title:	**Revision date:**
Project Work I	01.04.2026
Module code no.:	**Related component modules**
IE26	IE 261 Project Management IE 262 Project I

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 2	Summer
Module convenor:	**Faculty/Department:**
Prof. Dr. rer. nat. Stefan-Alexander Schneider	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

IE261 Lectures:	2 hrs/w	3 CP
IE262 Project Work, Exercises:	1 hrs/w	2 CP
ECTS Credit Points		5 CP

Workload:

IE261 Lectures:	30 hrs
IE262 Project Work, Exercises	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

In a project-based learning environment (seminar-based teaching and lecture in sub-module IE261, individual and team-based project work with presentations in sub-module IE262), students acquire and apply fundamental methods and procedures of project management in an engineering context.

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

none

Learning outcomes:

IE261:

Students will acquire knowledge of the concept, evolution, meaning and content of classical and modern project management approaches. They will be able to select and apply project management tools in a reasoned and goal-oriented manner.

IE262:

Students will be able to reflect on the challenges of working on a project task in a heterogeneous team. They will acquire and deepen their knowledge of interaction, communication, motivation and moderation in teamwork, define their own role within a project team, handle incomplete information constructively, contribute new input to the group, and organise their own work independently.

Module content:

IE261:

• Fundamental principles of classical and modern project management (e.g. relevance, definitions and delimitations)
• Project organisation and governance (project objectives, roles, documentation, project-related communication)
• Project planning (scope, time, resources)
• Project management tasks (planning, monitoring, risk management)
• Project management stages (project life cycle: conception, planning, execution, control, follow-up and closure)
• Project teams and communication aspects

IE262:

• Transfer of fundamental project management concepts to a practical project setting
• Application and documentation of suitable project management methods
• Reflection on the project process, teamwork and project outcomes

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Material (slides, exercises, project guidelines and templates) are provided via the learning platform and complementary digital collaboration tools.

Literature:

Recommended Literature

- Patel, Nehal: *Practical Project Management for Engineers*. Artech House, 2019
- Kuster, Jürg et al.: *Project Management Handbook: Agile-Traditional-Hybrid*. Springer, 2023
- ISO 21502:2020 – *Project, programme and portfolio management – Guidance on project management*. International Organization for Standardization.
- Project Management Institute: *A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 7th Edition*. PMI, 2021.
- International Project Management Association: *IPMA Individual Competence Baseline (ICB4)*, 2015.

Optional / Recommended Reading

- DeMarco, Tom: Deadline: A Novel About Project Management
- Goldratt, E. M. & Cox, J.: *The Goal: A Process of Ongoing Improvement*

Examination type – format and duration:	**Examination – permitted aids:**
IE26: Combined examination: 60 % Project Management Handbook 40 % Presentation of Project Results	All project-related materials and tools.

2.2 Modules for the advanced course

2.2.1 IE31 Measurement Technology

Module title:	**Revision date:**
Measurement Technology	16.01.2025
Module code no.:	**Related component modules**
IE31	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 3	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr. Josef Griesbauer	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	2 hrs/w
Lab, Exercises:	2 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	30 hrs
Lab, Exercises:	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

The lecture teaches the basics for measuring electrical quantities and introduces the associated sensors and instrumentation

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

- Basic knowledge of electrical engineering and mechanics.
- Integral and differential ducalculus; calculation with complex numbers; binary numbers, statistics, Fourier analysis.

Learning outcomes:

The students…

- … learn the basic concepts of measurement technology and can apply them correctly.
- ... know basics about measurement uncertainties and can combine and quantify them.
- ... know the structure of measuring devices (oscilloscope, digital multimeter DMM) for measuring electrical quantities and learn how to use these devices during the lab. By using the manufacturer's specifications, they can assign measurement uncertainties to measured values.
- ... get to know basic electronic circuits for sensors and measurement signals.
- ... know sensor measuring principles and amplifiers for the measured variables temperature, magnetic field and for mechanical variables such as acceleration, strain, force and distance.
- ... can calculate the effects of amplitude and time discretization in digital measurement systems.
- ... get an overview on computer based data acquisition systems and can program such a system for a simple application example

Module content:

- Basic terms and concepts of electrical metrology.
- Measurement of electrical quantities U, I , R.
- Measurement devices und proper use of them.
- Determination of measuring uncertainties and calculation of error propagation in combined systems.
- Electronics circuits for measurement and amplification of signals.
- Selected sensors for: current, temperature, expansion, distance, acceleration.
- Digital metrology and computer based data acquisition

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Exercises are available on the Intranet.

Literature:

- Elmar Schrüfer, Leonhard M. Reindl und Bernhard Zagar: Elektrische Messtechnik, Hanser.
- Hoffmann, Jörg: Taschenbuch der Messtechnik, Hanser.
- Weichert, Norbert, Wülker Michael: Messtechnik und Messdatenerfassung, Oldenburg.
- Tränkler, Reindt: Sensortechnik, Springer.
- Lerch, Reinhard: Elektrische Messtechnik, Springer.
- Lerch Reinhard: Übungen zur elektrischen Messtechnik, Springer

Examination type – format and duration:	**Examination – permitted aids:**
Written Module Examination (“MP”) 90 minutes	Self-provided notes with 2 pages (on both sides) Non programmable pocket calculator

2.2.2 IE32 Mathematical Modeling and Simulation

Module title:	**Revision date:**
Mathematical Modeling and Simulation	28.02.2025
Module code no.:	**Related component modules**
IE32	IE 321 IE 322

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced course, semester 3	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr. Andreas Goehlich	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

IE321	Lectures:	3 hrs/w	4 CP
IE322	Lab, Exercises:	1 hrs/w	1 CP
IE 32	ECTS Credit Points		5 CP

Workload:

IE 321 Lectures:	45 hrs
IE 322 Lab, Exercises:	15 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

The course imparts basic knowledge of mathematical simulation and its application in engineering and technology. Based on realistic examples and exercises the ability to apply mathematical concepts to engineering problems will be expanded.
This sub-module IE 322 focusses on practical exercises with MatLab and MatLab Simulink

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

Applied mathematics I+II, Physic

Learning outcomes:

IE321
Comprehension of analytical and numerical concepts and algorithms, in particular solution of ordinary and partial differential equations.
Proper use of mathematical technics.
Recognition of mathematical context in engineering and technical problems.
IE322
Knowledge and handling of the MatLab and MatLab/Simulink programming language
Implementation of the theoretical concepts to application problems.

Module content:

IE321
1. Analytical solution methods for ordinary differential equations (ode) 1st and higher order. Analytical solution of code's with the MatLab Symbolic Tool Box.

2. Numerical solution of nonlinear equations, numerical derivative, integration and interpolation.

3. Numerical solution of ordinary differential equations (Euler-, Heun-, Runge Kutta-algorithm). Examples programmed in MatLab. Introduction into Simulink.

4. Analytical solution by Fouriers method and numerical treatment of partial differential equations (pde). Examples of heat conduction and wave equation.

IE322

In the practical course the basics of the programming language MatLab will be imparted and the theoretical concepts will be transferred to application problems.
Several practical problems e.g. in mechanical, electrical or thermal engineering are treated.

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Documentation and exercises are available on the intranet via Moodle course.

Literature:

Script of Lecture

Practical MATLAB Modeling with Simulink, Sulaymon L. Eshkabilov, APRESS, 2020

Applied Numerical Analysis with MATLAB®/Simulink® Synthesis Lectures on Engineering, Science, and Technology For Engineers and Scientists, F.Asadi,, Springer 2023

An Introduction to Partial Differential Equations, D. Arrigo, Springer 2023

Examination type – format and duration:	**Examination – permitted aids:**
IE321 Written Module Examination (“MP”) 90 minutes Prerequisites for admission to examination is the passed test basic mathematics. IE322 TN (certificate of participation) A MatLab code for the simulation of a practical problem has to be developed	Handwritten notices 3 DIN A4 pages , Collection of formulas book, non-programmable pocket calculator

2.2.3 IE33 Production Engineering

Module title:	**Revision date:**
Production Engineering	28.04.2026
Module code no.:	**Related component modules**
IE33	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 3	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr.-Ing. Thomas Garber	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	3 hrs/w
Lab, Exercises:	1 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	45 hrs
Lab, Exercises:	15 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

The course provides a basic understanding of how manufacturing processes work, their applications and limitations, and their economic aspects. Lectures are supplemented by practical exercises in the laboratory.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

None

Learning outcomes:

Students will be able to assess the areas of application, parameters and conditions of the individual production technologies. They will be able to calculate technological parameters such as cutting speed and process duration and analyse the economic efficiency of their use. Students acquire the competence to recognise complex tasks in the field of production technology and to plan them from a technological, quality-relevant and economic point of view.

Module content:

Cutting manufacturing processes – milling, drilling, turning, grinding
Primary forming processes – casting
Forming manufacturing processes – deep drawing, hot and cold forging
Joining processes – welding, glueing and soldering

Part 3:

Literature, permitted aids

Internet links, computer-based learning:

Scripts and exercises are available on the intranet.

Literature:

These books are recommended. However, their content goes far beyond the scope of the lecture.

Manufacturing Processes 1 – Cutting, F. Klocke, Springer 2011
Manufacturing Processes 2 – Grinding, Honing, Lapping, F. Klocke, Springer 2009
Manufacturing Processes 4 – Forming, F. Klocke, Springer 2013

Examination type – format and duration:	**Examination – permitted aids:**
Written Module Examination (“MP”) 90 minutes	handwritten formulary, 1 DIN A4 page

2.2.4 IE34 Computer Science II

Module title:	**Revision date:**
Computer Science II	28.02.2025
Module code no.:	**Related component modules**
IE34	IE341 IE342

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 3	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr. Manuel Giuliani	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

IE341	Lectures:	2 hrs/w	3 CP
IE342	Lab, Exercises:	2 hrs/w	2 CP
IE 34	ECTS Credit Points		5 CP

Workload:

IE341 Lectures:	30 hrs
IE342 Lab, Exercises:	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	IE 24 Computer Science I

Short Description:

Computer Science II builds upon foundational programming and computer science concepts to delve deeper into advanced topics essential for software development and system design. This course equips students with the knowledge and skills necessary to tackle complex problems using efficient algorithms, data structures, object-oriented programming, databases, networking, and parallel programming

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

Fundamental knowledge about simple data structures and programming as taught in IE 24 Computer Science I.

Learning outcomes:

- Understand and apply advanced data structures and algorithms.
- Understand and apply object-oriented principles in programming, including inheritance and polymorphism.
- Query databases and integrate them into applications.
- Understand the fundamentals of concurrency, network communication, and computer systems in real-world applications.

Module content:

Data structures
- Hash tables and hashing
- Trees: binary trees, AVL trees, B-trees
- Graphs: representation and traversal

Sorting and searching
- Efficient sorting algorithms (e.g. merge sort, quick sort)
- Graph algorithms (e.g. Dijkstra, depth-first and breadth-first search)
- Recursion and its application

Object-oriented programming
- Classes, objects, constructors
- Inheritance and polymorphism

Databases
- Introduction to relational databases (SQL basics)
- Database connection to programs

Concurrency and parallelism
- Threads and processes
- Synchronization and deadlocks
- Introduction to parallel programming

Basics of computer architecture
- Memory hierarchies (cache, RAM, hard drive)
- Processors and machine code
- Operating system basics

Networks and communication
- Basics of networks (OSI model, protocols)
- Introduction to Internet technologies (HTTP, TCP/IP)
- Security aspects: encryption and authentication

Part 3: **Literature, permitted aids**
Internet links, computer-based learning: Additional learning materials are available on Moodle
Literature: Russell, S. J., & Norvig, P. (2016). Artificial intelligence: a modern approach. Pearson.

Examination type – format and duration:	**Examination – permitted aids:**
Written Module Examination (“MP”) 90 minutes No prerequisites for admission	handwritten notes, 1 DIN A4 page

2.2.5 IE35A German as a Foreign Language B1.1

Module title:	**Revision date:**
German as a Foreign Language B1.1	21 February 2025
Module code no.:	**Related component modules**
IE35A	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 3	Winter
Module convenor:	**Faculty/Department:**
Dr Michael Märlein	Language Centre

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Seminars:	6 hrs/w
ECTS Credit Points	5 CP

Workload:

Seminar:	67,5 hrs
Independent learning:	82,5 hrs
Total workload:	150 hrs

Taught in:

German (English as required)

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	IE24A

Short Description:

Seminars with exercises in class. Independent learning involves regular homework, preparing for and reviewing classes, and preparing for the examination.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

Completed Level A2 of German as a Foreign Language according to the Common European Framework of Reference for Languages

Learning outcomes:

After successfully completing this module, students will be able to:

- Understand key information in simple broadcasts on familiar topics when spoken slowly and clearly;
- Understand short, simple texts about everyday topics and simple descriptions of events;
- Describe simple experiences and events and talk briefly about plans and opinions, providing reasons;
- Participate in brief conversations about familiar topics if the other person speaks slowly and clearly;
- Write short, simple, cohesive texts about familiar topics, and recount personal experiences and impressions using simple sentences;
- Use basic grammatical structures confidently.

Module content:

This module covers the following topics, amongst others (including the required vocabulary and grammar):

- Vacations and travel
- Technology
- Shopping and consumption
- Important milestones in life
- Work environment
- Applications and interviews
- Telephone calls
- Environment and environmental protection
- Weather
- Visions for the future

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Posted in the Moodle classroom for this course.

Literature:

Obligatory purchase(s):

- *Netzwerk neu B1.1. Hybrid edition allango.*
  ISBN 978-3-12-607290-8 or digital edition

OR for B1.1 and B1.2

- *Netzwerk neu B1. Hybrid edition allango.*
  ISBN 978-3-12-607288-5 or digital edition

Examination type – format and duration:	**Examination – permitted aids:**
(“MP”) • Written examination with listening comprehension lasting 90 min. during the examination period at the end of the semester	No aids permitted

2.2.6 IE36 Project Work II

Module title:	**Revision date:**
Project Work II	02.04.2025
Module code no.:	**Related component modules**
IE36	IE 361 Quality Management IE 362 Project II

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced course, semester 3	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr. Thomas Nägele, Prof. Dr. Josef Griesbauer, Prof. Dr. Frank Niemeier	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

IE361 Lectures:	2 hrs/w	2 CP
IE362 Project Work, Exercises:	1 hrs/w	3 CP
ECTS Credit Points	5 CP	

Workload:

I361 Lectures:	30 hrs
I362 Lab, Exercises:	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

In this module fundamental knowledge is imparted about the most important strategies and methods regarding a preventive quality management. Selective methods are specifically applied in tutorials as well as in the project.
As part of the project, the students will independently work on a project task in the area of quality assurance in production using machine vision methods.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

Applied mathematics I and II, computer science 1

Learning outcomes:

IE361 Quality Management:
General learning outcomes:
- Being able to explain functions and correlations of a comprehensive quality management
- Being able to apply selective methods and tools in the product development process phases
- Being able to apply selected QM-methods and -tools effectively and efficiently during the project

IE362 Project:
The students are able to transfer the competencies they gained in the modules of the current semester to the project tasks.
The students are able to select, adapt and integrate the different gained skills and competencies to achieve overall solutions.
The students are able to define a measuring system consisting of a camera and suitable lighting for a typical machine vision measuring task.
They can process images and program algorithms that solve given measuring tasks.
They will be able to understand and use basic methods of image processing and machine vision.

Module content:

IE 361Quality Management:

Basics of quality management (QM)

- Problem-solving methods and elementary tools of QM (8D, 7 Tools)
- Methods and statistical procedures of QM (QFD, FMEA, FTA, DoE, PFA, SPC, Poka Yoke)
- Basics on QM-systems

IE 362 Project II:

- Overview of the necessary image processing components
- Selecting the right imaging components for 2D measuring tasks
- Solving the task with image processing algorithms in python and/or open CV

Part 3: **Literature, permitted aids**	
Internet links, computer-based learning: The course material is supplied online via the learning platform	
Literature:	
Examination type – format and duration: Portfolio exam: The project is evaluated based on the solution quality of different tasks. The different project tasks as well as the evaluation criteria are defined in a separate project description.	**Examination – permitted aids:** None

2.2.7 IE41 Feedback Control Systems

Module title:	**Revision date:**
Feedback Control Systems	03.03.2025
Module code no.:	**Related component modules**
IE41	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced course, semester 4	Summer
Module convenor:	**Faculty/Department:**
Prof. Dr.-Ing. Matthias Lorenzen	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	2 hrs/w
Lab, Exercises:	2 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	30 hrs
Lab, Exercises:	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

The course teaches the basics to understand and design linear time-invariant (LTI) feedback control systems. Matlab and Simulink are used for numerical simulation and analysis.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

- Applied Mathematics for Engineers I & II, in particular basics of linear algebra.
- Basic understanding of measurement technology and mathematical modelling and simulation

Learning outcomes:

After successfully completing the module, students

- have a basic understanding of the behaviour of LTI systems and the effect of feedback.
- are able to analyse LTI systems in time and frequency domain.
- have the capability to solve control problems with scientific approaches and methods.
- are aware of and can apply different methods for designing continuous-time controllers for LTI systems.
- can design discrete-time controllers and implement digital controllers.

Module content:

- Fundamental terminology of feedback control systems
- Description and solutions of LTI systems in time and frequency domain (transfer function, Nyquist plot, Bode plot, state-space representation)
- Stability analysis in time and frequency domain
- Controller synthesis (PID controller, loop-shaping design, root locus method, LQR, LQG, pole placement)
- Control loop design and 2-DOF-controller
- Analysis of discrete-time systems and basics of digital control loops

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Course material will be made available in the intranet.

Literature:

K. J. Åström and R. M. Murray, *Feedback Systems: An Introduction to Scientists and Engineers*, Princeton University Press, 2021.

J. Lunze, *Regelungstechnik 1*, 12. Auflage, Springer Verlag, 2020.

J. Lunze, *Regelungstechnik 2*, 10. Auflage, Springer Verlag, 2020

Examination type – format and duration:	**Examination – permitted aids:**
Written Module Examination (“MP”) 90 minutes	DIN A4 pages

2.2.8 IE42 Energy and Drive Technology

Module title:	**Revision date:**
Energy and Drive Technology	28.02.2025
Module code no.:	**Related component modules**
IE42	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced course, semester 4	Summer
Module convenor:	**Faculty/Department:**
Prof. Dr.-Ing. Matthias Schmidt	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures, Lab, Exercise: 4 hrs/w
ECTS Credit Points 5 CP

Workload:

Lectures, Lab, Exercises:	60 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

The course covers the theoretical background and analytical methods to understand electric drives in different use cases and energy distribution via power grids.

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

- IE13 Electrical Engineering I
- IE23 Electrical Engineering II
- IE11 Math 1 IE21 Math 2
- IE21 Math 2

Learning outcomes:

After successfully completing the module, students will be able to …

… describe the behavior of elementary semiconductor components

… describe the function of the three-phase network and electric machines and investigate typical questions relating to this

… understand the function of frequency converters and pulse width modulation

… understand the design and requirements on vehicle drives

Module content:
Semiconductor components: Behavior of semiconductors, elementary semiconductor components and their application. Brief overview of analog circuit technology based on operational amplifiers.

Power converters/frequency converters: theory and basics of power converters, typical applications of power converters

Electrical drives: Generation of rotating fields, functional principle of synchronous and induction machines including the associated equivalent circuit diagrams and machine characteristics. Application of electrical machines as drives and generators

Energy distribution via electrical grids: basics of electrical energy transmission, introduction to high-voltage technology, European interconnected grid, requirements for electrical grids with regard to the energy transmission and stability (FCR, aFRR, mFFR). Energy storage (e.g. batteries) and generation (e.g. Photovoltaic).

Vehicle drives: Driving resistances: rolling resistance, air resistance, grade resistance, acceleration resistance.
Comparison of the characteristic maps of combustion engines, electric motors and fuel cells. Structure of conventional, electric and hybrid drive trains. Types of transmissions and structure. Efficiency of drives and transmissions. Energy storage. Tank to wheel and well to wheel analysis.

Automation of energy systems: basics of digital technology, data buses

Part 3: **Literature, permitted aids**	
Internet links, computer-based learning: Will be announced later	
Literature: Will be announced later	
Examination type – format and duration: Written Module Examination (“MP”) 90 minutes	**Examination – permitted aids:** formulary non-programmable pocket calculator

2.2.9 IE43 Design Methodology

Module title:	**Revision date:**
Design methodology	13.04.2025
Module code no.:	**Related component modules**
IE43	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced course, semester 4	Summer
Module convenor:	**Faculty/Department:**
Dr. Florian Besler	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	2 hrs/w
Lab, Exercises:	2 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	60 hrs
Lab, Exercises:	60 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	.

Short Description:

This module provides students with a systematic introduction to design methodology within the context of engineering. It covers structured approaches to the design process, from the identification of customer needs through to the realization of technical solutions. Emphasis is placed on creativity, problem-solving and evaluation of concepts, preparing students to tackle complex engineering challenges with a strategic mindset.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisite knowledge:

Following lectures: Design 1+2, technical communication

Learning outcomes:

Upon successful completion of this module, students will be able to:

1. Understand and apply fundamental principles of engineering design methodology.
2. Analyze and define design problems using structured methods.
3. Generate, evaluate, and select design solutions based on technical and economic criteria.
4. Apply tools such as requirement analysis, morphological charts and decision matrices.
5. Collaborate effectively in interdisciplinary design teams.

Module content:

- Introduction to design thinking and engineering design processes
- Stages of the design process: problem definition, conceptual design, embodiment design, detail design
- Creativity techniques and idea generation
- Requirements engineering and stakeholder analysis
- Functional analysis and system decomposition
- Concept evaluation and decision-making methods
- Case studies and group-based design projects

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Posted in the Moodle classroom for this course.

Literature:

Examination type – format and duration:	**Examination – permitted aids:**
Written Module Examination (“MP”) 90 minutes	None

2.2.10 IE44 Intercultural Management

Module title:	**Revision date:**
Intercultural Management	21.03.2025
Module code no.:	**Related component modules**
IE44	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced course, semester 4	Summer
Module convenor:	**Faculty/Department:**
Prof. Dr.-Ing. Gerald Winz	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	3 hrs/w
Lab, Exercises:	1 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	45 hrs
Lab, Exercises:	15 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	IE16

Short Description:

The module focuses on the cultural characteristics of the central management functions leading, planning, organisation and control. The knowledge and skills learned are applied in the development of solution scenarios in critical incidents of real complex case studies.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

Module IE16 Intercultural Competence (Basic Studies, 1st Semester)

Learning outcomes:

Students are familiar with the organisational structures of international companies. They are familiar with the concept of cultural standards and can compare the cultural standards of selected foreign cultures. They are aware of the differences between foreign and domestic culture. They are familiar with culture-specific management styles. Students are able to recognise and bridge gaps in intercultural technical management (e.g. project management or quality management). They know how to analyse business related critical intercultural interaction situations and are able to develop solution scenarios. This enables students to expand their professional competence in the globalised world. The module thus makes a significant contribution in fostering social responsibility.

Module content:

- Organisation of multinational companies and global supply chains
- Concept of cultural standards and impact on business
- Cultural characteristics of management functions: leading, planning, organisation, control
- Systematic of House of Intercultural (Quality) Management;
- Critical Incident Method
- Analysing and solving complex case studies with critical incidents of multinational technical companies

Part 3:

Literature, permitted aids

Internet links, computer-based learning:

Literature:

Meyer E. (2015): The Culture Map, PublicAffairs, New York

Moussa M. et.al. (2022): Cross-Cultural Performance Management. Palgrave Macmillan by Springer Nature Switzerland AG, Cham

Thomas, A. (2005): Grundlagen der interkulturellen Psychologie. Verlag Traugott Bautz, Nordhausen

Winz, G. (2023): Interkulturelles Qualitätsmanagement S. 231-287; in: Einführung in das Qualitätsmanagement. Hanser Verlag, München

Examination type – format and duration:	**Examination – permitted aids:**
(PSA) The overall grade is based on 40% of a presentation and 60% final report	None

2.2.11 IE45A German as a Foreign Language B1.2

Module title:	**Revision date:**
German as a Foreign Language B1.2	21 February 2025
Module code no.:	**Related component modules**
IE45A	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 4	Summer
Module convenor:	**Faculty/Department:**
Dr. Michael Märlein	Language Centre

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Seminars:	6 hrs/w
ECTS Credit Points	5 CP

Workload:

Seminar:	67,5 hrs
Independent learning:	82,5 hrs
Total workload:	150 hrs

Taught in:

German (English as required)

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	IE35A

Short Description:

Seminars with exercises in class. Independent learning involves regular homework, preparing for and reviewing classes, and preparing for the examination.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

Completed Level B1.1 of German as a Foreign Language according to the Common European Framework of Reference for Languages

Learning outcomes:

After successfully completing this module, students will be able to:

- Extract key information from broadcasts about current affairs or topics related to work and interests, when spoken relatively slowly and clearly;
- Understand texts primarily about everyday or work-related topics / descriptions of events, feelings and wishes;
- Describe experiences and events, explain hopes and aims, and briefly explain opinions and plans, providing reasons;
- Participate in discussions about familiar topics without major preparation;
- Compose simple, cohesive texts about familiar topics, and talk in some detail about personal experiences studying, at work or in training;
- Understand the main points in conversations about familiar things (e.g. work, school/occupation, leisure) and current affairs using standard language;
- Understand texts containing common everyday and business language and private letters;
- Handle most situations encountered in areas where this language is spoken, enter unprepared into conversations, and express their own opinion/feelings/wishes, argue a case, and relate the plot of a

Module content:

This module generally covers the following topics (including the required vocabulary and grammar):

- Relationships and communication
- Family
- Health
- Culture and art
- Living in social communities
- Urban life
- Banks and money
- The European Union

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Posted in the Moodle classroom for this course.

Literature:

Obligatory purchase(s):

- *Netzwerk neu B1.2. Hybrid edition allango.*
  ISBN 978-3-12-607291-5 or digital edition

OR for B1.1 and B1.2

- *Netzwerk neu B1. Hybrid edition allango.*
  ISBN 978-3-12-607288-5 or digital edition

Examination type – format and duration:	**Examination – permitted aids:**
(“MP”) • Written examination with listening comprehension lasting 90 min. during the examination period at the end of the semester	No aids permitted

2.2.12 IE46 Project Work III

Module title:	**Revision date:**
Project Work III	31.03.2025
Module code no.:	**Related component modules**
IE46	IE 461 IE 462

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced course, semester 4	Summer
Module convenor:	**Faculty/Department:**
Prof. Dr. Andreas Goehlich	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

IE461 Lectures:	2 hrs/w	2 CP
IE462 Project Work, Exercises:	1 hrs/w	3 CP
ECTS Credit Points		5 CP

Workload:

Lectures:	30 hrs
Lab, Exercises:	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

In a project atmosphere accompanied by seminar-based teaching, lectures and coaching students will learn about the fundamental concepts of mechatronic systems. Organized in project teams the students develop mechatronic components and integrate these into system.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

Basic electrical and mechanical methods, basic physical principles from the previous semesters 1-3.

Learning outcomes:

IE461
Comprehension of fundamental principles of mechatronic systems.
Recognition of mechatronic concepts in context of general technical problems.
IE461
Gain of practical experience with development and handling of mechatronic systems.
Experience with collaboration in a team atmosphere

Module content:
IE 461:
1. Introduction into engineering of mechatronic systems

2. Specification and fundamentals of the specific mechatronic system that has to be developed and realized

IE 462:
1. Development and realization of the mechatronic system components by the student teams.

2. System integration

3. Testing and validation

Part 3:

Literature, permitted aids

Internet links, computer-based learning:

Documentation and supporting information is available via moodle course

Literature:

The relevant literature will be adapted to the specific mechatronic system.

Examination type – format and duration:	**Examination – permitted aids:**
Combined examination: 70% Written project reports 30% Presentation of project results	None

2.2.13 IE61 Systems Engineering

Module title:	**Revision date:**
Systems Engineering	23.03.2025
Module code no.:	**Related component modules**
IE61	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced course, semester 6	Summer
Module convenor:	**Faculty/Department:**
Prof. Dr.-Ing. Georg Happich	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	2 hrs/w
Lab, Exercises:	2 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	30 hrs
Lab, Exercises:	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English /German (English as required)

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

This module provides an introduction to the principles and methodologies of Systems Engineering. It covers fundamental concepts, formalization tools, and the role of Systems Engineering in the development process. The focus lies on structured problem-solving methodologies rather than specific application domains.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

Fundamentals of the International Engineering Program; basics in science and engineering methodologies. Experiences of internship helpful, not mandatory.

Learning outcomes:

After successfully completing this module, students will be able to:

- Understand and apply the fundamental principles of Systems Engineering.
- Utilize engineering tools and methods systematically to solve complex technical problems.
- Analyze requirements and structure development processes within the V-model framework.
- Apply formalization techniques such as UML and SysML to describe systems.
- Develop structured solutions in a methodical and reproducible manner.
- Gain insights into various application fields of Systems Engineering.

Module content:

This module provides a comprehensive introduction to Systems Engineering as a structured approach to designing, developing, and verifying complex technical systems. The module is based of 3 structural pillars:

1. **Fundamentals of Systems Engineering:**
    - Introduction to Systems Engineering concepts and methodologies
    - The flavors of Systems Engineering and their relevance in different industries
    - Overview of formalization tools such as UML, SysML, and other modeling techniques
    - The role of Systems Engineering in interdisciplinary projects
2. **Systems Engineering in the Development Process:**
    - The V-model as a structured development approach
    - Requirements analysis and specification techniques
    - System architecture and functional decomposition
    - Methods for system validation and verification
    - Test design strategies and quality assurance (Application Life Cycle Management)
3. **Mechatronic Practice:**
    - Application of Systems Engineering methodologies to a mechatronic system
    - Hands-on lessons with SysML for system modeling and documentation
    - Development of structured workflows from requirements to system verification
    - Consideration of interdisciplinary aspects and system integration challenges

The focus of the module is on methodology rather than on specific technical applications. Students will learn to apply structured problem-solving techniques that are transferable across different engineering disciplines. By the end of the module, students will be equipped with essential skills to approach complex engineering challenges in a systematic and efficient manner.

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Posted in the Moodle classroom for this course.

Literature:

Tim Weilkiens,: *Systems Engineering with SysML/UML*, Morgan Kaufman publishing, 2007

Oliver Alt: Modellbasierte Systementwicklung mit SysML, Hanser Fachbuch Verlag, 2012

Mahd, Seivers, Augustine et. al.: Handbook of Systems Engineering, Springer International, 2023

Examination type – format and duration:	**Examination – permitted aids:**
Written Module Examination (“MP”) 90 minutes	None

2.2.14 IE62 Data Science

Module title:	**Revision date:**
Data Science	10.02.2025
Module code no.:	**Related component modules**
IE62	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced course, semester 6	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr. Matthias Kühnbach, Prof. Dr. Matthias Kuba	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	3 hrs/w
Lab, Exercises:	1 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	45 hrs
Lab, Exercises:	15 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	Applied Mathematics for Engineers I and II, Computer Science I and II

Short Description:

This course conveys the theoretical background and practical techniques for extracting insights from data using classical methods and machine learning.

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Sound knowledge of mathematics as well as at least one programming language.

Learning outcomes:

- Ability to process, interpret, and visualize information from data sets
- Knowledge of the most common machine learning algorithms (classification- and regression-analysis)
- Ability to program, train and test machine learning algorithms
- Knowledge of various types of errors and success metrics

Module content:

- Basics of descriptive statistics
- The programming language Python
- Data visualization
- Supervised machine learning algorithms
- Unsupervised learning
- Error types and success metrics
- Data pre- and post-processing

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

The course material is available on the Intranet (Moodle). Registration for the course is mandatory.

Literature:

A. Géron, „Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, 2nd Edition“,O'Reilley, 2019.

Examination type – format and duration:	**Examination – permitted aids:**
Written Module Examination (“MP”) 90 minutes	• open book examination, all non-electronical aids are allowed • non-programmable calculator

2.2.15 IE64 Project IV: International Project

Module title: **Project IV: International Project**	**Revision date:** 12.02.2025
Module code no.:	**Related component modules**
IE64	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced course, semester 6	Summer
Module convenor:	**Faculty/Department:**
Prof. Dr.-Ing. Matthias Bittner Prof. Dr. Michael Schorer	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Project work:	4 hrs/w
ECTS Credit Points	5 CP

Workload:

Project seminars and coaching	15 hrs
Project work:	135 hrs
Total Effort Hours:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

The students learn to apply previously acquired knowledge in a practical setting. Student teams use their engineering problem solving skills and intercultural competencies to work on challenges in an international context.

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Project management and self-organization skills from previous project works
Engineering skills from semesters 1–4
International and intercultural competencies from international modules

Learning outcomes:

The students:

- have the ability to apply engineering methods to analyse and solve problems and to implement theoretical knowledge and skills in practical applications
- have the ability to think analytically and critically to solve technical, organizational and business challenges in real world scenarios.
- have the ability to work and communicate appropriately and effectively in international teams, interdisciplinary projects and intercultural situations.
- are able to organize and motivate themselves and can organize their working hours efficiently by applying project management skills.

Module content:

Each project team works on an individual topic from the field of engineering in an international context. The topics must contain an engineering challenge that is adequate for the level of studies and has to have an international and/or intercultural aspect.
The teams have the possibility to propose a topic. The final acceptance of topics is up to the module coordinator.

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

All organizational information is provided in the eLearning platform.

Literature:

Literature depends on each individual project

Examination type – format and duration:	**Examination – permitted aids:**
Combined examination: 70% Written project reports 30% Presentation of project results	No restrictions

2.3 Modules for Track B

Students placed on Track B must complete elective modules totalling 15 CPs, to be selected from the catalogue of General Elective modules ("AW" in German). The range of modules and the procedures for signing up and the allocation of places are described in the "Module Handbook for General Elective Studies and Languages", which is provided and updated by the Centre for General Elective Studies and Languages.
https://www.hs-kempten.de/en/centre-for-general-elective-studies-and-languages/general-elective-studies/general-elective-modules
Students are recommended to take modules totalling 5 Credit Points in each of the semesters 2, 3 and 4 in order to ensure optimal progression with studies.

General Elective modules can also be taken as voluntary additional achievements (credited to the "Voluntary additional achievements" elective account). These additional achievements have no influence on the final grade, but are listed in the official academic record for the bachelor's degree.

2.4 List of subject-specific compulsory elective modules

Subject-specific compulsory elective modules totalling 30 Credit Points must be taken in semesters 6 and 7. The study schedule envisages students completing three of these modules – each worth 5 Credit Points – in semester 6 and a further batch of three – again, each worth 5 Credit Points – in semester 7.

Major modules are integrated into the list of subject-specific compulsory elective modules. Students must earn a total of 15 Credit Points from their major modules,
which will then be named as the major on the student's certificate.

The following **majors** are offered, including the corresponding modules:
– Electrical Engineering and Information Technology
- IE63EE1 Information and Communications Technology (5 Credit Points)
- IE63EE2 Signal Processing (5 Credit Points)
- IE63EE3 Electronic Devices and Circuits (5 Credit Points)

– Mechanical Engineering
- IE63ME1 Finite Element Analysis in Structural Mechanics (5 Credit Points)
- IE63ME2 Engineering Mechanics II (5 Credit Points)
- IE63ME3 Fundamentals in Energy Engineering (5 Credit Points)

– International Studies
- The modules for the major in International Studies must be completed at foreign partner universities.

The catalogue of subject-specific compulsory elective modules that can be taken might change from semester to semester. The range of courses that applies and can be taken can be found in MeinCampus during the period for signing up.

2.4.1 IE63EE1 Information and Communications Technology

Module title:	**Revision date:**
Information and Communications Technology	10.02.2025
Module code no.:	**Related component modules**
IE63EE1	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced course, semester 7	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr. Matthias Kuba	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	3 hrs/w
Lab, Exercises:	1 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	45 hrs
Lab, Exercises:	15 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory Elective	Applied Mathematics for Engineers I and II, Electrical Engineering I and II

Short Description:

The course covers the theoretical background and the analytical and practical methods to understand information and communications systems.

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Fundamentals of electrical engineering

Learning outcomes:

- Understand and apply the fundamental concepts and principles of information and communications technology.
- Analyze and evaluate digital and analog communication systems.
- Utilize signal processing techniques in technical applications.
- Explain network protocols and architectures and describe their role in modern communication systems.

Module content:

- Communication signals
- Basics of information theory
- Transmission media
- Baseband processing
- Passband processing
- Components and systems of communication technology
- Selected topics of communication technology

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

The course material is available on the Intranet (Moodle). Registration for the course is mandatory.

Literature:

A. Goldsmith, “Wireless Communication”, Cambridge India, 2010

S. Haykin and M. Moher, “Communication Systems”, Wiley, 2009

T. S. Rappaport, “Wireless Communications: Principles and Practice”, Cambridge University Pr., 2024.

Examination type – format and duration:	**Examination – permitted aids:**
Written Module Examination (“MP”) 90 minutes	• open book examination, all non-electronical aids are allowed • non-programmable calculator

2.4.2 IE63EE2 Signal Processing

Module title:	**Revision date:**
Signal Processing	14.02.2025
Module code no.:	**Related component modules**
IE63EE2	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced course, semester 6	Summer
Module convenor:	**Faculty/Department:**
Prof. Dr. Tim Poguntke	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	2 hrs/w
Lab, Exercises:	2 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	30 hrs
Lab, Exercises:	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory Elective	None

Short Description:

The module provides an introduction to continuous-time and discrete-time signals and linear time-invariant (LTI) systems. Topics include signals and systems descriptions in time and frequency domain as well as its applications in analog and digital filters. Further, practical applications of LTI systems are discussed with regard to wireless communication systems and signal processing for perception sensors (e.g. radar, lidar, and ultrasonic) for Time-of-Flight (ToF) measurements.

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

- Complex numbers and functions
- Concepts of integration and differentiation
- Fundamentals in electrical engineering
- Laplace and Z-transform

Learning outcomes:

After successful completion of this course, students are able to

- calculate signal and LTI system representations in time and frequency domain
- describe and calculate the relationships between input and output signals of LTI systems
- calculate discrete-time signal and LTI system representations in time and frequency domain
- explain and illustrate the working principles of perception sensors for ToF measurements
- describe and illustrate the properties of wireless channels in communication systems

Module content:

- Signals and Linear Time-Invariant (LTI) systems
- Fourier Transform
- Impulse response and transfer functions
- Ideal sampler and discrete-time signals
- Z-transform and Discrete Fourier Transform (DFT)
- Discrete-time signals and LTI systems
- System Identification applications
- Wireless transmission channel
- Applications from communication and perception sensor systems

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Accompanying and additional learning material is accessible via the university network.

Literature:

Recommended literature will be announced at the beginning of the lecture.

Examination type – format and duration:	**Examination – permitted aids:**
The final mark depends 100% on a written examination (90 minutes). (“MP”)	Two DIN A4 pages, handwritten on both sides, and a non-programmable pocket calculator.

2.4.3 IE63EE3 Electronic Devices and Circuits

Module title:	**Revision date:**
Electronic Devices and Circuits	28.02.2025
Module code no.:	**Related component modules**
IE63EE3	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced course, semester 6	Summer
Module convenor:	**Faculty/Department:**
Prof. Dr. Thomas Zeh	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	3 hrs/w
Lab, Exercises:	1 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	45 hrs
Lab, Exercises:	15 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory Elective	Applied Mathematics for Engineers I and II, Electrical Engineering I and II

Short Description:

The course covers the theoretical background, analytical methods and practical skills to select electronic devices and to apply them in circuits

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Fundamentals of electrical engineering

Learning outcomes:

The students …

- gain knowledge about function and typical applications of electronic devices.
- can employ large- and small-signal models of semiconductor devices.
- gain knowledge about function and typical applications of fundamental circuits and they can dimension them.
- understand the working principle of SPICE-based circuit simulators and can perform transient and frequency domain analyses of circuits. They understand the challenges and limitations of circuit simulation.
- can excerpt relevant information from devices data sheets for a circuit design.

Module content:

- Application of passive devices (R, L, C) in circuits
- Circuit Simulation
- Fundamental semiconductor devices and their applications: diodes, bipolar and field effect transistors, thyristors
- Transistors in switching applications
- Fundamental digital circuits
- Single stage transistor amplifier circuits
- Operational amplifiers and their applications
- Passive and active filters
- Stability, noise and distortions in circuits
- Understanding data sheets of devices and circuit diagrams
- Analog to digital and digital to analog conversion
- Power supply circuits

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

The course material is available on the Intranet (Moodle). Registration for the course is mandatory.

Literature:

A. S. Sedra, K. C. Smith: Microelectronic Circuits, Oxford University Press

Examination type – format and duration:	**Examination – permitted aids:**
Written Module Examination (“MP”) 90 minutes	• open book examination, all non-electronical aids are allowed • non-programmable calculator

2.4.4 IE63ME1 Finite Element Analysis in Structural Mechanics

Module title:	**Revision date:**
Finite Element Analysis in Structural Mechanics	28.02.2025
Module code no.:	**Related component modules**
IE63ME1	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced course, semester 7	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr.- Ing. Stephan Löhr	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	2 hrs/w
Lab, Exercises:	2 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	30 hrs
Lab, Exercises:	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory Elective	Mechanics

Short Description:

In this course, techniques and methods are taught to perform Finite Element Analysis (FEA) in Structural Mechanics during the development process. This is particularly useful for designing components for specific loads and deformations.

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Mechanics: loads, boundary conditions, stress, strain

Learning outcomes:

Ability to perform a Finite Element Analysis during a design process using Ansys Workbench.
Competence to assess FEA regarding statement quality and result accuracy.

Module content:

- Theoretical foundations: Mathematics and mechanics for simple rod models and the planar continuum.
- Introduction to the FEA software ANSYS Workbench: Use of CAD geometry, meshing, application of boundary conditions, equation solvers, result presentation.
- Modeling guidelines: Use of symmetry properties, appropriate selection of boundary conditions.
- Meshing: Options for influencing the FEA mesh. Assessment of mesh accuracy. Minimization of elements and nodes.
- Calculation results: Selection of suitable evaluation methods, stresses, deformations, strains.
- Surface and volume models: Criteria for the use of surface models. Examples.
- Assemblies: Calculation of assemblies. Consideration and selection of appropriate contact conditions.
- Threads: Calculation of threads.
- Lifetime calculation: Assessment of components regarding lifetime.
- Evaluation of FEA calculation results. Types of calculations: Linear elastic structural mechanics.
- Multi-Body Simulation

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Course material is available on the Intranet (Moodle). Registration for the course is necessary.

Literature:

Examination type – format and duration:	**Examination – permitted aids:**
PSA = graded research paper, during the course	None

2.4.5 IE63ME2 Engineering Mechanics II

Module title:	**Revision date:**
Engineering Mechanics II	12.03.2025
Module code no.:	**Related component modules**
IE63ME2	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Specialisation course, semester 6	Summer
Module convenor:	**Faculty/Department:**
Prof. Dr.-Ing. Hubert Mayr	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	2 hrs/w
Lab, Exercises:	2 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	30 hrs
Lab, Exercises:	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

The course provides advanced knowledge about the principles and methods of statics for elastic bodies and will enable students to design and to dimension components in mechanical engineering.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

Engineering Mechanics IE14, Materials Engineering IE15

Learning outcomes:

Students understand and apply the advanced methods of statics for elastic bodies. They acquire these skills for an optimized design and dimensioning in mechanical engineering:

- Analysing and evaluating uniaxial and plane stress and deformation states
- Determination of internal forces in plane and spatial structural systems, calculating stress distributions and evaluating them with the aid of strength hypotheses
- Dimensioning stressed cross-sections and select appropriate materials
- Investigation of stability problems such as buckling of compression rods, performance of buckling safety analyses and dimensioning of compression rods against buckling

Module content:

The module includes the following topics:

1. Strength of materials
   - Uniaxial stress and deformation states from mechanical and thermal loads; stress-strain-relation
   - Plane stress and deformation states, transformation relationships, principal stresses/strains, Mohr's circle of stresses and strains
   - Area moments of inertia, types of loading: tension/compression, uniaxial and biaxial bending, shear force, torsion, combined loading and resulting stresses and deformations, strength hypotheses / comparative stresses, strength verification, dimensioning, material selection
2. Stability problems
   - Stability cases, buckling cases, buckling stress, buckling safety

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Course material is available on the Intranet (Moodle). Registration for the course is necessary.

Literature:

1. Russell C. Hibbeler, "Engineering Mechanics: Statics, SI Units", Pearson, 15th Edition (2022), Print-ISBN: 978-1-292-44404-8 E-ISBN: 978-1-292-44393-5.

2. Russell C. Hibbeler, "Mechanics of Materials, SI Units", Pearson, 11th edition (2023), Print-ISBN: 978-1-292-72573-4; E-ISBN: 978-1-292-45744-4

Examination type – format and duration:	**Examination – permitted aids:**
100% of the mark results from a written examination (90 minutes).	Any documents; Non programmable calculator.

2.4.6 IE63ME3 Fundamentals in Energy Engineering

Module title:	**Revision date:**
Fundamentals in Energy Engineering	21.03.2025
Module code no.:	**Related component modules**
IE63ME3	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 7	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr. Bernhard Müller, Prof. Dr. Matthias Finkenrath	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	2 hrs/w
Lab, Exercises:	2 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	30 hrs
Lab, Exercises:	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory elective	None

Short Description:

The course covers the fundamentals of technical thermodynamics, fluid mechanics and heat and mass transfer. It covers also applications in energy engineering. Established analytical calculation methods will be applied, and an introduction to modern simulation methods will be given.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

- Mathematical knowledge (level: bachelor course)
- Physical knowledge (level: bachelor course)

Learning outcomes:

- Demonstrate comprehensive understanding of core thermodynamic principles and their application to energy conversion systems
- Apply fluid mechanics concepts to analyze flow phenomena in energy engineering applications
- Evaluate heat and mass transfer processes in various thermal systems
- Design and analyze energy systems using fundamental engineering principles
- Develop problem-solving skills for complex energy engineering challenges using analytical methods
- Employ modern simulation techniques to model and optimize energy systems
- Critically assess the performance and efficiency of energy conversion technologies in mechanical engineering applications

Module content:

- Thermodynamic principles and laws applied to energy conversion systems
- Properties of working fluids and thermodynamic cycles
- Fluid mechanics fundamentals relevant to energy transport and conversion
- Heat transfer mechanisms: conduction, convection, and radiation
- Energy conversion technologies in mechanical engineering applications
- Thermal systems design and optimization
- Computational methods for energy system simulation
- Case studies in mechanical energy engineering applications

Part 3:

Literature, permitted aids

Internet links, computer-based learning:

Exercises are available on Moodle.

Literature:

- Y. A. Çengel, M. A. Boles: Thermodynamics – An Engineering Approach, McGraw-Hill
- F.P. Incropera, D.P. DeWitt: Fundamentals of Heat and Mass Transfer, Wiley
- Cengel, Ghajar: Heat and Mass Transfer: Fundamentals and Applications, McGraw-Hill
- Y. Cengel, J. Cimbala: Fluid Mechanics: Fundamentals and Applications, McGraw-Hill
- Course material is available on Moodle.

Examination type – format and duration:	**Examination – permitted aids:**
The final mark depends 100% on a written examination (90 minutes).	- Commented formulary (of this course) - Non-programmable pocket calculator

2.4.7 IE631 Technologies for Sustainable Energy Systems

Module title:	**Revision date:**
Technologies for Sustainable Energy Systems	10.02.2025
Module code no.:	**Related component modules**
IE631	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced course, semester 6	Summer
Module convenor:	**Faculty/Department:**
Prof. Dr. Hesse, Prof. Dr. Klingele	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	2 hrs/w
Lab, Exercises:	2 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	30 hrs
Lab, Exercises:	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory Elective	None

Short Description:

The course imparts basic knowledge of mathematics and their application in engineering and technology. Based on practical exercises the ability to apply mathematical laws will be expanded.

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

School-level mathematics corresponding to the "Fachabitur" *(German advanced technical college certificate)*

Learning outcomes:

Knowledge about the history and the definition of “sustainable development”.

Knowledge and hands on experience with tools and methods for sustainability assessment

Understanding of basic functional principles of technologies for renewable energy systems

Understanding of materials used in technologies for renewable energy systems

Module content:

- Sustainability and sustainability assessment
- Structure of sustainable energy systems
- Basics of solar irradiation
- Solar thermal energy
- Photovoltaics
- Wind energy
- Other renewable energy sources
- Energy storage and conversion via hydrogen technologies
- Energy storage via batteries
- Cross-Technology comparisons and assessments

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

None

Literature:

Volker Quaschning: Understanding Renewable Energy Systems
Michael Sterner: Handbook of Energy Storage: Demand, Technologies, Integration

Examination type – format and duration:	**Examination – permitted aids:**
Written Module Examination (“MP”) 90 minutes	None programmable calculator

2.4.8 IE632 Energy System Transition, Economics & Analysis

Module title:	**Revision date:**
Energy System Transition, Economics & Analysis	17.02.2025
Module code no.:	**Related component modules**
IE632	

Part 1:

This course teaches fundamentals of smart energy systems with a focus on grids, markets and energy economics. It also covers sector coupling (heat, mobility and hydrogen) and energy transition aspects.

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced course, semester 7	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr. Matthias Kühnbach	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	2 hrs/w
Lab, Exercises:	2 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	30 hrs
Lab, Exercises:	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
None	None

[1] hrs/w = contact hours per week during the semester

Short Description:

This course provides a comprehensive understanding of modern power systems, focusing on the interplay between power generation, grid infrastructure, and market dynamics. It explores the transition from conventional to renewable energy sources and the challenges of integrating them into existing grids.
The course teaches practical information and analytical skills concerning investment strategies, self-consumption and energy system analysis.
Ultimately, the course examines pathways toward decarbonization, policy interventions, and the future of energy systems including sector coupling towards the heat and mobility sector and towards a hydrogen economy.

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

School-level mathematics corresponding to the "Fachabitur" *(German advanced technical college certificate)*

Learning outcomes:

Knowledge on power systems & grid infrastructure: gain insights into the structure and operation of power grids and the overarching power system.

Knowledge and hands-on experience with energy markets & investment strategies: Learn how electricity markets function, including pricing mechanisms, trading strategies, and investment planning for generation and storage.

Understand Sector Coupling & Policy Impacts: Assess the integration of energy sectors into the power system and the role of policies in shaping the energy transition.

Develop a systemic perspective on sustainable energy development, emissions reduction, and the challenges of a carbon-neutral future.

Module content:
Power system fundamentals

Grid operation and power markets

Power market design and renewables integration

Investment planning for generation and storage assets and self-consumption

Smart grids and intelligent energy systems

Sector coupling (heat, mobility, hydrogen)

Energy and climate policy

Energy and decarbonization scenarios

Part 3: **Literature, permitted aids**	
Internet links, computer-based learning: None	
Literature: Buchholz, Bernd Michael (2020): Smart Grids. Fundamentals and Technologies in Electric Power Systems of the Future (available through the university library catalogue)	
Examination type – format and duration: Written Module Examination (“MP”) 90 minutes	**Examination – permitted aids:** None programmable calculator

2.4.9 IE634 Introduction to mobile robotics

Module title:	**Revision date:**
Introduction to mobile robotics	31.03.2025
Module code no.:	**Related component modules**
IE634	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced studies	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr. Matthias Lorenzen	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	2 hrs/w
Lab, Exercises:	2 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	60 hrs
Lab, Exercises:	60 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Elective	None

Short Description:

The module teaches the basics of mobile robotics. In particular, the topics of sensors, kinematics of mobile robots as well as algorithms for localization, map generation, control and navigation.

Part 2:
Prerequisites, learning outcomes, content

[1] hrs/w = contact hours per week during the semester

Prerequisite knowledge:

- Engineering Mathematics
- Fundamentals of Mechanics and System Dynamics
- Programming

Out of these lectures, in particular, fundamentals of Linear Algebra, System Dynamics and Programming in Python, C or C++ are necessary.

Learning outcomes:

The students

- know important sensors of mobile robots and their properties. They can select them according to their application.
- know drives of mobile robots and can describe the movement mathematically.
- can mathematically describe the position and orientation of a robot in space and deal with different coordinate systems.
- know basic algorithms for localization, map generation, control and navigation and can apply them practically in basic tasks.
- can implement the learned algorithms in ROS2.

Module content:

- Environment sensors
- Kinematics of mobile robots
- Description of position and attitude
- Localization
- Mapping
- Control and navigation

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Exercises are available on the Intranet.

Literature:

- Sebastian Thrun Wolfram Burgard Dieter Fox: Probabilistic Robotics, MIT Press, 2006
- Steven M. LaValle, Planning Algorithms, Cam-bridge University Press, 2006
- Roland Siegwart, Illah R. Nourbakhsh, Davide Scaramuzza, Introduction to Autonomous Mobile Robots, 2nd Edition, MIT Press, 2011

Examination type – format and duration:	**Examination – permitted aids:**
The final mark depends 100% on a written examination (90 minutes).	- Non-programmable calculator - Din A4 pages.

2.4.10 IE635 Electronics manufacturing

Module title:	**Revision date:**
Electronics manufacturing	10.04.2025
Module code no.:	**Related component modules**
IE635	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Elective course, semester 6	Summer
Module convenor:	**Faculty/Department:**
Prof. Dr. Till Huesgen	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	2 hrs/w
Lab, Exercises:	2 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	60 hrs
Lab, Exercises:	60 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory elective	None

Short Description:

The course covers the fundamentals of manufacturing technologies for electronic systems, encompassing schematic capture, layout of printed circuit board and assembly and interconnection technologies. Within the course, the students will develop, layout and prototype.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

- Basics of electronic components and circuit technologies
- Material sciences

Learning outcomes:

- Knowledge about assembly and interconnection technologies for electronic devices and systems
- Practical skills in using state-of-the-art eCAD software for schematic capture and circuit board layout.
- Practical skills in assembly and testing of electronic circuits.

Module content:

- Design methodology, standards, eCAD tools
- Circuit diagrams, Symbols, bill-of-materials
- Packaging and Interconnection technologies such as printed circuits boards, component level packaging
- Circuit layout, footprint planing, routing, electromagnetic compatibility, production data
- Thermal management of electronics
- Manufacturing: Surface mount technology

Part 3:

Literature, permitted aids

Internet links, computer-based learning:

Course material is available on Moodle.

Literature:

- Lienig, Schieble, Fundamentals of Layout Design for Electronic circuits

Examination type – format and duration:	**Examination – permitted aids:**
The final mark depends 100% on a project report (design project).	- **No restrictions**

2.4.11 IE636 Human-Machine Interaction

Module title:	**Revision date:**
Human-Machine-Interaction	02.04.2025
Module code no.:	**Related component modules**
IE636	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Specialisation studies, semester 7	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr. Manuel Giuliani	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	2 hrs/w
Lab, Exercises:	2 hrs/w
ECTS Credit Points	5 CP

Workload:

Lectures:	60 hrs
Lab, Exercises:	60 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory elective	None

Short Description:

This course teaches fundamental concepts and techniques of human-machine interaction. The course covers a wide range of topics that are essential for understanding and designing effective and user-friendly interfaces and systems. This course combines theoretical knowledge with practical applications to provide students with a comprehensive understanding of human-machine interaction and to enable them to develop and evaluate user-friendly systems.

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

none

Learning outcomes:

1. Understanding human perception and cognitive processes. Students should understand the basic principles of human perception and cognition and be able to apply this knowledge to the design of user-friendly interfaces. They should be able to understand the interaction between human motor skills and machines.
2. Apply user-centred design methods. Students should be able to use user-centred design (UCD) methods to analyse, design and evaluate user-friendly and intuitive systems. They should know and be able to apply the principles of affordances and design principles in order to design effective interfaces.
3. Design and evaluation of visual interface elements. Students should master the basics of colour theory, typography and graphic design and be able to apply these to the design of screen-based and web-based user interfaces. They should be able to design interactive interfaces and evaluate the user-friendliness of these interfaces.
4. Development of innovative forms of interaction. Students should be familiar with the special challenges and techniques of mobile interaction and ubiquitous computing. They should understand the basics and possible applications of augmented reality, virtual reality and mixed reality.

Module content:

- Perception: Investigation of human sensory perception and its influence on interaction with machines.
- Cognition, motor skills: Cognitive processes and motor skills that play a role in dealing with technical systems.
- Mental models and errors: Analysing how users understand systems and the typical errors they make.
- User-Centred Design: Introduction to user-centred methods for analysing and designing interfaces.
- Design principles: Concepts for designing intuitive and easy-to-understand interfaces.
- Colours, typography, graphic design: basic principles of visual design and their application in user interface design.
- Screen-based user interfaces: Design and optimisation of interfaces for screen-based devices.
- Web-based interfaces, interactive interfaces: Development and implementation of web-based and interactive user interfaces.
- Mobile Interaction, Ubiquitous Computing: Challenges and techniques of mobile interaction and ubiquitous computing.
- Augmented, Virtual, Mixed Reality: Use and design of augmented, virtual and mixed realities.

Part 3: **Literature, permitted aids**	
Internet links, computer-based learning: Course material will be made available on Moodle.	
Literature: TBA	
Examination type – format and duration: The final grade is made up of a written examination (90 minutes, 50 %) and a written report (8-12 pages, 50 %). The written examination relates to the content of the course. The written report refers to the contents of the laboratory practicals carried out.	**Examination – permitted aids:** 1 DIN A4 sheet of own notes.

2.5 Modules for the practical semester

The practical semester includes a total of 24 weeks, including 21 weeks of practical work in industry with a practical report and the practical seminar with a presentation. In addition, the practical module IE 51 must be taken during the practical semester.

- The module **IE50 Internship** is divided into IE501 Internship and IE502 Internship seminar
- The module **IE51 Intercultural Self- and Team Competence** is divided into IE511 Intercultural Self- and Team Competence Seminar and IE512 Reflection Diary + World Café

2.5.1 IE 501 Internship

Module title: Internship	**Revision date:** 27.03.2025
Module code no.:	**Related component modules**
IE501	IE50 IE502
Part 1: **General Information**	
Degree programme: International Engineering (IE)	
Course level, semester: Advanced course, semester 5	**Taught in semester:** Winter
Module convenor: Person in charge of internship	**Faculty/Department:** Electrical Engineering / Mechanical Engineering
Teaching methods, hrs/w,[1] ECTS Credit Points (CP) Practical training in a company: 21 weeks ECTS Credit Points 23 CP	
Workload: Practical activity: regular weekly working hours in the company x 21 weeks	
Taught in: Practical training: Local language of the company or English Report: German or English	
Compulsory subject / Compulsory elective: Compulsory subject	**Compulsory prerequisite modules** Admission requirements in accordance with the Study and Examination Regulations (SPO)

[1] hrs/w = contact hours per week during the semester

Short Description:

Practical activity in a company allows students to increase their competence to put knowledge into practice and to act accordingly. Knowledge acquired so far in the course of studies are to be used and deepened in an environment oriented towards the work of an engineer.

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Learning outcomes:

- The objective of practical training is getting an insight into intra-company processes and procedures as well as the introduction to the work of an industrial engineer by the student independently carrying out planning, organisational and control-related tasks.
- Using the knowledge acquired during the first part of their studies, students are to handle first projects in industry successfully.

Module content:

- In line with the degree course, students are deployed in the company and are given extensive and challenging tasks. Students work on these independently or in an interdisciplinary team in a results-oriented and targeted manner. Working methods and specialist knowledge are learned, developed and applied in a targeted manner. The solutions are documented and presented. By being integrated into organizational units in the company environment, students learn about the structure, division of tasks and interrelationships of the company divisions.

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Pertinent statutory regulations to be applied, such as the Ordinance on the practical semester, the information leaflet for the practical semester as well as a model agreement can be downloaded from the homepage of Kempten University.

Literature:

Examination type – format and duration:	**Examination – permitted aids:**
	-

2.5.2 IE502 Internship Seminar

Module title:	**Revision date:**
Internship Seminar	27.03.2025
Module code no.:	**Related component modules**
IE502	IE50 IE501

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced course, semester 5	Winter
Module convenor:	**Faculty/Department:**
Person in charge of internship	Electrical Engineering / Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Seminar	2 hrs/w
ECTS Credit Points	2 CP

Workload:

Seminar	30 hrs
Independent learning:	30 hrs
Total workload:	60 hrs

Taught in:

English/German

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	Admission requirements in accordance with the Study and Examination Regulations (SPO)

Short Description:

The course helps students practice the presentation of work results achieved during the practical semester to a large audience and to discuss questions.
(Block seminar)

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Learning outcomes:

- Ability to present work results to a large audience
- Adequate answers to questions put from the audience.
- Putting the communication and presentation skills acquired into practice.

Module content:

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Literature:

Examination type – format and duration:	**Examination – permitted aids:**
Students record, analyse and evaluate the knowledge they have acquired in a practical report with proof of activity, the preparation of posters and a presentation on the internship.	

2.5.3 IE51 Intercultural Self- and Team Competence

Module title:	**Revision date:**
Intercultural Self- and Team Competence	10.04.2025
Module code no.:	**Related component modules**
IE51	IE511 Intercultural Self- and Team Competence - Seminar IE512 Reflection Diary + World Café

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation course, semester 5	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr. Georg Happich	Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

IE511 Seminar:	2 hrs/w	2CP
IE512Reflection Diary+World Café:	2 hrs/w	3CP
ECTS Credit Points		5 CP

Workload:

Seminar:	30 hrs
Reflection Diary+World Café:	30 hrs
Independent learning:	90 hrs
Total workload:	150 hrs

Taught in:

English/ German

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	None

Short Description:

The module develops personal and team competences required for professional activities in an international environment. Students receive a theoretical introduction to self-management, teamwork, and intercultural communication. During an international internship, they apply these concepts in practice. Through a structured Reflection Diary and a moderated World Café session, students critically reflect on challenges and solutions encountered during the internship.

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Basic scientific and engineering knowledge; No specific prior knowledge of tools required

[1] hrs/w = contact hours per week during the semester

Learning outcomes:

- Apply self- and team-management techniques in international and intercultural contexts.
- Reflect critically on professional experiences abroad.
- Identify and implement strategies for collaboration, conflict resolution, and intercultural communication.
- Communicate reflective insights in both written and oral formats.

Module content:

- Theoretical foundations of self-competence, team development, and intercultural communication
- Reflection support during international internship (one semester)
- Reflection Diary
- World Café (moderated discussion session)

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Exercises are available on the Intranet.

Literature:

- Erin Meyer (2018). *The Culture Map.* Wiley Publishing
- Katzenbach, J. R., & Smith, D. K. (2015). *The Wisdom of Teams: Creating the High-Performance Organization.* Harper Business.

Examination type – format and duration:	**Examination – permitted aids:**
Portfolio assessment	Will be announced during lecture

2.6 Modules for the bachelor's thesis

2.6.1 IE71 Bachelor's Thesis

Module title:	**Revision date:**
Bachelor's Thesis	17.03.2025
Module code no.:	**Related component modules**
IE71	

Part 1: **General Information**	
Degree programme: International Engineering (IE)	
Course level, semester: Advanced course, semester 7	**Taught in semester:** Winter/ Summer
Module convenor: Mentoring Professor	**Faculty/Department:** Electrical Engineering / Mechanical Engineering
Teaching methods, hrs/w,[1] ECTS Credit Points (CP) ECTS Credit Points 12 CP	
Workload: 10 weeks	
Taught in: English or German	
Compulsory subject / Compulsory elective: Compulsory subject	**Compulsory prerequisite modules** Admission requirements in accordance with the Study and Examination Regulations (SPO)
Short Description: The students apply their acquired knowledge and methods by working on a theoretical or practical task of an industrial company or in research areas.	

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Learning outcomes:

The students structure tasks by a methodical oriented problem analysis.
They transfer principals of modelling and simulation of processes in an industrial firm.
They apply techniques of engineering and business administration under consideration of economical, ecological and technical requirements.

Module content:
The bachelor thesis has to focus on a problem within the field of the degree program. The thesis is handed out and supervised by the professor, who is working at the University of Kempten.
The student has the possibility to propose a topic of the thesis.
The thesis can be realized in a facility outside of the university. Therefor an acceptance of the board of examiners is obliged.

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Pertinent statutory regulations to be applied can be downloaded from the homepage of Kempten University .

Literature:

Examination type – format and duration:	**Examination – permitted aids:**
The Bachelor thesis has to be submitted in time. In addition a successful attendance of colloquium (IE72) is needed.	

2.6.2 IE72 Colloquium

Module title:	**Revision date:**
Colloquium	17.03.2025
Module code no.:	**Related component modules**
IE72	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Advanced course, semester 7	Winter/ Summer
Module convenor:	**Faculty/Department:**
Mentoring Professor	Electrical Engineering / Mechanical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

ECTS Credit Points 3 CP

Workload:

90 hrs

Taught in:

English or German

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject	Admission requirements in accordance with the Study and Examination Regulations (SPO)

Short Description:

The supervisor supports the scientific work by regular meetings.
Presentation and discussion of the thesis.

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Learning outcomes:

The student can review, present and defend complex issue

Module content:
The supervisor gets insight into content and progress of the thesis. The students are supported, that their procedure is in accordance to the objectives and the content will be treated in time.

There are regular presentations and discussions to the current status of the thesis.

The supervisor gives assistance, suggestions and proposals for improvement.

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Pertinent statutory regulations to be applied can be downloaded from the homepage of Kempten University .

Literature:

Examination type – format and duration:	**Examination – permitted aids:**
Presentation of 30 min and additional discussion.	

2.7 Modules for dual study programmes

Students on dual study format degree programmes – either combined or with extended practice – must also complete the following additional studies.

No.	Modules (M) and part-modules (TM)	M-CP	TM-CP	h/w	Course format	Assessment format
IE81	Internship 1					PB
IE82	Internship 2					PB
IE83	Internship 3					PB
IE84	Internship 4					PB
IE855	Colloquium Dual Internship	5				S
IE851	Colloquium Dual Internship 1		1,25	1	S	MP[1) 2)]
IE852	Colloquium Dual Internship 2		1,25	1	S	MP[1) 2)]
IE853	Colloquium Dual Internship 3		1,25	1	S	MP[1) 2)]
IE854	Colloquium Dual Internship 4		1,25	1	S	MP[1) 2)]

Instead of providing evidence of 30 Credit Points earned in subject-specific compulsory elective modules, students on dual-format degree programmes are only required to earn 25 Credit Points this way, with the remaining 5 Credit Points stemming from the internship colloquia.

2.7.1 IE81 Internship Phase 1

Module title: **Internship Phase 1**	**Revision date:** 03.02.2026
Module code no.:	**Related component modules**
IE81	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester: Foundation or advanced course, latest 4th semester	**Taught in semester:** Lecture-free period. Also possible as a pre-study internship before the degree course
Module convenor: Prof. Dr. Bernhard Weich	**Faculty/Department:** Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Workload:

Internship	80 hrs
Total workload:	80 hrs

Taught in:

German

Compulsory subject / Compulsory elective: Compulsory subject for Students of the dual study programme	**Compulsory prerequisite modules** None

Short Description:

Internship phase in the lecture-free period to deepen the theoretical content of the course through practical relevance. Can also be carried out as a pre-internship in the partner company before starting the substantive studies.

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Learning outcomes:

Placements in the company are fundamentally used to learn and apply practical skills (social, methodological and personal) in real-life situations. They prepare students for the subsequent theory modules and enrich the content and skills learned so far in the theory-based stages by familiarising them with practical solutions. The first internship phase serves to familiarise students with contact persons, products, company structures and processes.

Module content:
Students are integrated into existing work processes in a department at the partner company or work on current projects. They get to know the company's products and services, familiarise themselves with the general and specific company structure, and gain important experience in in-house collaboration. The first internship phase serves to familiarise students with the products, company structures and processes.

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Literature:

Examination type – format and duration:	**Examination – permitted aids:**
Proof of working hours and activities already undertaken according to the co-operation agreement and training contract	

2.7.2 IE82 Internship Phase 2

Module title: **Internship Phase 2**	**Revision date:** 03.02.2026
Module code no.:	**Related component modules**
IE82	
Part 1: **General Information**	
Degree programme: International Engineering (IE)	
Course level, semester: Foundation or advanced course, latest 5th semester	**Taught in semester:** Study period without lectures
Module convenor: Prof. Dr. Bernhard Weich	**Faculty/Department:** Electrical Engineering
Teaching methods, hrs/w,[1] ECTS Credit Points (CP)	
Workload: Internship 80 hrs Total workload: 80 hrs	
Taught in: German	
Compulsory subject / Compulsory elective: Compulsory subject for students of the dual study programme	**Compulsory prerequisite modules** None
Short Description: Internship phase in the lecture-free period to deepen the theoretical content of the course through practical relevance	

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Learning outcomes:

Placements in the company are fundamentally used to learn and apply practical skills (social, methodological and personal) in real-life situations. They prepare students for the subsequent theory modules and enrich the content and skills learned so far in the theory-based stages by familiarising them with practical solutions. During the second internship phase, students familiarise themselves in particular with the working methods in the company and are able to combine specialist and economic objectives. They can work on a defined project in their specialist subject area using scientific methods under supervision.

Module content:
Students are integrated into existing work processes in a department at the partner company or work on current projects. They get to know the company's products and services, familiarise themselves with the general and specific company structure, and gain important experience in in-house collaboration.

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Literature:

Examination type – format and duration:	**Examination – permitted aids:**
Proof of working hours and activities already undertaken according to the co-operation agreement and training contract	

2.7.3 IE83 Internship Phase 3

Module title: **Internship Phase 3**	**Revision date:** 03.02.2026
Module code no.:	**Related component modules**
IE83	
Part 1: **General Information**	
Degree programme: International Engineering (IE)	
Course level, semester: Foundation or advanced course, latest 6th semester	**Taught in semester:** Study period without lectures
Module convenor: Prof. Dr. Bernhard Weich	**Faculty/Department:** Electrical Engineering
Teaching methods, hrs/w,[1] ECTS Credit Points (CP)	
Workload: Internship 80 hrs Total workload: 80 hrs	
Taught in: German	
Compulsory subject / Compulsory elective: Compulsory subject for students of the dual study programme	**Compulsory prerequisite modules** None
Short Description: Internship phase in the lecture-free period to deepen the theoretical content of the course through practical relevance.	

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Learning outcomes:

Placements in the company are fundamentally used to learn and apply practical skills (social, methodological and personal) in real-life situations. They prepare students for the subsequent theory modules and enrich the content and skills learned so far in the theory-based stages by familiarising them with practical solutions. During the third internship phase, students familiarise themselves in particular with the working methods in the company and are able to combine specialist and economic objectives. They can work on a defined project in their specialist subject area using scientific methods under supervision.

Module content:
The third internship phase involves working on a project related to the specialist subject area and company. The student is set a topic for the project at the beginning of the internship phase, which has been agreed between the university supervisor and the company supervisor in consultation with the student. The content relates to the student's level of training in the relevant subject area and the products, operational processes, organisational structure and manufacturing processes in the partner company. Overarching content addresses project management, presenting and moderating in practice.

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Literature:

Examination type – format and duration:	**Examination – permitted aids:**
Proof of working hours and activities already undertaken according to the co-operation agreement and training contract	

2.7.4 IE83 Internship Phase 4

Module title: **Internship Phase 4**	**Revision date:** 03.02.2026
Module code no.:	**Related component modules**
IE84	
Part 1: **General Information**	
Degree programme: International Engineering (IE)	
Course level, semester: Foundation or advanced course, latest 7th semester	**Taught in semester:** Study period without lectures between semester
Module convenor: Prof. Dr. Bernhard Weich	**Faculty/Department:** Electrical Engineering
Teaching methods, hrs/w,[1] ECTS Credit Points (CP)	
Workload: Internship 80 hrs Total workload: 80 hrs	
Taught in: German	
Compulsory subject / Compulsory elective: Compulsory subject for students of the dual study programme	**Compulsory prerequisite modules** None
Short Description: Internship phase in the lecture-free period to deepen the theoretical content of the course through practical relevance.	

[1] hrs/w = contact hours per week during the semester

Part 2:

Prerequisites, learning outcomes, content

Prerequisite knowledge:

Learning outcomes:

Placements in the company are fundamentally used to learn and apply practical skills (social, methodological and personal) in real-life situations. They prepare students for the subsequent theory modules and enrich the content and skills learned so far in the theory-based stages by familiarising them with practical solutions. During the fourth internship phase, students learn how to independently acquire detailed knowledge of selected processes in production, administration or services and how to transfer the knowledge they have learned to specific practical business problems.

Module content:

The fourth internship phase involves working on a project related to the specialist subject area and company. The student is set a topic for the project at the beginning of the internship phase, which has been agreed between the university supervisor and the company supervisor in consultation with the student. The content relates to the student's level of training in the relevant subject area and the products, operational processes, organisational structure and manufacturing processes in the partner company. Overarching content addresses project management, presenting and moderating in practice.

Part 3:

Literature, permitted aids

Internet links, computer-based learning:

Literature:

Examination type – format and duration:	**Examination – permitted aids:**
Proof of working hours and activities already undertaken according to the co-operation agreement and training contract	

2.7.5 IE851 Colloquium Dual Internship 1

Module title:	**Revision date:**
Colloquium Dual Internship 1	03.02.2026
Module code no.:	**Related component modules**
IE851	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation or advanced course, latest 4th semester	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr.-Ing. Matthias Kuba	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	1 hrs/w
ECTS Credit Points	1.25 CP

Workload:

Lectures:	15 hrs
Independent learning:	16,25 hrs
Total workload:	31,25 hrs

Taught in:

German

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject for students of the dual study programme	Internship phase 1

Short Description:

Company excursion as an accompanying course to the internship phases of the Dual study programs "Verbundstudium" or "Studium mit vertiefter Praxis".

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Learning outcomes:

Students on combined degree programmes reflect upon their experiences in practice during the internship phase. The activities and experiences relating to the practice partner's particular field of expertise are actively reflected upon and examined in greater depth.

Module content:
Cross-sectoral insights into the cooperative work setting; business model, structure, fields of activity; collaboration with students on cooperative degree programmes.

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Literature:

Examination type – format and duration:	**Examination – permitted aids:**
Proof of participation (TN)	No permitted auxiliaries

2.7.6 IE852 Colloquium Dual Internship 2

Module title:	**Revision date:**
Colloquium Dual Internship 2	03.02.2026
Module code no.:	**Related component modules**
IE852	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation or advanced course, latest 5th semester	Summer
Module convenor:	**Faculty/Department:**
Prof. Dr.-Ing. Matthias Kuba	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	1 hrs/w
ECTS Credit Points	1,25 CP

Workload:

Lectures:	15 hrs
Independent learning:	16,25 hrs
Total workload:	31,25 hrs

Taught in:

German

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject for students of the dual study programme	Internship phase 2

Short Description:

Communication and awareness training as an accompanying course to the internship phases of the Dual study programs "Verbundstudium" or "Studium mit vertiefter Praxis".

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Learning outcomes:

Students on combined degree programmes reflect upon their experiences in practice during the internship phase. The activities and experiences relating to the practice partner's particular field of expertise are actively reflected upon and examined in greater depth.

Module content:
Effective communication in professional settings; feedback mechanisms; appreciative communication and conflict resolution.

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Literature:

Examination type – format and duration:	**Examination – permitted aids:**
Proof of participation (TN)	No permitted auxiliaries

2.7.7 IE853 Colloquium Dual Internship 3

Module title:	**Revision date:**
Colloquium Dual Internship 3	03.02.2026
Module code no.:	**Related component modules**
IE853	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation or advanced course, latest 6th semester	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr.-Ing. Matthias Kuba	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	1 hrs/w
ECTS Credit Points	1,25 CP

Workload:

Lectures:	15 hrs
Independent learning:	16,25 hrs
Total workload:	31,25 hrs

Taught in:

German

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject for students of the dual study programme	Internship phase 3

Short Description:

Self-management training as an accompanying course to the internship phases of the Dual study programs "Verbundstudium" or "Studium mit vertiefter Praxis".

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Learning outcomes:

Students on combined degree programmes reflect upon their experiences in practice during the internship phase. The activities and experiences relating to the practice partner's particular field of expertise are actively reflected upon and examined in greater depth.

Module content:
Strategies for prioritisation, resilience and fortitude; practical applications in corporate settings; self-management methods

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Literature:

Examination type – format and duration:	**Examination – permitted aids:**
Proof of participation (TN)	No permitted auxiliaries

2.7.8 IE854 Colloquium Dual Internship 4

Module title:	**Revision date:**
Colloquium Dual Internship 4	03.02.2026
Module code no.:	**Related component modules**
IE854	

Part 1:
General Information

Degree programme:

International Engineering (IE)

Course level, semester:	**Taught in semester:**
Foundation or advanced course, latest 7th semester	Winter
Module convenor:	**Faculty/Department:**
Prof. Dr.-Ing. Matthias Kuba	Electrical Engineering

Teaching methods, hrs/w,[1] ECTS Credit Points (CP)

Lectures:	1 hrs/w
ECTS Credit Points	1,25 CP

Workload:

Lectures:	15 hrs
Independent learning:	16,25 hrs
Total workload:	31,25 hrs

Taught in:

German

Compulsory subject / Compulsory elective:	**Compulsory prerequisite modules**
Compulsory subject for students of the dual study programme	Internship phase 4

Short Description:

Training on the topic of "project management in complex working environments" as an accompanying course to the internship phases of the Dual study programs "Verbundstudium" or "Studium mit vertiefter Praxis".

[1] hrs/w = contact hours per week during the semester

Part 2:
Prerequisites, learning outcomes, content

Prerequisite knowledge:

Learning outcomes:

Students on combined degree programmes reflect upon their experiences in practice during the internship phase. The activities and experiences relating to the practice partner’s particular field of expertise are actively reflected upon and examined in greater depth.

Module content:
Agile and classic project management methods; systemic thinking and acting; tools for coping with uncertainty and dynamics; interdisciplinary cooperation.

Part 3:
Literature, permitted aids

Internet links, computer-based learning:

Literature:

Examination type – format and duration:	**Examination – permitted aids:**
Proof of participation (TN)	No permitted auxiliaries

3 Bachelor’s thesis

The bachelor’s thesis (abbreviated to "BA" in German) is designed to show that the student is able to work independently on a task in technical and international fields on a scientific basis. The nominal workload is designated as 12 Credit Points according to the European Credit Transfer and Accumulation System (ECTS).

3.1 Legal basis

The programme and examination regulations for the bachelor’s degree programme in International Engineering (SPO IE-BA/HKE) stipulate a bachelor’s thesis as the final dissertation.

The rules outlined below regarding the bachelor’s thesis comply with the following official regulations:

- State Examination Regulations
- University Examination Regulations
- Programme and Examination Regulations

3.2 Task setter/examiner and supervisor

All professors, lecturers with special duties and sessional lecturers at Kempten University of Applied Sciences who are appointed to do so by the Examinations Committee can take on the role of task setter/examiner.

3.3 Allocation of topics

Subject to the approval of the Examinations Committee, the bachelor’s thesis may be conducted at an institution outside the university as long as supervision by an examiner at the university of applied sciences is ensured. This applies in particular to the degree programme with extended practice. If the bachelor’s thesis is conducted in industry, an additional supervisor shall be an expert at the company.

The bachelor’s theses proposed by the task setters/examiners are posted on a notice board. Students can also suggest a topic themselves to a task setter. The academic advisor and the Examinations Committee will help students to find a topic if necessary.

3.4 Time allowed for completion

The topic of the bachelor’s thesis must be suitable for completion in a full-time, uninterrupted effort generally lasting ten weeks. The time allowed for working on the thesis is determined by the federal states’ common structural guidelines for implementing the Bologna Process. A precise regulation on this can be found in the University Examination Regulations (“APO”).

The bachelor’s thesis is awarded a grade of “5” if it is not submitted on time. If a grade of “5” has been awarded, one further attempt can be made at the bachelor’s thesis – with a new topic.

The Examinations Committee can allow an appropriate extension, upon application, if the student cannot meet the deadline for producing the thesis due to illness or other reasons beyond his/her control. The existence of a reason beyond the student’s control must be plausibly substantiated. [4]In case of ill health, a medical certificate must be presented (§31 para. 4 sentences 5-7 RaPO).

3.5 Registering the bachelor’s thesis

The procedure requires students to take these individual steps:

- Once you have successfully completed the practical semester and have earned at least 150 ECTS Credit Points, you can obtain the form (carbon copy) for registering your bachelor's thesis from Academic Registry.
- Academic Registry certifies, by adding the appropriate mark, that the criteria for embarking upon the bachelor's thesis have been met.
- The student enters his/her personal data onto the form for registering the bachelor's thesis.
- At this point, task setter/examiner adds the topic and date of issue. The task setter/examiner and the student sign the registration form. Before signing, the student clarifies **who will act as** the **second examiner** for his/her bachelor's thesis.
- When you hand the form back in to Academic Registry, as the last step, the final deadline for submitting the thesis will be entered. You will receive a copy of the registration form.

3.6 Written paper

Two written papers for the thesis must be submitted in person to Academic Registry.

The bachelor's thesis must include a declaration signed by the student with the following wording: "I confirm that I have prepared this bachelor's thesis independently, have not submitted it elsewhere for examination purposes, have indicated all sources and aids used, and have labelled any direct quotations or paraphrasing as such."

Bound copies of the printed papers must be submitted in DIN A4 portrait format. Spiral binding is not permitted.

Please note the guidelines on "Formatting and layout of final theses", which can be downloaded from the university website under "Service".

3.7 Grading, weighting of grades in the official academic record

The following individual achievements by the student are evaluated in determining the grade:

- Solving the task, – professional quality, – technical innovation,
- Independence and initiative, – working methodology,
- Contribution in seminars, if applicable,
- Written work,
- Final presentation, if applicable.

If the bachelor's thesis was awarded the grade "insufficient", then one more attempt can be made on a new topic. The period allowed for completing the work on repeating the bachelor's thesis commences no later than six months after the first assessment is made known.

The bachelor's thesis is the final dissertation required to earn the bachelor's degree. The grade for the bachelor's thesis carries a weighting of 15 in calculating the overall examination grade.

4 Additional information about the practical semester

4.1 General information

In accordance with §7 of the Programme and Examination Regulations for the bachelor's degree programme in International Engineering, the practical study semester is conducted in semester 5. The Statute on Practical Study Semesters at Kempten University of Applied Sciences ("PrS") prohibits postponing the practical semester of study to semester 7 (§3, para. 2).

The practical semester comprises 24 weeks, including the classes accompanying the practical training. Of these, 21 weeks are spent on placement in the company and three weeks on the accompanying block of teaching.

In order to be entitled to embark upon the semester of practical study, a student must have successfully completed all modules on the foundation course. The admission criteria for the industrial internship and the practical seminar additionally include having earned at least 25 Credit Points on the advanced course. Students on Track A must also have completed and passed module IE35A.

4.2 Practical training

Practical work forms part of the degree programme at the university of applied sciences, with the aim of applying and honing the specialist skills acquired during the degree programme by working independently on suitable projects in a professional environment.

As a rule, evidence must be provided of having completed practical training lasting 21 continuous weeks. Any interruptions must be compensated for. Any absences lasting more than one week must be made up. Students are not entitled to holiday leave. The daily working hours correspond to the normal working hours of the training company.

4.3 Traineeships

Students must endeavour to find an internship in good time that will enable them to achieve the objective of training (under 4.4). Kempten University of Applied Sciences does not arrange traineeships, but does assist with finding the contact details of companies (Academic Registry, International Office).

4.4 Training objective and content

Students shall familiarise themselves with the activities and working methods of international engineers by carrying out specific tasks in an operational environment.

A maximum of three project tasks from the following fields of work should be completed:
System planning, project planning, production planning and set-up, quality assurance, technical purchasing, sales or other comparable areas.
The tasks should be carried out as independently and responsibly as possible, in consideration of operational circumstances. Rotation between many departments for short periods of time is not desired. Working in a team on a larger project is considered advantageous.

4.5 Training contract

A training contract must be drawn up and signed between the student and the training company. The template provided by Kempten University of Applied Sciences for the contract, available from Academic Registry, should be used for this purpose. The contract must be approved by Kempten University of Applied Sciences

before the start of the internship and must therefore be submitted to Academic Registry in the first week of July at the latest.

No additional training contract is required for the “programme with extended practice”.

4.6 Report

Each student must submit a report on their practical placement. A single copy of the report is to be submitted in a loose-leaf binder. It should be at least 12 pages long (typewritten) and be structured as follows:
Standard cover sheet (template from Kempten University of Applied Sciences website)
– Table of contents
– Information section including
  a) Personal details (name, place, career)
  b) Company portrait (headquarters, director, size, turnover, products)
  c) Table of activities performed (type of activity, department, from / until)
– Main section with detailed presentation of a technical topic from the practical placement
– Summary including personal evaluation of the internship (professional and personal experiences, successes, problems, consequences, suggestions for improvement)

The report incl. standard cover sheet must be submitted to the company’s training officer for review and signature.

Students must submit their duly completed practical report and a copy of the professional reference (“certificate”) from the training company covering the entire 21-week period to Academic Registry. **The deadline for submission is two weeks before the first day of the practical seminar(s).**

The reports will be reviewed by the placements officer. Any corrections requested must be resubmitted within a period of one month. Once reports have been returned to students, they must be kept for verification purposes.

The practical semester is deemed to have been successfully completed upon recognition of the practical report and professional reference (“certificate” – see 2.5) for the prescribed period, and after the student has participated successfully in the classes accompanying the practical semester (See 3.).

4.7 Professional reference attesting to training

At the end of the contract, the training company must issue a professional reference containing the following details:

- Duration of training with details of any absences,
- Activities carried out,
- Success of the training with regard to the required training objectives and content.

4.8 Forms of insurance

Students remain enrolled during the practical semester. This means that special regulations apply with regard to compulsory social insurance. (See separate notice.) Due to the often not inconsiderable risk of causing personal injury and financial loss in the training company, taking out private liability insurance is recommended. Further information can be obtained from Academic Registry.

4.9 Exemption from practical training

The 21-week practical training programme is usually completed in a company or other institution of professional practice outside the university of applied sciences, and is dedicated to performing an activity that has been clearly determined as professionally relevant. Students can only be exempted, partially or entirely, from the practical training in exceptional cases with special justification. Details are regulated by the State

Examination Regulations in §2, para. 2. Exemptions from practical training must be applied for no later than during the third semester of study.

5 Additional information about time spent abroad

5.1 Funding & bursaries

The student should negotiate a salary with the company to cover living expenses at the internship location, including travel expenses. In addition, there is potential for bursaries or travel allowances. For example, the ERASMUS scheme offers bursaries for EU countries (taking the company's remuneration partially into account). Further information and application forms are available from the International Office at Kempten University of Applied Sciences.

5.2 Residence and work permits

For countries **outside the EU**, the student must obtain a residence and work permit in liaison with the company. The consulate or embassy of the host country will generally help to clarify the necessary measures. Waiting times and delays might have to be taken into account.

5.3 Forms of insurance

Students must ensure that they have sufficient health insurance cover for the periods spent abroad. Students must therefore check with their health insurance fund whether their insurance cover needs to be extended, or whether additional insurance needs to be taken out. Unlike internships in Germany, during an internship abroad, students are **not insured against accidents** by an "employers' liability insurance association". It is therefore recommended that students take out **private accident insurance.** Students should certainly also be insured against private liability.

5.4 Further information, contact addresses

The point of contact for all formalities is Academic Registry, which is where you can obtain any forms (templates for contracts, etc.) and must submit all reports, certificates, contracts, applications etc. The placements officer is available to discuss any technicalities (drop-in hours are posted on the notice board, or by appointment). The International Office provides assistance in international matters.

During the practical semester, too, students must re-enrol in time for the following semester, register punctually for any examinations,

and use the online portal for Kempten University of Applied Sciences to sign up for the following semester's compulsory elective modules.