Technische Hochschule Rosenheim

Faculty of Engineering

Curriculum

of the

International Bachelor of Engineering

Specialisation in Energy and Building Technology at Rosenheim Technical University of Applied Sciences

Status: February 2, 2024

Version a1a207e6 for students according to the SPO of May, 6th 2022

Contents

1 Preliminary remark

The Faculty of Applied Natural Sciences and Humanities draws up a study plan (according to § 4 of the Study and Examination Regulations) to ensure the courses offered and to inform the students. It is decided by the Faculty Council and made public at the university. New regulations are announced at the latest at the beginning of the lecture period of the semester they affect for the first time. The curriculum includes the current module plan and the internship guide as an appendix.

The curriculum contains in particular regulations and information

- on the course of studies
- on the modules and associated examinations
- on the detailed provisions on examinations, certificates of attendance and admission requirements
- on the bachelor thesis

The module plan, as part of the curriculum, contains compulsory and elective modules for all students:

- Aims, contents, sub-modules
- Credit points, number of semester hours per week, type of course and lecturers

The internship guidelines, as part of the curriculum, describe the objectives and contents of the practical study semester and the courses accompanying the practice, as well as their form and organisation.

2 Credit points (ECTS)

The specialisation Energy and Building Technology in the International Bachelor of Engineering degree programme comprises eight semesters of study, each with 30 credit points (ECTS). Thus, 240 credit points must be achieved in the entire Bachelor’s degree programme.

3 Module plan and course of studies

3.1 General

The basic studies during the first three semesters include central engineering fundamentals and integrated German language classes. These are taught predominantly in English. Parallel to this, students acquire the necessary German language skills in order to switch to the German-language main studies from the fourth semester onwards and complete their studies in German. For this purpose, they complete three semesters of German language courses in the amount of 10 CP per semester, beginning with the acquisition of language level B1 according to the CEFR (Common European Framework of Reference for Languages) - German language skills at level A2 according to the CEFR are a language admission requirement for the degree programme. The acquisition of German language skills up to level C1 according to the CEFR within the framework of the basic studies qualifies students to transfer to the German-language main studies. Language acquisition supports successful internships and creates the basis for a successful connection to the regional labour market. There is a common starting semester that qualifies students to study in each specialisation. From the second semester onwards, subject-specific compulsory modules supplement the joint modular study at the Rosenheim campus. From the second semester onwards, the compulsory modules required for training are added at the Rosenheim campus. From the third semester onwards, foreign students are introduced to German-language studies through selected German taught courses. In addition to the compulsory modules, from the fourth semester onwards students have the opportunity to take in-depth modules of their own choice in the defined areas. The basis of the degree programme, in addition to the German language modules with 30 CPs, is a broad basic education in engineering subjects. This includes 15 CPs in mathematics, 5 CPs in physics, 5 CPs in engineering mechanics, 10 CPs in electrical engineering and 5 CPs in applied informatics, which form the basis for all participating engineering degree programmes at the Rosenheim campus and cover a very broad range of subjects. The diversification begins in the second semester and is then clearly noticeable in the third semester, because in this semester mainly individual modules are offered per specialisation. The two specialisations during the main studies each comprise 7 modules.

3.2 Module plan and time regulations

In order to support rapid study progress, the following minimum achievements must be made: The examinations in the modules “Mathematics 1” and “Physics 1” must be taken by the end of the second semester. If students exceed this deadline for reasons for which they themselves are responsible, the associated examinations shall be deemed to have been taken for the first time and not passed. Only those students are entitled to enter the fourth study semester and to continue their studies who

- have achieved at least 25 credit points from the subject-related study basics as outlined in the study and examinations regulations, and
- have achieved at least 20 credit points from the language modules “German as a Foreign Language” as outlined in the study and examinations regulations.

By the end of the first semester at the latest, students must decide on one of the following concentrations:

- Energy and Building Technology (Faculty of Applied Sciences and Humanities)
- Electrical Engineering and Information Technology (Faculty of Engineering)
- Plastics Engineering / Sustainable Polymer Engineering (Faculty of Engineering)
- Mechanical Engineering (Faculty of Engineering)
- Mechatronics (Faculty of Engineering)
- Medical Technology (Faculty of Engineering)
- Engineering and Management (Faculty of Management and Engineering)

Further information can be found in the **study and examination regulations** at International Bachelor of Engineering. The exact details of the examinations, in particular of the compulsory elective modules, can be found in the “Announcement of the performance records”, which are published by the university at the beginning of each semester. The Bachelor’s thesis is an examination performance. The work begins with the issue of the topic by the examination committee. The maximum processing time is 5 months. If the maximum processing time is exceeded for reasons for which the student is responsible, the examination is deemed to have been failed.

Deadlines:
The standard period of study, including the Bachelor’s thesis, is 8 semesters. If the standard period of study is exceeded by more than 2 semesters, all examinations that have not been taken by then will be deemed as failed for the first time. It is therefore recommended to take the examinations as early as possible.

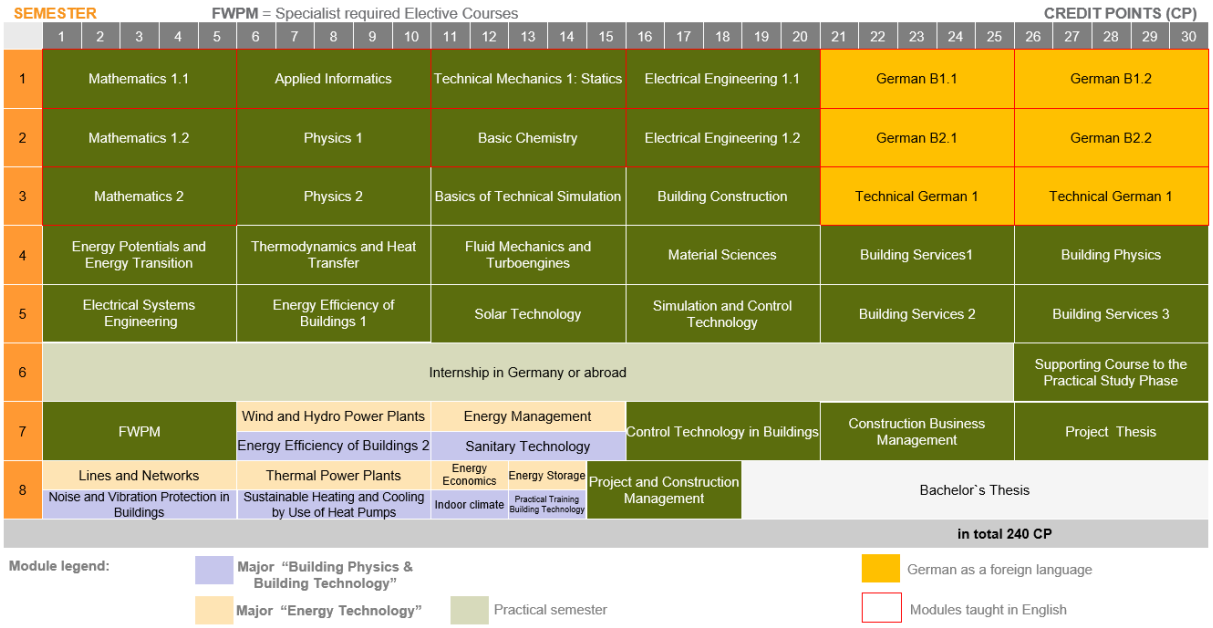

Figure 1: Study plan

4 Exams

4.1 General

The type and scope of the examinations in the compulsory modules, subject-specific compulsory elective modules (FWPM) and elective modules for the acquisition of interdisciplinary competences (AWPM) are governed by the current version of the Study and Examination Regulations (SPO) of the International Bachelor of Engineering degree programme, which is published by the Examinations Office.

4.2 Regulations on examination modalities, admission requirements and aids for examinations

The announcement of the examination modalities (type of examination, aids in the examination, examination performance, performance assessment at module level or submodule level) as well as the admission requirements for the examination (performance and participation certificates) is made for all modules through the respective examination announcements

for the respective semester posted online by the examination office; only these are legally binding.

4.3 Participation in internships as part of the course of study

The following modules include a university internship, the successful completion of which is a prerequisite for admission to the examination.

- 004 Engineering Informatics
- 006 Applied Physics
- 009 Fundamentals of technical simulation
- 012 Fluid Mechanics and Fluid Machinery
- 016 Building physics
- 021 Solar technology

The following regulations apply:

- In principle, attendance is compulsory at all dates.
- Successful participation (processing of the topic) in all practical course dates is a prerequisite for admission to the written examination at the end of the semester. Confirmation of participation and successful completion of the practicals is provided by the lecturers.
- The tests do not contain a grade and therefore do not count towards the module grade.

4.4 Regulations of individual modules

- IBR24 Physics 1 The examination requirement in the Physics module is also a written, ungraded performance record for the 1st semester, usually at the end of the 1st semester.
- 016 Building physics The number of internship places in the building physics internship of the fourth semester is limited. The admission requirements are announced at the beginning of each semester.
- 025 Project Thesis
  - Compulsory participation in the interim presentation (entire event)
  - Compulsory participation in the final presentation (entire event)

5 Curriculum

A detailed description of the modules and their sub-modules with the learning objectives and teaching content can be found in the End of the Energy and Building Technology degree programme (see appendix). The following table shows an overview of the modules with their sub-modules and the associated semester hours per week (SWS), arranged by semester.

6 Module Overview

Modul or Modul Group	Module Name or Designation of the Module Group	Major "Building Physics & Building Technology" Semester								
		1	2	3	4	5	6	7	8	Σ CP
IBR11	German B1.1	5								5
IBR12	German B1.2	5								5
IBR13	Mathematics 1.1	5								5
IBR14	Electrical Engineering 1.1	5								5
IBR15	Applied Informatics	5								5
IBR16	Technical Mechanics 1:	5								5
IBR21	German B2.1		5							5
IBR22	German B2.2		5							5
IBR23	Mathematics 1.2		5							5
IBR24	Physics 1		5							5
IBR25.2	Electrical Engineering 1.2		5							5
IBR25.3	Basic Chemistry		5							5
IBR31	Technical German 1			5						5
IBR32	Technical German 2			5						5
IBR33	Mathematics 2			5						5
IBR25.7	Physics 2			5						5
IBR25.15	Basis of the Technical Simulation			5						5
IBR25.16	Building Construction			5						5
EGT-002	Materials Science				5					5
EGT-005	Energy Potentials and Energy Transition				5					5
EGT-012	Fluid Mechanics and Turbo Engines				5					5
EGT-013	Building Services 1				5					5
EGT-015	Thermodynamics and Heat Transfer				5					5
EGT-016	Building Physics				5					5
EGT-018	Building Services 2					5				5
EGT-019	Building Services 3					5				5
EGT-020	Simulation and Control Technology					5				5
EGT-021	Solar Technology					5				5
EGT-023	Construction Business Management							5		5
EGT-024	Control Technology in Buildings							5		5
EGT-025	Project Thesis							5		5
EGT-026	Project and Construction Management								4	4
EGT-101	Electrical Systems Engineering					5				5
EGT-201	Energy efficiency of buildings 1					5				5
EGT-202	Energy efficiency of buildings 2							5		5
EGT-203	Sanitary Engineering							5		5
EGT-204	Sustainable Heating and Cooling by Use of Heat Pumps								5	5
EGT-205	Noise and Vibration Protection in Buildings								5	5
EGT-206	Indoor climate								2	2
EGT-207	Practical Training Building Technology								2	2
MG-FWPM	Specialist Required Elective Courses							5		5
PLV	Lectures for Practical Internship						5			5
SP	Practical Internship						25			25
BA	Bachelor`s Thesis								12	12
	Σ CP	**30**	30	**30**	30	**30**	30	**30**	30	**240**

Figure 2: Curriculum Building Technologys

Modul or Modul Group	Module Name or Designation of the Module Group	Major "Energy Technology" Semester								
		1	2	3	4	5	6	7	8	Σ CP
IBR11	German B1.1	5								5
IBR12	German B1.2	5								5
IBR13	Mathematics 1.1	5								5
IBR14	Electrical Engineering 1.1	5								5
IBR15	Applied Informatics	5								5
IBR16	Technical Mechanics 1:	5								5
IBR21	German B2.1		5							5
IBR22	German B2.2		5							5
IBR23	Mathematics 1.2		5							5
IBR24	Physics 1		5							5
IBR25.2	Electrical Engineering 1.2		5							5
IBR25.3	Basic Chemistry		5							5
IBR31	Technical German 1			5						5
IBR32	Technical German 2			5						5
IBR33	Mathematics 2			5						5
EGT-006	Physics 2			5						5
EGT-009	Basis of the Technical Simulation			5						5
EGT-010	Building Construction			5						5
EGT-002	Materials Science				5					5
EGT-005	Energy Potentials and Energy Transition				5					5
EGT-012	Fluid Mechanics and Turbo Engines				5					5
EGT-013	Building Services 1				5					5
EGT-015	Thermodynamics and Heat Transfer				5					5
EGT-016	Building Physics				5					5
EGT-018	Building Services 2					5				5
EGT-019	Building Services 3					5				5
EGT-020	Simulation and Control Technology					5				5
EGT-021	Solar Technology					5				5
EGT-023	Construction Business Management							5		5
EGT-024	Control Technology in Buildings							5		5
EGT-025	Project Thesis							5		5
EGT-026	Project and Construction Management								4	4
EGT-101	Electrical Systems Engineering					5				5
EGT-201	Energy efficiency of buildings 1					5				5
EGT-102	Wind and Hydro Power Plants							5		5
EGT-103	Thermal Power Plants								5	5
EGT-104	Energy Management							5		5
EGT-105	Lines and Networks								5	5
EGT-106	Energy Economics								2	2
EGT-107	Energy Storage								2	2
MG-FWPM	Specialist Required Elective Courses							5		5
PLV	Lectures for Practical Internship						5			5
SP	Practical Internship						25			25
BA	Bachelor`s Thesis								12	12
	Σ CP	30	30	30	30	30	30	30	30	240

Figure 3: **Curriculum Energy Technologys**

6.1 Subject and general science elective modules

For personal development and subject-specific specialisation, the fifth semester includes an AWPM, the seventh semester an FWPM, which can be chosen freely. The overview of the subjects offered for election is published in the Learning Campus immediately before the election.

6.1.1 Subject-specific elective modules (FWPM)

The selection of the subject-specific elective modules for the summer semester takes place at the end of the previous winter semester. All necessary information is provided via the Learning Campus at the beginning of December, in particular the FWPMs offered for selection. The list of potentially offered FWPMs can be found in the **module handbook of the SPO 20222**.

6.1.2 Note

There is no claim that all FWPMs and AWPMs will actually be offered. Likewise, there is no claim that the associated courses will be held if there are not enough participants.
Participation in the courses can be refused in the study plan due to limited capacity (according to §7 of the matriculation, re-registration and de-registration statutes of Rosenheim Technical University of Applied Sciences). More details will be given in the announcements of the performance records for the respective study semester of the Energy and Building Technology degree programme.

7 Internships

During the internship, which accompanies the studies, increasingly complex tasks are taken on in typical engineering projects. The internship comprises 18 weeks of activities. Please note the notices of the Internship Office regarding admission requirements and deadlines.

7.1 Training objective

The practical semester enables students to gain an insight into the professional practice of an engineer and is intended to introduce students to their later professional activity through concrete tasks and practical work in companies. The following skills should be required and promoted during the practical semester:

- Independent problem identification and finding of solutions
- Preparation of decisions for the implementation of the solution, taking into account technical, organisational and economic aspects
- Prompt and optimal implementation of technical or organisational solutions

- Simple implementation of the success control of solutions

Furthermore, the student should gain insight and knowledge in the following areas:

- Interrelationships of energetic processes in, or for, buildings
- Working methods of machines and plants
- Work organisation and leadership of employees
- Monitoring and optimisation of operational processes, etc.

7.2 Duration and content

7.2.1 Duration and timing

20 weeks, of which 18 weeks as practical training in the 5th semester and 2 weeks as a course accompanying practical training (PLV) in the 4th and 5th semester or final presentation after the practical training.

7.2.2 Training content

Activities that provide a broad insight into the work of an engineer in the areas listed below are particularly suitable:

- Energy consulting
- Planning and development of energy technology systems
- Technical Sales and Marketing
- Construction or project management for assembly and execution
- Project or department management for quotation and order processing

7.2.3 Practical courses (PLV)

The practical training is accompanied by a preparatory introductory block before the practical study semester and a final block after the practical semester. For more information, see Chap. 2.4.

7.3 Evidence

- Training contract according to the specifications of the traineeship office
- Trainee report as a technical report
- Certificate of the company on the success of the training

7.3.1 Trainee Report (Technical Report)

Due to the "Framework Examination Regulations for Universities of Applied Sciences in Bavaria (RaPO)", the student is obliged to prepare a report in due time in accordance with the faculty, which shows the course of the practical training.

The timely submission as well as the form and content of the report will be appreciated in the decision on the successful completion of the practical study semester.

7.3.2 Submission of the report

By the date specified in the timetable of the Traineeship Office, the report must be submitted at the latest to:

Rosenheim Technical University of Applied Sciences InternshipOffice Hochschulstraße 1 83024 Rosenheim

7.3.3 Form and arrangement of the report

The report is to be examined by the internship office and lecturers in specified sections within a short processing period. For this reason, the external form must be suitable for quick division:

1. In a labelled envelope folder (please use "Jurismappe", no folders), format DIN A4 are to be filed in the following order:
2. Form **Cover Sheet** (Form Cover Sheet General Report)
3. Form of **training contract** with proof (18 weeks)
4. Form(s) **Certificate of** the training place(s)
5. One page company and activity description in **duplicate**. The company/activity description should contain the most important information/characteristics about the training

company. Furthermore, the most important activities with which the student was involved are listed here in key words (reference to the respective subreport). Finally, there is a short statement on the company and the internship from the student's point of view. This page is not signed off by the training company

6. Participation list of the PLV dates
7. Two independently written sub-reports, the content of which relates to two different subject areas. At least one of the two reports is to be written in English (for further information see No. (3) Sub-reports). Submission of the partial reports incl. appendix in printed as well as electronic version (CD, zip file, etc.) in PDF format. The naming of the electronic storage data should correspond to the following pattern: Year_Name_FirstName_Matriculation_Number

You can find the forms under Praxissemester

7.3.4 Partial reports

The two sub-reports are technical reports on issues of practical activity selected by the student themselves. They serve to verify whether the intern has dealt in depth with engineering issues in practice in accordance with the objective. The reports must show that the performance of the task was predominantly an independent engineering activity (no general descriptions and literature citations!). It is assumed that the partial reports meet the requirements for scientific work. The **length of** each partial report is at least 10 pages, max. 15 pages DIN A4 with typewriting. This may also include documents which the trainee has prepared independently for the training company (but at least 5 pages of new work in accordance with the above-mentioned structure). Company and office documents (information leaflets, brochures, plans, etc.) can certainly be added to the appendix of the partial report. In this case, as in the drafting of the partial reports, care must be taken not to violate the duty of confidentiality. However, such supplements are not counted towards the required minimum scope of the overall report. All documents of a partial report must be listed on the cover sheet. The sub-reports build on the subject knowledge at the end of the 4th semester; i.e. contexts known from the studies do not have to be repeated, but can be taken for granted by the reader.

The following structure is recommended for the sub-reports:

- Task and objective
- Preliminary work (evaluation of literature and standards, data procurement, work equipment, planning of implementation)

- Execution of the task
- Results and findings
- Critical statement, conclusion, if necessary outlook (suggestions for improvement)
- References and sources

Each sub-report receives its own cover sheet (form - cover sheet sub-report) with at least the following information:

- Name of the trainee
- Internship company, department, supervisor
- Signature of the training officer / supervisor of the company

There is no obligatory format template for the partial reports. Attention should be paid to the following features:

- technically clear, concise formulations
- Quality of language that is also expected of an engineer in a managerial position in later professional life.
- Text pages DIN A4, max. font size 12, line spacing 1.5
- clear graphical representations and tables;
- Drawings (CAD or clean hand drawings / sketches) with title block, folded to DIN A4

7.4 Practical courses (PLV)

The practical training is accompanied by a preparatory introductory block before the practical study semester and a final block after the practical study semester.
The introductory block serves to teach the topics of presentation techniques, working techniques and thought models for carrying out engineering activities, as well as the teaching of “soft skills” in everyday professional life. Furthermore, the introductory block includes a usually one-week excursion in the 5th semester. Here, the students are to gain an insight into the practical activities of the companies. In the final block, a **15-minute presentation** followed by a professional discussion about the activities in the practical training is required. **Successful participation in all three parts** is a prerequisite for recognition of the practical study semester!

7.4.1 Excursion

At the beginning of the summer semester (5th semester), there is a one-week excursion to various companies and construction sites in the industries surrounding energy and building technology and related areas (e.g. supplier industry). Participants of the excursion are those students who are in the 3rd (repeater) and 4th study semester in the summer semester. Participation in the excursion is a prerequisite for entry into the practical study semester. In special cases (e.g. proven illness), the excursion can be made up for after the practical study semester. The excursion is accompanied by two lecturers who teach in the Energy and Building Technology programme. However, the organisation of the excursion is primarily the responsibility of the students themselves. The accompanying lecturers coordinate and supervise the organisation, which takes place regularly during the preceding winter semester.

7.4.2 Introductory block

The introductory block serves as preparation for the activities in the practical study semester. Proven participation is a prerequisite for entry into the practical study semester. It consists of the following parts:

- Participation in the final block of students of the preceding practical study semester at the beginning of the 3rd and 4th semester.
- Participation in the PLV dates during the 4th semester on various topics preparing for practical work. The topics are selected anew each semester. Here are some examples of topics:
  - Presentation techniques
  - Scientific working techniques / literature and database research
  - Time management, correspondence
  - Various specialist lectures, etc.

All events of the introductory block will be announced in good time via the community. Furthermore, students must have their participation in the events confirmed (attendance lists). Students receive the attendance list, which must be maintained personally, from the Internship Officer at the beginning of the semester (introductory event PLV). The attendance list of the PLV dates is to be attached to the internship reports.

7.4.3 Closing block

In the final block, students present their experiences after their practical semester in the form of a 15-minute presentation (10 min. presentation, 5 min. discussion). Usually, the final block takes place in the last week of the semester break (approx. 2 days in the 2nd week of March). Prerequisite for successful participation in the final block is:

- an at least sufficient evaluation of the technical report and the unit

The presentation should give a brief account of the company and a more detailed account of the experience gained there. The projects in which the trainee has been involved and the activities of the trainee during his/her training period should be presented. It is customary to explain the topics already presented in the technical report in more detail in the presentation. Attention should be paid to the following points:

- Compliance with the presentation time (10 min.)
- Support the lecture with slides, samples, PC presentation, etc.
- Clear, logical structure of the presentation

The presentation can be given either in German or English.

7.5 Internship contract

The trainee relationship becomes legally binding through the training contract to be concluded between the company and the trainee. The contract specifies all rights and obligations of the trainee and the training company as well as the type and duration of the internship.

7.6 Training support

The internship is considered tertiary education and is therefore eligible for BAföG funding. The trainee should contact the competent authority in his/her place of residence for the grant.

7.7 Compulsory insurance

Attention must be paid to health and accident insurance cover. Questions of compulsory insurance are regulated by the relevant laws.

8 Bachelor Thesis

8.1 General

The **Bachelor's Thesis** should show that the student is able to work on a problem independently on a scientific basis within a given period of time. The topic of the respective thesis should be handed out by the beginning of the 8th semester at the latest. The Bachelor's thesis shall be issued, supervised and evaluated by two lecturers teaching in the EGT degree programme, at least one of whom must be a full-time professor. The student shall be given the opportunity to propose a topic and a supervisor. This does not constitute a legal claim. Upon request, the examination board shall ensure that the candidate receives a supervisor and a topic for the Bachelor's thesis in good time.

The final paper may also be submitted in the form of a group paper if the contribution of the individual students to be assessed as an examination performance is clearly distinguishable and assessable on the basis of the specification of sections, page numbers or other objective criteria that enable a clear demarcation.
According to RaPO § 8 "Standard dates and deadlines", Paragraph 3, Sentence 3, all examinations must be completed by the end of the 10th semester. (8 semesters standard period of study plus a maximum of 2 semesters extension). Thus, the submission and presentation of the Bachelor's thesis must be completed by then and will otherwise be automatically assessed as failed.

The **approval of the topic** shall be made by the chairperson of the examination board. The date of issue is to be recorded. The **period** from the issue of the topic to its submission is **five months**. In exceptional cases, the time limit may be extended by up to three months by the examination committee in agreement with the supervisor. The topic, task and scope of the final dissertation must be limited in such a way that the deadline for completion can be met. The topic may only be returned once, for a valid reason and with the consent of the chairperson of the examination committee. The Bachelor's thesis may not be returned if the student repeats the thesis and has already returned the topic when writing thier first thesis. The processing period of five months begins anew with the issue of the second topic.

If the **deadline** is not met, the paper is graded as "failed" (ECTS grade F), unless the student is not responsible for the failure to meet the deadline. When handing in the work, the candidate has to assure in writing that they have written thier work or, in the case of a group work, thier correspondingly marked part of the work independently and that they have not used

any sources and aids other than those indicated and has marked citations. The assurance also extends to graphical representations and to software attached or used as a basis. The Bachelor thesis is assessed by two examiners, one of whom must be a professor (i.e. in the case of assessment by a teacher for special tasks, the second examiner must be a professor). The thesis is considered to have been passed if it has been assessed with at least “sufficient”. The assessment procedure should not exceed four weeks.

A Bachelor’s thesis assessed with the grade “not sufficient” can be repeated once with a new topic. In case of repetition, the following regulation applies according to the RaPO:
“If the Bachelor thesis was assessed with the grade”not sufficient”, it can be repeated once with a new topic. The processing period for the Bachelor’s thesis to be repeated begins at the latest six months after the announcement of the first assessment. ”

The examination board may grant an appropriate extension upon application if the processing deadline cannot be met due to illness or other reasons for which the candidate is not responsible. The existence of a non-justifiable reason must be made credible. In case of illness, a medical certificate must always be submitted.

8.2 Presentation/oral examination

In the presentation, the results of the Bachelor thesis are presented. The presentation should show that the student can discuss scientific questions and present results clearly. The presentation is usually to be made **within 4 weeks after submission** of the Bachelor thesis.
The presentation lasts **30 minutes**. The examiners determine the grade after the presentation. Students, employees of the university and guests may attend the presentation as audience members, subject to the number of seats available. Participation does not extend to the deliberation and to the announcement of the examination result. For important reasons or at the candidate’s request, the public is to be excluded.

8.3 External Bachelor Thesis

The implementation of projects within the framework of final theses in or for companies and authorities is a long-standing practice at Rosenheim Technical University of Applied Sciences. It is welcomed and encouraged for mutual benefit. The following point should be noted for external Bachelor’s theses: The company should grant the two examiners access at their

request so that they can inform themselves on site about the subject and progress of the work.

8.4 Registration of the Bachelor thesis

The application form **"Antrag auf Themenausgabe für die Abschlussarbeit"** is available on the internet at.

The student independently takes care of the choice of the topic and the two examiners, i.e. agrees with them on the topic in terms of title and content. In the case of additional supervision by an external institution, this institution must be consulted for coordination. The student obtains the signatures of the examiners and, if applicable, of the external institution. It should be noted that the **signature date of the first examiner is later used as the registration date**.

Within a maximum of 14 calendar days, the student shall arrange an appointment with the chairperson of the examination board of the EGT degree programme. This

- checks the application with regard to topic wording (later changes - including spelling - are not possible),
- checks the choice of examiners (examiners must always be lecturers teaching at EGT; at least one of them must be a full-time professor),
- checks the formal framework conditions (e.g. 80 ECTS as well as successfully completed practical semester; in general, the examination regulations apply),
- determines the submission date (5 months - see study examination regulations),
- signs the application.

The student independently prepares and distributes the copies of the application form for:

- the Chairperson of the Examination Commission
- the first examiner
- the second examiner
- If applicable, the external institution
- themselves (a copy must be enclosed later when handing in)

The original must be handed in at the examination office.

8.5 Requirements for the Bachelor Thesis

The Bachelor's thesis must be handed in completely and on time to the examination office.

The Bachelor thesis is considered complete if it contains the following:

- For the two examiners: Two bound copies of the thesis (no spiral binding), each including a CD. All copies remain with the Rosenheim Technical University of Applied Sciences. A copy of the application, if necessary with a blocking note (for the information of the library), is to be inserted in one copy. The CD in the bound copies contains the complete thesis and appendices as PDF files, as well as any calculation files in Excel format or results from industry software.
- For the library: A CD containing only the PDF file of the thesis (with appendix). Other formats are not permitted, otherwise the work cannot be published. In addition, the entry form must be submitted in printed form together with the CD and sent to the library by e-mail.
- Title page (1st page) and explanation (last page)
- Half-page abstract of the paper before the table of contents, as well as 3 to 5 keywords on the content of the paper.
- Text pages with numbered pages, illustrations, tables and bibliographical references
- Enclosed drawings and tables are to be folded according to standards, in a glued-in insert pocket, and enclosed with the work. Compilation of the literature used (journal articles, books, internet, etc.)

8.6 Bachelor's certificate and academic degree

If all examinations have been passed and the Bachelor's thesis has been assessed with at least "sufficient", the graduate will receive a **certificate within a few weeks after the presentation** in which all academic achievements are listed together with the respective credit points. Grades are listed for the course achievements in connection with which the graduate has taken a course-related examination. In addition, the certificate shall contain the chosen major field of study, the topic and grade of the Bachelor's thesis as well as the overall grade. The certificate is signed by the chairperson of the examination board. In addition, the graduate receives a certificate of equivalence of the certificate in English.
By issuing a certificate, the graduate of the **Bachelor's degree** programme is awarded the

academic degree “Bachelor of Engineering”, abbreviated to “B.Eng.

9 Dual Study Option “Study with In-Depth Practical Experience”

9.1 Admission Requirements

In order to be able to complete the study programme in in-depth practice, the following requirements must be met:

- Application to a practice partner of the International Bachelor of Engineering degree programme at Rosenheim Technical University of Applied Sciences.
- The cooperation between the practice partner and the higher education institution must be regulated by a cooperation agreement.
- Conclusion of the education contract (supplementary agreement on dual study with a practice partner). The educational contract regulates and documents, among other things, the agreements on the practical phases in the company.
- Application for a place on the International Bachelor of Engineering degree programme at Rosenheim Technical University of Applied Sciences.
- Enrolment for the EGT degree programme.

Please contact the central student advisory service of Rosenheim Technical University of Applied Sciences to clarify whether all requirements are met. In particular, if there is a wish to conclude an educational contract with a company or organisation with which there is not yet a cooperation agreement with Rosenheim Technical University of Applied Sciences.

10 General

The dual practice-integrated study variant “Study with in-depth practice” of the International Bachelor of Engineering - Energy and Building Technology degree programme comprises, like the regular variant, 25 basic or subject-specific modules, as well as two elective modules. The two specialisations each comprise 7 modules. The basic and subject-specific modules are compulsory for all students and comprise 124 credit points. Within the scope of the subject-specific specialisation in the two specialisations, a total of 29 ECTS must be earned.

The subject-specific elective module (FWPM) and the elective module for the acquisition of interdisciplinary competences (AWPM) each comprise 5 ECTS.
The 10-week preliminary practice is to be carried out at the cooperation partner.
Three practice modules, the project work, the courses accompanying the practice and the completion of the Bachelor's thesis at the sending practice partner ensure a systematic dovetailing of the content of the two learning locations of the university and the practice partner. The sum of the credit points of the practice-oriented modules at the learning location practice partner is 42 ECTS. In addition, the non-credited additional company practice is bindingly agreed in the education contract (see Appendix Practical phases in the education contract). This allows the skills acquired in the study programme to be applied and deepened. The students already gain work experience during the study period. Depending on the orientation of the practice partner, the respective focus "Energy Technology" or "Building Physics and Building Technology" must be taken. The content of the modules is aligned with the fields of activity of the partner companies. The knowledge acquired during the study programme can be applied and deepened during the practical phases.

10.1 Modul Plan and Time Regulations

The requirements for entry into the 4th semester are defined in the current version of the Study and Examination Regulations (SPO) for the Energy and Building Technology degree programme, which is published by the Examinations Office.

The dual study option Energy and Building Technology is made up of six module blocks:

- Mathematical-scientific foundation modules
- Engineering fundamentals modules
- Subject-specific modules
- Electives
- Focus modules
- Professional experience and independent work

The module plans for the two focal points are now shown below with the timing and weighting of the modules:

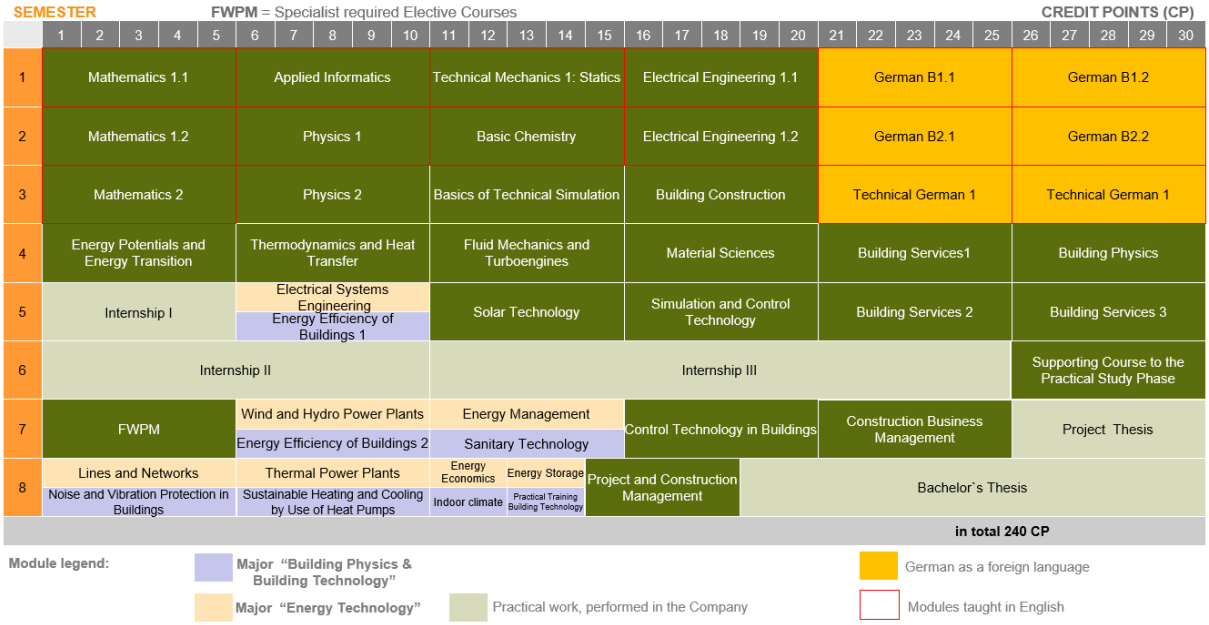

Figure 4: Curiculum Energy and Building Technology DUAL

The following illustration shows the flow chart of the study model with "study with in-depth practice" for the EGT degree programme:

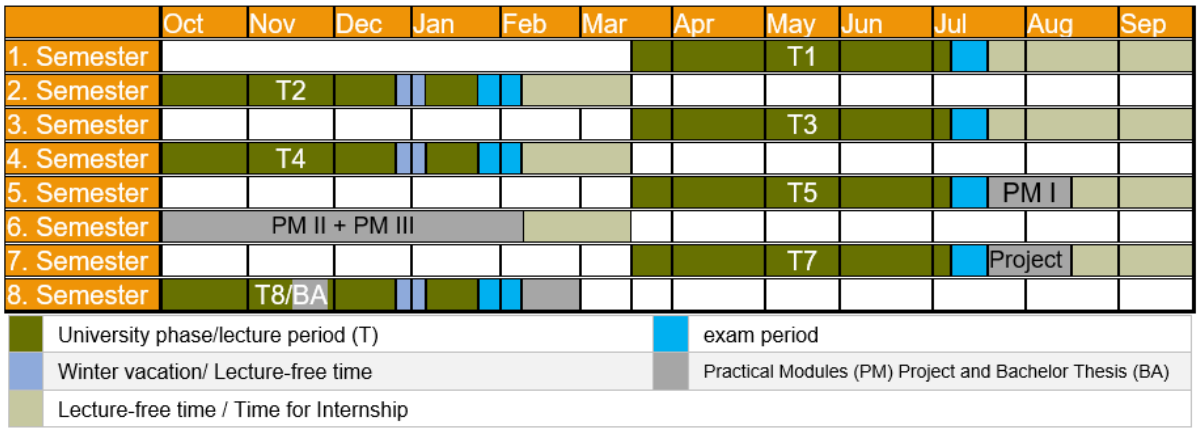

Figure 5: study with in-depth practice

In total, the sum of the internship months without Bachelor thesis is 13.5 months with the practice partner. The Bachelor's thesis must be completed within 5 months. In total, this results in up to 18.5 months of practical experience for the entire duration of the degree

programme. Further details are regulated in the education contract (appendix practical phases).

11 Internationalisation / Study-related stays abroad

The International Bachelor of Engineering programme recommends spending an internship semester or a theory semester abroad during your studies. Rosenheim Technical University of Applied Sciences offers support for both projects through the International Office. The following describes how the stay abroad can be integrated into the course of studies.

11.1 Mobility window for internships abroad

The 18-week internship accompanying the studies can be completed at home or abroad. If the study-related internship is to be completed abroad, it is particularly suitable to do it as a practical semester in the 6th semester (mobility window). It is recommended to consult with the representative for the practical semester before taking up an internship abroad.

General information on the internship semester can be found under Internship Office. Information on internships abroad can be found under International Office.

11.2 Mobility window for studying abroad

In principle, the study and examination achievements obtained abroad can be credited to the studies at Rosenheim Technical University of Applied Sciences, provided that there are no significant differences with regard to the competences acquired.

In the **study model with a practical semester**, the 6th semester is recommended for a study semester abroad. These semesters contain many courses that facilitate the recognition of study and examination achievements abroad, amounting to up to 30 ECTS credits per semester.

Note 1:
The creditability of modules taken at foreign universities must be clarified with the examination board **prior to the stay** abroad. **The eligibility will be checked favourably**.

Note 2:
The module group of practical courses can usually also be taken in Rosenheim during a stay abroad in the 6th semester, as the courses take place either asynchronously online or as block courses in the last two weeks of March before the start of the lecture period of the summer semester. Please inform yourself about this in advance.

Further information:

- Information on studying abroad can be found at International Office
- Information on the recognition of study achievements from abroad can be found at International Office - Recognition of Study Achievements
- The exchange programme of the programme's partner universities can be researched under Partner universities recherchiert werden.
- Information about a semester abroad as a freemover (i.e. outside the university partnerships of the faculty) can be found here.

12 Contact person

Secretariat:

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13 Module Descriptions

Version a1a207e6 for students
according to the SPO of May, 6th 2022

Module name	German B1.1		
Number(s)	**Abbreviation**	**Curriculum semester**	**ECTS**
IBR11		1	5
Responsible for the module	**Lecturer(s)**	**Teaching form**	**SWS**
Barbara Lembcke	Janika Hausner	SU	4
Form of examination	**Module duration**	**Module rotation**	**Language**
see SPO	1 Semester	Summer semester	German / Englisch
Total workload	**= Presence**	**+ Self-study**	**+ Exam preparation**
150 h	60 h	60 h	30 h

Applicability of the module in the degree programmes

IBE

Mandatory requirements according to examination regulations

-

Recommended prerequisites

A2 completed according to CEFR

Intended learning objectives

Advanced language use B1.1 according to CEFR
The students can

- understand frequently used expressions and clear standard language relating to study, work and leisure
- cope with most everyday situations in the language area
- express themselves simply and coherently on familiar topics and personal areas of interest
- report on experiences and events
- Describe hopes and goals
- give brief reasons and explanations for plans and views
- use some more complex grammatical structures.

Content

B1.1 (The module comprises parts of level B1)

- Teaching and examination focus: Speaking and listening comprehension
- Practical language skills for study and everyday life
- Presenting and discussing (oral presentation of one's own opinion with brief justification)
- Vocabulary (expanding the range of vocabulary for everyday life and study, noun-verb combinations, use of vocabulary in context)
- Grammar (perfect / preterite / past perfect, future tense, passive voice, subjunctive II, verbs with prepositions, prepositions, adjective declension, accusative / dative / genitive, connectors and sentence combinations, relative clauses, etc.)
- Pronunciation
- intercultural competence

Recommended literature

- To be announced in the course

Module name	German B1.2		
Number(s)	**Abbreviation**	**Curriculum semester**	**ECTS**
IBR12		1	5
Responsible for the module	**Lecturer(s)**	**Teaching form**	**SWS**
Barbara Lembcke	Janika Hausner	SU	4
Form of examination	**Module duration**	**Module rotation**	**Language**
see SPO	1 Semester	Summer semester	German / Englisch
Total workload	**= Presence**	**+ Self-study**	**+ Exam preparation**
150 h	60 h	60 h	30 h

Applicability of the module in the degree programmes

IBE

Mandatory requirements according to examination regulations

-

Recommended prerequisites

A2 according to GER completed

Intended learning objectives

B1.2 (The module comprises parts of level B1)

- Teaching and examination focus: Writing and reading comprehension
- Practical language skills for study and everyday life
- Emails and written communication
- Written presentation of one's own opinion with brief justification on familiar topics
- Vocabulary (expanding the range of vocabulary for everyday life and study, noun-verb combinations, use of vocabulary in context)
- Grammar (perfect / preterite / past perfect, future tense, passive voice, subjunctive II, verbs with prepositions, prepositions, adjective declension, accusative / dative / genitive, connectors and sentence combinations, relative clauses, etc.)
- intercultural competence

Content
Level B1.2 • Teaching and examination focus: Writing and reading comprehension • Practical language skills for study and everyday life • Mails and written communication • Vocabulary and grammar • Intercultural competence
Recommended literature
• To be announced in the course

Module name	Mathematics 1.1		
Number(s)	**Abbreviation**	**Curriculum semester**	**ECTS**
IBR13	Maths 1.1	1	5
Responsible for the module	**Lecturer(s)**	**Teaching form**	**SWS**
Prof. Dr. Link	Prof. Dr. Link, Dr. Douka	SU	5
Form of examination	**Module duration**	**Module rotation**	**Language**
see SPO	1 Semester	Summer Semester	English
Total workload	**= Presence**	**+ Self-study**	**+ Exam preparation**
150 h	60 h	54 h	36 h

Applicability of the module in the degree programmes
IBE
Mandatory requirements according to examination regulations
none
Recommended prerequisites
General higher education qualification (Abitur), advanced technical college certificate (Fachhochschulreife) or equivalent
Intended learning objectives
The aim is to teach and deepen mathematical basics and their applications. The students are then able to formulate practical problems mathematically and solve them by selecting suitable methods. Due to the knowledge of mathematical basics, the students are able to independently deal with more advanced mathematical methods.
Brief description of the module
The students master the basics of linear algebra and vector calculus. They know the basics of calculus, can confidently deal with functions of a variable and are proficient in differential and integral calculus in a variable. They can handle and apply complex numbers.

Content

Lecture:

- Basics
- Linear algebra
- Differential and integral calculus of a variable
- Introduction to complex numbers

Exercises

Exercises accompanying the lectures

Recommended literature

- G. James, P. Dyke: Modern Engineering Mathematics, Pearson, 6th edn. , 2020
- G. James, P. Dyke: Advanced Modern Engineering Mathematics, Pearson, 4th edn. , 2011
- E. Kreyszig,: Advanced Engineering Mathematics, John Wiley & Sons, 10th edn. , 2011

Module name	Electrical Engineering 1.1		
Number(s)	**Abbreviation**	**Curriculum semester**	**ECTS**
IBR14	EE1	1	5
Responsible for the module	**Lecturer(s)**	**Teaching form**	**SWS**
Prof. Dr. Stubenrauch	Prof. Dr. Stubenrauch, Prof. Dr. Hagl	SU,Pr	4
Form of examination	**Module duration**	**Module rotation**	**Language**
see SPO	1 Semester	Summer Semester	English
Total workload	**= Presence**	**+ Self-study**	**+ Exam preparation**
150 h	60 h	54 h	36 h

Applicability of the module in the degree programmes

IBE

Mandatory requirements according to examination regulations

none

Recommended prerequisites

- Physical units and their conversion
- Angular, exponential and logarithmic functions
- Linear systems of equations with several unknowns
- Basic differential and integral calculus

Intended learning objectives

- are confident in the use and conversion of units
- apply modeling techniques in electrical engineering and describe the limited range of model validity
- are familiar with basic electric circuit devices and their voltage/current behavior
- simplify and solve DC circuits in a systematic fashion
- solving linear first order systems in time domain
- know the basic concepts of AC theory and measurements
- and apply computer-aided simulation methods (LTspice) to verify their calculations

Content

- Systems of units
- Basic electrotechnical quantities (charge, voltage, potential, current, work, power, resistance, conductance)
- Electronic components and circuit models (voltage/current source, Resistor, Diode, Transistor)
- Calculation of DC networks with standard methods (Ohm's Law, Kirchhoff's Laws, series- and parallel connection, source transformations, superposition)
- LTspice for simulation and verification of electrical circuits
- Operational amplifier circuits
- Capacitors and Inductors
- Analysis of first order circuits
- Basic AC circuit analysis

Recommended literature

- C. Alexander, M. Sadiku: Fundamentals of Electric Circuits, Mc Graw Hill, 7th Edition, 2020
- J.M. Fiore: DC Electrical Circuit Analysis: A Practical Approach, online available @dissidents (Creative Commons license), 2022, http://www.dissidents.com/books.htm

Module name	Applied Informatics		
Number(s)	**Abbreviation**	**Curriculum semester**	**ECTS**
IBR15	AppInf	1	5
Responsible for the module	**Lecturer(s)**	**Teaching form**	**SWS**
Prof. Dr. Klein	Prof. Dr. Klein	SU,Pr	4
Form of examination	**Module duration**	**Module rotation**	**Language**
see SPO	1 Semester	Summer Semester	English
Total workload	**= Presence**	**+ Self-study**	**+ Exam preparation**
150 h	60 h	54 h	36 h

Applicability of the module in the degree programmes

IBE

Mandatory requirements according to examination regulations

none

Recommended prerequisites

none

Intended learning objectives

After successful participation in the course, students are able to

- Understand the basic functioning of a computer
- Understand the computer's internal number representation and use the correct basic data types.
- produce programmes of medium complexity using control structures and functions and observing quality criteria (readability, maintainability and reusability).
- Design and implement algorithms
- use the version management tool Git
- use the C standard library
- analyse and evaluate other people's source code

Brief description of the module

The students learn the basics of procedural programming using the C language. In this context, the basics of computer architecture including memory model and data types are also taught. After successful participation, the students are able to design algorithms and implement programmes using control structures, functions and observing quality criteria.

Content

- Introduction to computer architecture and memory model
- Number systems, coding
- Basic data types and arrays
- Version management using Git
- Control structures
- Functions
- Arithmetic, bitwise and Boolean operators
- C standard library

Recommended literature

- B. Kernighan, D. Ritchie: Programmieren in C. ANSI C, Carl Hanser, 2.Auflage, 1990
- H. Erlenkötter: C:Programmieren von Anfang an, Rowohlt Taschenbuch, 25.Auflage, 1999
- A. Böttcher, F. Kneißl: Informatik für Ingenieure, Oldenbourg Verlag, 3.Auflage, 2012

Module name	Engineering Mechanics 1: Statics		
Number(s)	**Abbreviation**	**Curriculum semester**	**ECTS**
IBR16	Statics	1	5
Responsible for the module	**Lecturer(s)**	**Teaching form**	**SWS**
Prof. Dr. Schinagl, Prof. Dr. Wagner	Prof. Dr. Schinagl, Prof. Dr. Wagner	SU, Ü	4
Form of examination	**Module duration**	**Module rotation**	**Language**
see SPO	1 Semester	Summer semester	English
Total workload	**= Presence**	**+ Self-study**	**+ Exam preparation**
150 h	60 h	54 h	36 h

Applicability of the module in the degree programmes

IBE

Mandatory requirements according to examination regulations

none

Recommended prerequisites

Knowledge of mathematics and physics according to the contents of the FOS-Technology course or the Abitur (A-levels).

Intended learning objectives

After successful participation in the module courses, students are able to

- apply engineering-recognised methods of rigid-body statics to analyse technical components and assemblies under point and distributed loads with regard to internal and external forces, moments and their local curves.
- structure practical technical-mechanical systems.
- use the mathematical relationships generated with it for calculations.
- understand important special cases and apply the methods learned to them.
- document the methodical procedure for solving problems from structural analysis in a form-appropriate and comprehensible manner.

Brief description of the module

The course “Statics” is the first and essential part of technical mechanics. Here, the basics and methods for the calculation of internal and external forces and moments on static single and multi-body systems are taught. These basics are based on the equilibrium of forces and moments, which leads to mathematical equations and their solution via the free-cutting method. Important special cases, such as surface or wrap-around friction or distributed loads, are taken into account. Statics forms the basis for many other engineering fields and teaching modules.

Content

- Terms, basic laws, basic tasks of statics
- Central, plane force system
- Force, force couple and moment of a force
- Resultant force of a non-central planar force system
- Stock reactions
- Spatial force system
- Focus
- Internal forces and moments, internal force curves also under distributed loads
- Friction

Recommended literature

- Skript and Formulary
- M.Mayer: Technische Mechanik, Carl Hanser, 9th Edition, 2021
- D.Gross, W.Hauger, J.Schröder, W.A.Wall: Technische Mechanik 1:Statik, Springer Vieweg, 14th Edition, 2019
- C. Eller: Holzmann/Meyer/Schumpich Technische Mechanik Statik, Springer Vieweg, 15th Edition, 2018
- R.C. Hibbeler: Engeneering Mechanics: Statics, Pearson, 15th Edition, 2022
- D. Gross et. Al.: Statics – Formulas and Problems: Engineering Mechanics 1, Springer, 1st Edition, 2022

Module name	German B2.1		
Number(s)	**Abbreviation**	**Curriculum semester**	**ECTS**
IBR21		2	5
Responsible for the module	**Lecturer(s)**	**Teaching form**	**SWS**
Barbara Lembcke	Frau Hausner	SU	4
Form of examination	**Module duration**	**Module rotation**	**Language**
see SPO	1 Semester	Winter semester	German / English
Total workload	**= Presence**	**+ Self-study**	**+ Exam preparation**
150 h	60 h	60 h	30 h

Applicability of the module in the degree programmes

IBE

Mandatory requirements according to examination regulations

-

Recommended prerequisites

B1 according to GER completed

Intended learning objectives

Independent use of language B2 according to CEFR
The students can

- understand the main content of complex texts on concrete and abstract topics and on specialist discussions in their own area of specialisation
- communicate so spontaneously and fluently that a conversation with native speakers is possible without major effort on either side
- express themselves on a wide range of topics
- explain a point of view on a topical issue and state the advantages and disadvantages of various options.

Students have all the essential grammatical knowledge of the target language.

Content
B2.1 (The module comprises parts of level B2) • Teaching and examination focus: Speaking and listening comprehension • Practical language skills for study and everyday life • Presenting and discussing (detailed explanation of one's own point of view with advantages and disadvantages on current topics) • Description and brief interpretation of graphs and other charts • Vocabulary (deepening the known vocabulary spectrum and expanding it to include a subject-specific and a broad general range of topics, context-safe use, variation in language and expression) • Grammar (verbs, nouns and adjectives with prepositions, passive voice, connectors and conjunctions, subjunctive I and II, subjective meaning of modal verbs, etc. - precise use of all essential grammar structures in context) • Pronunciation • intercultural competence
Recommended literature
• To be announced in the course

Module name	German B2.2		
Number(s)	**Abbreviation**	**Curriculum semester**	**ECTS**
IBR22		2	5
Responsible for the module	**Lecturer(s)**	**Teaching form**	**SWS**
Barbara Lembcke	Frau Hausner	SU	4
Form of examination	**Module duration**	**Module rotation**	**Language**
see SPO	1 Semester	Winter semester	German / English
Total workload	**= Presence**	**+ Self-study**	**+ Exam preparation**
150 h	60 h	60 h	30 h

Applicability of the module in the degree programmes

IBE

Mandatory requirements according to examination regulations

-

Recommended prerequisites

B1 according to GER completed

Intended learning objectives

Independent use of language B2 according to CEFR
The students can

- understand the main content of complex texts on concrete and abstract topics and on specialist discussions in their own area of specialisation
- communicate so spontaneously and fluently that a conversation with native speakers is possible without major effort on either side
- express themselves on a wide range of topics
- explain a point of view on a topical issue and state the advantages and disadvantages of various options

Students have all the essential grammatical knowledge of the target language.

Content
B2.2 (The module comprises parts of level B2) • Teaching and examination focus: Writing and reading comprehension • Practical language skills for study and everyday life • Writing a graphic analysis and a short discussion • Vocabulary (deepening the known vocabulary spectrum and expanding it to include a subject-specific and a broad general range of topics, context-safe use, variation in language and expression) • Grammar (verbs, nouns and adjectives with prepositions, passive voice, connectors and conjunctions, subjunctive I and II, subjective meaning of modal verbs, etc. - precise use of all essential grammar structures in context) • intercultural competence
Recommended literature
• To be announced in the course

Module name	Mathematics 1.2		
Number(s)	**Abbreviation**	**Curriculum semester**	**ECTS**
IBR23	Maths 1.2	2	5
Responsible for the module	**Lecturer(s)**	**Teaching form**	**SWS**
Prof. Dr. Link	Prof. Dr. Link, Dr. Douka	SU	4
Form of examination	**Module duration**	**Module rotation**	**Language**
see SPO	1 Semester	Winter Semester	English
Total workload	**= Presence**	**+ Self-study**	**+ Exam preparation**
150 h	60 h	54 h	36 h

Applicability of the module in the degree programmes
IBE
Mandatory requirements according to examination regulations
none
Recommended prerequisites
General higher education qualification (Abitur), advanced technical college certificate (Fachhochschulreife) or equivalent
Intended learning objectives
The aim is to teach and deepen mathematical basics and their applications. The students are then able to formulate practical problems mathematically and solve them by selecting suitable methods. Due to the knowledge of mathematical basics, the students are able to independently deal with more advanced mathematical methods.
Brief description of the module
The students master the basics of linear algebra and vector calculus. They know the basics of analysis, can confidently deal with functions in several variables and are proficient in differential and integral calculus in several variables. Furthermore, the students are able to apply the basic integral transformations and the corresponding inverse transformations to elementary functions.

Content

Lecture:

- Basics
- Linear algebra
- Differential and integral calculus in several variables
- Integral transformations

Exercises

Exercises accompanying the lectures

Recommended literature

- G. James, P. Dyke: Modern Engineering Mathematics, Pearson, 6th edn. , 2020
- G. James, P. Dyke: Advanced Modern Engineering Mathematics, Pearson, 4th edn. , 2011
- E. Kreyszig,: Advanced Engineering Mathematics, John Wiley & Sons, 10th edn. , 2011

Module name	Physics 1		
Number(s)	**Abbreviation**	**Curriculum semester**	**ECTS**
IBR24	Physics 1	2	5
Responsible for the module	**Lecturer(s)**	**Teaching form**	**SWS**
Prof. Dr. Stanzel	Prof. Dr. Stanzel	SU,Pr	5
Form of examination	**Module duration**	**Module rotation**	**Language**
see SPO	1 Semester	Winter Semester	English
Total workload	**= Presence**	**+ Self-study**	**+ Exam preparation**
150 h	56 h	70 h	24 h

Applicability of the module in the degree programmes

In IBE

Mandatory requirements according to examination regulations

none

Recommended prerequisites

Mathematics and science school education:

- Knowledge of vector calculus (understanding the meaning of scalar and vector product)
- Be able to carry out a curve discussion of simple functions
- Understand the meaning of integration and differentiation of simple functions, be able to perform differentiation and integration of simple functions.
- Understand and calculate exponential and logarithm functions
- Understand and calculate trigonometric functions (sin, cos, tan)
- Be able to solve linear and quadratic equations

Intended learning objectives

After successful participation in the seminar-based teaching, students will be able to …

- Calculate safely with physical quantities and units including prefixes and powers and include them in all calculations.
- Understand and confidently apply the basic kinematic relationships between displacement, velocity and acceleration in translation and circular motion.
- Define the fundamental concept of force and describe the types of force.
- Use Newton's laws confidently and understand them as an important tool in solving problems.
- Understand and distinguish between the concepts of work, energy and power and apply the mechanical law of conservation of energy when solving problems.
- Set up the equation of motion of the one-mass oscillator for the free, damped and forced case and to discuss and interpret the different solution.
- Get to know different forms and realisations of oscillatory systems including damping and excitation mechanisms.
- Understand the phenomenon of resonance in forced oscillation in particular and understand and interpret the meaning of the amplitude resonance curve (amplitude frequency response).
- Name and distinguish thermal state and process variables.
- Calculate changes of state of the ideal gas and reproduce them in p-V diagrams.
- Name the main laws of thermodynamics and apply them to the evaluation and calculation of thermal processes.
- Safely consider heat capacities, phase transformations and heat transport mechanisms in calculations.
- Comprehend the principle of thermal plants based on circular processes.

Furthermore, after successful completion of the internship, students are able to …

- Independently understand the physical relationships in the context of the subject area.
- Perform uncertainty assessments safely.
- Plan experiments and record measurement data as well as evaluate, critically question and scientifically document the results obtained.
- Support each other through teamwork and to have professional discussions.

Brief description of the module

The module consisted of the blocks Size Units Uncertainty Test, Kinematics, Dynamics 1 (Translation), Vibration and Fundamentals of Thermodynamics. Accompanying the lecture, practical experiments are carried out for the subject area of quantities - units - uncertainty - experiment, for the understanding of the kinematic quantities velocity and acceleration as well as for the understanding of mechanical resonance and thermodynamics.

Content

Quantities, units, measurement and evaluation
Physical quantities, units, orders of magnitude, significant digits, measurement uncertainties, calculating with uncertainties, compensation line, linearisation

Kinematics
Definition and relationship of displacement, velocity and acceleration as vectorial quantities, special cases: rectilinear and circular motion

Dynamics 1
Concept of force and Newton's axioms, examples of forces, work, energy, power, efficiency, mechanical law of conservation of energy

Oscillations Setting up the equation of motion of the single-mass oscillator for the free, damped and forced case including discussion and interpretation of the solution, examples of oscillatory systems including damping and excitation mechanisms, resonance, amplitude resonance curve (amplitude frequency response), phase shift (phase frequency response).

Basics of thermodynamics
Thermal state and process variables, heat capacity, ideal gas, main laws of thermodynamics, cyclic processes, phase transformations, heat transport

Recommended literature

- P. A. Tipler, G. Mosca: Physics for Scientists and Engineers, W. H. Freeman, 6. Auflage , 2007

Module name	Electrical Engineering 1.2		
Number(s)	**Abbreviation**	**Curriculum semester**	**ECTS**
IBR25.2	EE1.2	2	5
Responsible for the module	**Lecturer(s)**	**Teaching form**	**SWS**
Prof. Dr. Stahl	Prof. Dr. Stahl	SU,Pr	4
Form of examination	**Module duration**	**Module rotation**	**Language**
see SPO	1 Semester	Winter Semester	English
Total workload	**= Presence**	**+ Self-study**	**+ Exam preparation**
150 h	60 h	54 h	36 h

Applicability of the module in the degree programmes

IBE

Mandatory requirements according to examination regulations

none

Recommended prerequisites

Contents of the module IBE 14 (Electrical Engineering 1.1)

Intended learning objectives

After successfully completing the module, students are able to:

- calculate the AC behavior of circuits,
- interpret the complex AC calculation for sinusoidal signals of a certain frequency,
- determine voltages, currents, and power values in RL und RC circuits, and in resonant RLC networks.

Brief description of the module

Based on the module IBE14 (Electrical Engineering 1.1), the complex calculation of AC circuits is introduced

Content

- Periodic / sinusodial Signals, Frequency
- Calculation of AC Quantities: Voltage / Current, Power, Energy, Effective values
- Introduction of complex Calculation of sinusodial Voltages and Currents using complex exponential Oscillations
- Complex calculation of Active, Reactive and Apparent Power
- Calculation of RC and LC Filters
- Calculation of RLC Circuits and resonant Circuits
- Basic Observation of Frequency Responses in a Bode Diagram
- Fundamental Principle of the Fourier Analysis of periodic Signals
- Magnetic Circuit and Transformers
- Lab Exercises, Practical Simulation Exercises

Recommended literature

- H. Stahl: Electrical Engineering – AC Circuit Analysis, Handout for the lecture, TH Rosenheim
- J.M. Fiore: DC Electrical Circuit Analysis: A Practical Approach, online available @dissidents (Creative Commons license), 2023, http://www.dissidents.com/books.htm
- J.M. Fiore: AC Electrical Circuit Analysis: A Practical Approach, online available @dissidents (Creative Commons license), 2023, http://www.dissidents.com/books.htm

Module name	Basic Chemistry		
Number(s)	**Abbreviation**	**Curriculum semester**	**ECTS**
IBR25.3	Chem.	2	5
Responsible for the module	**Lecturer(s)**	**Teaching form**	**SWS**
Prof. Dr. Larbig	Prof. Dr. Larbig	SU	4
Form of examination	**Module duration**	**Module rotation**	**Language**
schrP	1 Semester	Winter Semester	english
Total workload	**= Presence**	**+ Self-study**	**+ Exam preparation**
150 h	60 h	60 h	30 h

Applicability of the module in the degree programmes
IBE
Mandatory requirements according to examination regulations
none
Recommended prerequisites
Intended learning objectives
The students understand the structure of atoms and the formation of the different types of chemical bonds. The students can apply different atomic and molecular models to practical tasks. Simple redox equations can be created independently. Electrochemical concepts can be applied to galvanic cells and to issues related to corrosion and corrosion protection.
Brief description of the module
In this module students receive knowledge of basic concepts in chemistry, including atomic models, theories of chemical bonds, electrochemistry and redox equations.

Content

Basics of chemistry

- Atomic models and the chemical bond
- Intermolecular forces
- chemical reactions and stoichiometry
- Fundamentals of organic chemistry Metals and electrochemistry Redox equations Electrochemical series
- galvanic cells
- Corrosion and protection against corrosion
- Electrochemistry

Recommended literature

- lecture notes

Module name	Physik 2		
Number(s)	**Abbreviation**	**Curriculum semester**	**ECTS**
IBR25.7	Physik 2	2, IBE 3	5
Responsible for the module	**Lecturer(s)**	**Teaching form**	**SWS**
Prof. Dr. Schäfle	Prof. Dr. Schäfle	SU,Ü,Pr	5
Form of examination	**Module duration**	**Module rotation**	**Language**
schrP	1 Semester	Sommersemester	deutsch
Total workload	**= Presence**	**+ Self-study**	**+ Exam preparation**
150 h	55 h	75 h	20 h

Applicability of the module in the degree programmes
EGT, IBE
Mandatory requirements according to examination regulations
Zulassungsvoraussetzung zur Prüfung ist das erfolgreiche Bestehen des Praktikums durch Testate(LNmE)
Recommended prerequisites
Physik 1, Mathematik 1
Intended learning objectives
Grundlegende physikalische Konzepte werden richtig angewandt, um physikalisch-technische Probleme, insbesondere der Energie- und Gebäudetechnik und der thermischen und akustischen Bauphysik, zu analysieren und zu lösen. Hierzu werden verschiedene Repräsentationen (sprachliche Erklärungen, Graphen, Tabellen, Gleichungen, Skizzen, Vektordiagramme, Freikörperbilder, Energieflussdiagramme, ...) richtig eingesetzt und passende Berechnungen durchgeführt. Im physikalischen Praktikum werden physikalische Mechanismen und Experimente verbal erklärt, diskutiert und schriftlich im Versuchsprotokoll dokumentiert. Messergebnissen einschließlich Messunsicherheit werden angegeben und kritisch und eigenständig bewertet.
Brief description of the module
Das Modul vertieft und erweitert die Grundlagen der Thermodynamik aus Physik 1 hinsichtlich bauphysikalisch und energietechnische relevanter Themen. In der Fluidmechanik werden Grundlagen gelegt. Die Mechanik starrer Körper erweitert die Dynamik aus Physik 1. Schließlich werden Wellen und Akustik behandelt, wobei auch hier die Anwendungen im bauphysikalischen Bereich liegen. Zur Thermodynamik und Akustik werden verschiedene Praktikumsversuche durchgeführt und wie im Modul Physik 1 beschrieben ausgewertet und interpretiert.

Content

Grundlagen der Thermodynamik Teil 2 (Vertiefungen von Teil 1, u.a. Feuchte, Reales Gas, thermische Maschinen, Entropie, Wirkungsgrade, Maxwell-Boltzmann, thermische Strahlung, Transportphänomene)
Grundlagen der Fluidmechanik (Hydrostatik)
Mechanik starrer Körper (Massenträgheitsmoment, Drehmoment, Rotationsdynamik, Energie und Leistung, Drehimpuls, Unwucht)
Wellen und Akustik (Wellengleichung, Wellenarten, Schallwellen, Schallfeldgrößen, Energietransport, Schalldruckpegel, Frequenzanalyse, A-Bewertung, Interferenz, Beugung)
Physikalisches Grundlagenpraktikum Teil 2

Recommended literature

- P. Tipler, G. Mosca: Physics for Scientists and Engineers, WH Freeman, 6th Edition, 2007
- P. Tipler, G. Mosca: Physik für Studierende der Naturwissenschaften und Technik, Springer Verlag, 8. Auflage , 2019
- R. Knight: Physics for Scientists and Engineers, Pearson, 4th Edition, 2016
- F. Kuypers: Physik für Ingenieure und Naturwissenschaftler Bd. 1, Wiley-VCH, 4. Auflage , 2022
- L. McDermott, P. Shaffer: Tutorien zur Physik, Pearson, 1. Auflage , 2008
- E. Hering, R. Martin, M. Stohrer: Physik für Ingenieure, Springer Vieweg, 13. Auflage , 2021
- P. Dobrinski, G. Krakau, A. Vogel: Physik für Ingenieure, Vieweg Teubner, 12. Auflage , 2010
- H. Kuchling, T. Kuchling: Taschenbuch der Physik, Carl Hanser, 22. Auflage , 2022
- Physik/ Bauphysik - Formelsammlung TH Rosenheim

Module name	Grundlagen der technischen Simulation		
Number(s)	**Abbreviation**	**Curriculum semester**	**ECTS**
IBR 25.15	TechSim	2, IBE 3	5
Responsible for the module	**Lecturer(s)**	**Teaching form**	**SWS**
Prof. Dr. Aschaber	Prof. Dr. Aschaber	SU, Pr	4
Form of examination	**Module duration**	**Module rotation**	**Language**
siehe Ankündigung der Leistungsnachweise / Prüfungsamt	1 Semester	Sommersemester	deutsch
Total workload	**= Presence**	**+ Self-study**	**+ Exam preparation**
150 h	60 h	60 h	30 h

Applicability of the module in the degree programmes

EGT

Mandatory requirements according to examination regulations

keine

Recommended prerequisites

- Solide Kenntnis der Inhalte der Module Mathematik I und Angewandte Physik I
- Abstraktes Denkvermögen
- Logisches und analytisches Herangehen an Problemstellungen

Intended learning objectives

Mit Abschluss dieses Moduls können die Studierenden Datentypen und Ablaufstrukturen in MATLAB unterscheiden, grundlegende Algorithmen für technische Anwendungen beschreiben sowie vollfunktionsfähige Programme in MATLAB implementieren. Eigenständig entwickelte Programme in MATLAB werden zur Lösung ausgewählter Fragestellungen aus der Ingenieurspraxis eingesetzt. Die Studierenden sind in der Lage entwickelte Lösungen kritisch zu bewerten und durch Selbstreflexion und Selbstkritik qualitativ hochwertige Lösungen zu erarbeiten. Die Studierenden führen in kleinen Gruppen gemeinsam Übungen und Praktikumsaufgaben aus. Auf diese Weise wird die Kommunikations- und die Teamfähigkeit gestärkt.

Content

Einführung in die Programmierung mit MATLAB
- Programmumgebung
- Funktionen, Ein- und Ausgabe
- Ablaufstrukturen: Verzweigungen und Schleifen
- Felder und Matrizen

Ausgewählte Algorithmen: Grundlagen und Implementierung
- Lösung nichtlinearer Gleichungen
- Interpolation und Approximation
- Numerische Differentiation
- Finite-Differenzen-Methode zur Lösung der Wärmeleitungsgleichung

Anwendungsbeispiele
- Der freie Fall
- Mechanische Schwingungen
- Wärmeleitungsgleichung

Recommended literature

- U. Stein: Programmieren mit MATLAB: Programmiersprache, Grafische Benutzeroberflächen, Anwendungen, Carl Hanser, 6.Auflage, 2017
- A. Gilat, V. Subramaniam: Numerical Methods with MATLAB, Wiley, 1.Auflage, 2011
- Y. Çengel, A. Ghajar: Heat and Mass Transfer: Fundamentals & Applications, McGraw-Hill, 6.Auflage, 2019
- S. Chapra, R. Canale: Numerical Methods for Engineers, McGraw-Hill, 7.Auflage, 2014

Module name	Gebäudekonstruktion		
Number(s)	**Abbreviation**	**Curriculum semester**	**ECTS**
IBR25.16	GebKon	2, IBE 3	5
Responsible for the module	**Lecturer(s)**	**Teaching form**	**SWS**
Prof. Kühfuss	Prof. Kühfuss, Herr Kessler	SU	4
Form of examination	**Module duration**	**Module rotation**	**Language**
siehe Ankündigung der Leistungsnachweise / Prüfungsamt	1 Semester	Sommersemester	deutsch
Total workload	**= Presence**	**+ Self-study**	**+ Exam preparation**
150 h	60 h	60 h	30 h

Applicability of the module in the degree programmes
EGT
Mandatory requirements according to examination regulations
keine
Recommended prerequisites
Intended learning objectives
Die Studierenden sind in der Lage selbstständig Gebäudetypen sowie deren spezifische Anforderungen zu klassifizieren. Sie kennen die Konstruktionselemente des Hochbaus und sind befähigt Baupläne zu lesen und erforderliche Baumaßnahmen danach abzuleiten. Die Studierenden können einfache Baupläne skizzieren und erstellen

Content

Baukonstruktion

- Grundlagen der Hochbaukonstruktion
- Tragelemente und Baugefüge des Hochbaus
- Konstruktive Elemente und Bauweisen des Hochbaus und ihre Zusammenfassung zu einem Bauwerk
- Maß- und Modulordnung im Hochbau, Maßtoleranzen
- Erweiterung und Sanierung von Gebäuden
- Anfertigung von Bauplänen (Werk- und Detailplanung)

Ausbau

- Gebäudeausbau zur Integration der Gebäudetechnik: Einbauten und Installation für Heizung, Lüftung, Sanitär und Elektro

Recommended literature

- U. Hestermann, L. Rongen: Frick / Knöll, Baukonstruktionslehre Band 1, Springer Vieweg, 36.Auflage, 2015
- U. Hestermann, L. Rongen: Frick / Knöll, Baukonstruktionslehre Band 2, Springer Vieweg, 35.Auflage, 2018
- J. Kister, E. Neufert: Neufert: Bauentwurfslehre, Springer Vieweg, 43.Auflage, 2022
- C. Kaczmarczyk et. al.: Bautechnik für Bauzeichner, Vieweg Teubner, 2.Auflage, 2010
- J. Krass et. al.: Grundlagen der Bautechnik, Europa Lehrmittel, 2.Auflage, 2013

Module name	Technical German 1 – B2/C1		
Number(s)	**Abbreviation**	**Curriculum semester**	**ECTS**
IBR31		3	5
Responsible for the module	**Lecturer(s)**	**Teaching form**	**SWS**
Barbara Lembcke	Frau Hausner	SU	4
Form of examination	**Module duration**	**Module rotation**	**Language**
see SPO	1 Semester	Summer Semester	German / English
Total workload	**= Presence**	**+ Self-study**	**+ Exam preparation**
150 h	60 h	60 h	30 h

Applicability of the module in the degree programmes

IBE

Mandatory requirements according to examination regulations

-

Recommended prerequisites

Level B2 according to CEFR or higher

Intended learning objectives

Specialised language use level B2/C1 according to CEFR
The students can

- understand a wide range of demanding texts
- express themselves spontaneously and fluently without often having to search for clearly recognisable words
- use the language in your studies, social and professional life
- express themselves clearly and in a structured way on complex issues, using various means to link texts.

Content

- Practical language skills for studying
- Oral examination forms in German
- Technical German for engineers
- Grammar
- Vocabulary
- Presenting and discussing
- Pronunciation
- intercultural competence

Recommended literature

- M. Steinmetz, H. Dintera: German for Engineers, Springer Vieweg, 2nd edition, 2018
- Further materials will be announced during the course

Module name	Technical German 2 – B2/C1		
Number(s)	**Abbreviation**	**Curriculum semester**	**ECTS**
IBR32		3	5
Responsible for the module	**Lecturer(s)**	**Teaching form**	**SWS**
Barbara Lembcke	Frau Hausner	SU	4
Form of examination	**Module duration**	**Module rotation**	**Language**
siehe SPO	1 Semester	Summer Semester	German / English
Total workload	**= Presence**	**+ Self-study**	**+ Exam preparation**
150 h	60 h	60 h	30 h

Applicability of the module in the degree programmes

IBE

Mandatory requirements according to examination regulations

-

Recommended prerequisites

Level B2 according to CEFR or higher

Intended learning objectives

Specialised language use level B2/C1 according to CEFR
The students can

- understand a wide range of demanding texts
- express themselves spontaneously and fluently without often having to search for clearly recognisable words
- use the language in your studies, social and professional life
- express themselves clearly and in a structured way on complex issues, using various means to link texts.

Content

- Practical language skills for studying
- Written examination forms in German
- German for engineers
- Writing an internship report
- Grammar
- Vocabulary
- intercultural competence

Recommended literature

- M. Steinmetz, H. Dintera: German for Engineers, Springer Vieweg, 2nd edition, 2018
- Further materials will be announced in the course

Module name	Mathematics 2		
Number(s)	**Abbreviation**	**Curriculum semester**	**ECTS**
IBR33	Maths 2	3	5
Responsible for the module	**Lecturer(s)**	**Teaching form**	**SWS**
Prof. Dr. Link	Prof. Dr. Link, Dr. Douka	SU	4
Form of examination	**Module duration**	**Module rotation**	**Language**
see SPO	1 Semester	Summer Semester	English
Total workload	**= Presence**	**+ Self-study**	**+ Exam preparation**
150 h	60 h	54 h	36 h

Applicability of the module in the degree programmes
IBE
Mandatory requirements according to examination regulations
none
Recommended prerequisites
General higher education qualification (Abitur), advanced technical college certificate (Fachhochschulreife) or equivalent
Intended learning objectives
The aim is to teach and deepen mathematical basics and their applications. The students are then able to formulate practical problems mathematically and solve them by selecting suitable methods. Due to the knowledge of mathematical basics, the students are able to independently deal with more advanced mathematical methods.
Brief description of the module
The students master the basics of vector analysis and can apply them to simple problems. They can solve ordinary differential equations of first and second order. Furthermore, the students are able to apply the basic integral transformations and the associated inverse transformations to elementary functions. They know the basics of numerical mathematics and can apply them to simple problems.

Content

Lecture:

- Vector analysis
- Differential equations
- Integral transformations
- Fundamentals of numerical mathematics

Exercises

Exercises accompanying the lectures

Recommended literature

- G. James, P. Dyke: Modern Engineering Mathematics, Pearson, 6th edn. , 2020
- G. James, P. Dyke: Advanced Modern Engineering Mathematics, Pearson, 4th edn. , 2011
- E. Kreyszig,: Advanced Engineering Mathematics, John Wiley & Sons, 10th edn. , 2011