Technische Hochschule Ingolstadt

Module Handbook

B.Eng. SUSTAINABLE CIVIL ENGINEERING (SPO SS 26)

Faculty of Sustainable Infrastructure

Study and examination regulation SS 26

Created on 12.03.2026

Content

1 Overview

The module handbook describes the individual modules of the degree programme Sustainable Civil Engineering. It describes the course contents, the intended learning outcomes and the examination requirements of the modules. In addition, the objectives of the degree program and possible professional profiles resulting from studying Sustainable Civil Engineering are described.

Name of the Study Programme	Sustainable Civil Engineering
Type of Study Programme & Degree	Undergraduate programme, Bachelor of Engineering (B.Eng.), full-time
Profile §12 (6)BayStudAkkV:	Full-time (also available as a dual study programme)
Initial Start Date	Summer term 2026, annually start
Standard Period of Study	8 Semester (210 ECTS)
Place of Study	THI sustainability campus Neuburg
Language(s) of Instruction	English & German (gradual transition from English to German)
Cooperation according to §§19–20 BayStudAkkV	None
Admission Requirement	University entrance qualification and Language proficiencies: • Beginning of program: English language proficiency level B2 (CEFR) • End of second Semester: German language proficiency level A2 (CEFR) • End of fourth Semester: German language proficiency level B2 (CEFR)

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2 Introduction

2.1 Objective

The objective of the Bachelor's degree programme Sustainable Civil Engineering is to educate students as practice-oriented engineers. The programme provides students with a strong foundation in civil engineering and practical competencies that enable graduates to address the wide range of challenges in civil engineering practice with a particular focus on sustainability.

Civil engineers are responsible for the planning, design, calculation, construction and safe operation of structures. They ensure the safety, serviceability, economic efficiency and sustainability of both new and existing buildings and infrastructure. With its transdisciplinary approach, the programme combines core disciplines of civil engineering with principles of sustainability, environmental sciences and social aspects.

The Bachelor's degree programme, with its focus areas (Studienschwerpunkte), reflects the wide range of fields in civil engineering and allows students to choose courses according to their interests and professional goals.

In addition to technical competencies, students acquire social and methodological skills that enable them to address civil engineering tasks responsibly and to integrate sustainability principles into engineering practice.

2.2 Admission and Language Requirements

Admission to the Bachelor's degree programme requires that applicants meet the general admission requirements for universities of applied sciences.

The programme is governed by the following regulations:

- Studienprüfungsordnung (SPO): Study and Examination Regulations for the Bachelor's degree programme Sustainable Civil Engineering (13 October 2025) including the appendix (7 July 2025)
- Allgemeine Prüfungsordnung (APO): General Examination Regulations of Technische Hochschule Ingolstadt (as amended)
- Immatrikulationssatzung: Enrolment Regulations of Technische Hochschule Ingolstadt (as amended)

Additional language requirements apply in accordance with §4 of the Study and Examination Regulations. If no German-language university entrance qualification is available, applicants must provide proof of the following language qualifications within the specified deadlines:

a) provide proof of sufficient English language proficiency at the beginning of the programme (level B2 or higher according to the Common European Framework of Reference for Languages – CEFR),

b) provide proof of sufficient German language proficiency (level A2 or higher according to the CEFR) no later than the end of the second semester, and

c) provide proof of sufficient German language proficiency (level B2 or higher according to the CEFR) no later than the end of the fifth semester.

If the language certificates required under b) and c) are not provided within the specified deadlines, enrolment will be revoked.

A pre-study internship (Vorpraxis) is not required for admission to the Bachelor's degree programme.

2.3 Target Group

The degree programme is aimed at:

- students with a strong interest in STEM (Science, Technology, Engineering and Mathematics) subjects who wish to shape an individual study profile within a defined academic framework.
- individuals interested in technology and processes who want to understand how infrastructure and buildings are planned, constructed and operated.
- future professionals who aim to contribute to sustainable development in the construction sector and who consider economic, ecological and socio-cultural aspects in planning and construction processes.

2.4 Structure of the Programme

The standard period of study is eight semesters. The programme consists of two study phases. The first study phase (Semester 1 to Semester 3) comprises three theoretical semesters. The second study phase (Semester 4 to Semester 8) comprises four theoretical semesters and one practical semester in the sixth semester.

The programme supports students in gradually transitioning from English to German as the language of instruction. This structure enables international students to start their studies in English while simultaneously developing the German language skills required for professional practice in Germany. From the sixth semester onwards, courses are taught exclusively in German. Students attend the same modules as students of the German-language degree programme *Nachhaltiges Bauingenieurwesen* (NB), and the Bachelor's thesis is written in German.

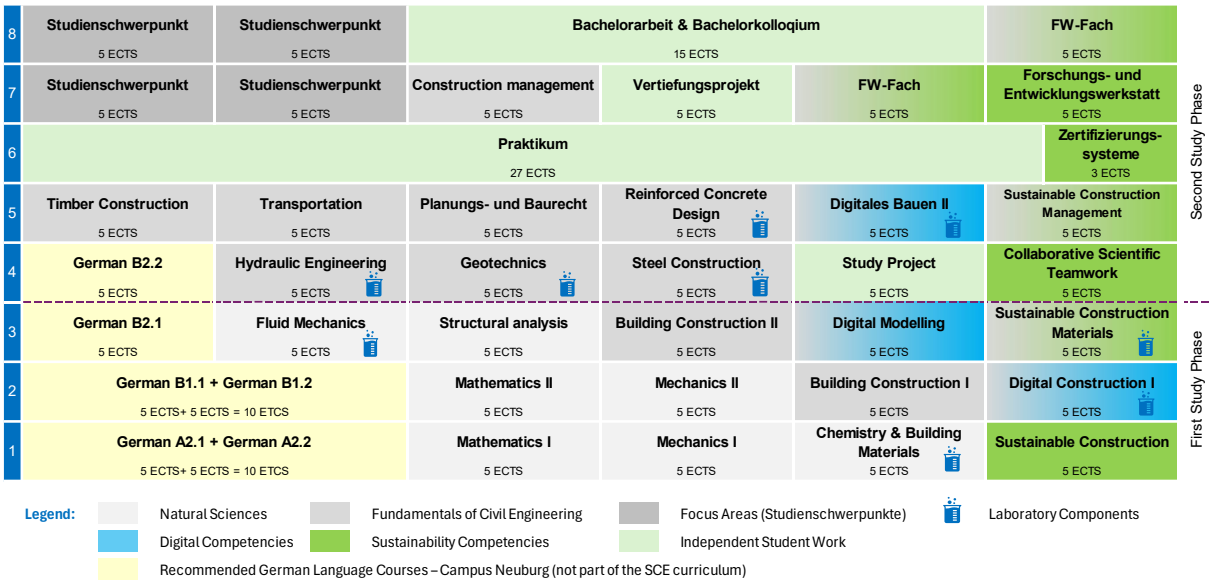
The structure of the programme is organised as follows:

- During the first four semesters, the programme includes an integrated language phase. In this phase, all courses are taught in English. Students may attend optional German language courses at the Neuburg campus. Although these courses are not mandatory, participation is strongly recommended. Proof of German language proficiency must nevertheless be provided in accordance with Section 2.2:
    - By the end of the second semester, students must provide proof of German language proficiency at level A2 or higher according to the CEFR.
    - By the end of the fifth semester, students must provide proof of German language proficiency at level B2 or higher according to the CEFR.
- The fifth semester serves as a transition phase. During this semester, the first courses in German are introduced, while other courses continue to be offered in English, allowing students to gradually adapt to studying in German.
- From the sixth semester onwards, students of the *Sustainable Civil Engineering* (SCE) programme attend the same modules as students of the German-language degree programme *Nachhaltiges Bauingenieurwesen* (NB). Both groups of students study together in the same courses and classes, as the curriculum of both programmes is identical.
- In the sixth semester, students also complete an internship, enabling them to apply their theoretical knowledge in a professional environment and gain practical experience in the construction industry.
- From the seventh semester onwards, focus areas (Studienschwerpunkte) are offered. Students may choose a focus area by the end of the fifth semester. If students do not choose a focus area, they must

select modules from all focus areas with a total of 20 ECTS credits by the end of the fifth semester. These modules are taken in the seventh and eighth semester. Students may change their chosen focus area or modules once before taking the first examination in that focus area.

- In the eighth semester, students complete their Bachelor's thesis.

The following diagram illustrates the structure of the programme. The language of the module title indicates whether the module is taught in English or German.



2.5 Advancement requirements

Second Study Phase

Students may enter the fourth semester only after having obtained at least 42 ECTS credits from the modules of the first study phase.

Internship

Students may begin the internship only after having passed all examinations and assessments of the first study phase and having obtained at least 20 ECTS credits from the compulsory modules of the second study phase.

2.6 Programme Design and Advisory Board

The degree programme was designed by subject experts at Technische Hochschule Ingolstadt in collaboration with representatives from professional practice and is continuously being further developed.

3 Qualification Profile

3.1 Mission Statement

The degree programme directly reflects the general mission statement of Technische Hochschule Ingolstadt: “Personalities and innovations – for a future worth living.” The programme concept addresses the following key principles:

- We develop personalities for the professional world of the future.
- We create innovations and live sustainability – technology and business are our focus.
- We promote knowledge transfer to industry and society.
- We teach, conduct research and work in an international and interdisciplinary environment.
- We act with humanity, passion and openness to the world.

3.2 Programme Objectives

Students acquire a solid foundation in all core fields of civil engineering, complemented by topics related to digitalisation and sustainability.

3.2.1 Discipline-specific Knowledge and Skills of the Programme

Upon completion of the programme, students are able to:

- classify and understand procedures, processes and methods used in civil engineering
- apply common tools used in civil engineering practice
- identify engineering problems in civil engineering and develop appropriate solutions
- develop sustainable construction projects while considering technical, economic and socio-economic aspects

3.2.2 Interdisciplinary Knowledge and Skills of the Programme

Upon completion of the programme, students are able to:

- communicate results clearly and precisely
- apply their analytical skills and technical reasoning in teamwork to develop sustainable solutions
- evaluate solutions from different perspectives and balance ecological, economic, ethical and social considerations in collaborative decision-making
- apply their theoretical knowledge and practical experience in professional engineering practice

3.2.3 Examination Concept of the Programme

The programme uses various forms of assessment to evaluate learning outcomes.

The most frequently used assessment format is the portfolio examination. A portfolio examination consists of two to six components that may be completed during the semester as well as during the examination period and may combine different types of assessment (e.g. written examinations, oral examinations or seminar papers).

Portfolio examinations are intended to promote continuous learning throughout the semester.

3.2.4 Practical Orientation of the Programme

The degree programme was developed in close cooperation with industry and is taught by academic staff with professional experience. It provides practice-oriented content and enables students to gain practical experience.

Laboratory exercises and tutorials link theoretical foundations with practical applications. Interdisciplinary project work brings together the knowledge acquired by students and provides opportunities to collaborate in small teams.

3.2.5 Contribution of Individual Modules to the Programme Objectives

The degree programme provides fundamental knowledge in mathematics, engineering, scientific methods and business management through its compulsory modules. These foundations are complemented by topics related to digitalisation and sustainability.

These foundations are complemented by content related to digitalisation and sustainability.

The following diagram presents the competence matrix of the compulsory modules.

	Technical knowledge and skills					Personal and interpersonal skills			
	classify and understand procedures, processes and methods used in civil engineering	apply commonly used tools in civil engineering practice	identify engineering problems in civil engineering and develop appropriate solutions	develop sustainable construction projects while considering technical, economic and socio-economic aspects	critically analyse data using established scientific methods	communicate results clearly and precisely	apply analytical skills and technical reasoning in teamwork to develop sustainable solutions	evaluate solutions from different perspectives and balance ecological, economic, ethical and social considerations in team-based decision-making	apply theoretical knowledge and practical experience effectively in professional engineering practice
Mathematics I		x			x				
Mechanics I	x	x	x						
Chemistry & Building Materials	x	x	x						
Building Construction I	x	x					x		
Digital Construction I	x	x				x	x		
Sustainable Construction	x	x		x				x	
Mathematics II		x			x				
Mechanics II	x	x	x				x		
Fluid Mechanics	x	x	x		x	x			
Building Construction II		x	x	x		x			
Digital Modelling	x	x	x			x			
Sustainable Construction Materials	x	x	x	x					
Structural analysis	x	x	x				x		
Geotechnics	x	x	x		x	x	x		x
Hydraulic engineering	x	x	x		x	x	x		
Steel Construction	x	x	x			x	x		
Study project				x		x	x	x	
Collaborative Scientific Teamwork			x		x	x	x	x	x
Timber construction	x	x	x			x			
Transportation	x	x	x			x			
Planungs- und Baurecht	x					x		x	
Reinforced concrete design	x	x	x			x			
Digitales Bauen II	x	x							x
Sustainable construction management	x	x	x	x		x		x	x
Construction management	x	x		x		x	x	x	x
Vertiefungsprojekt			x	x	x	x	x	x	
Forschungs- und Entwicklungswerkstatt			x			x	x	x	
Bachelorarbeit		x	x		x	x			x
Bachelorkolloquium			x		x	x		x	
Praktikum		x	x	x		x	x	x	x
Zertifizierungssysteme		x	x	x			x	x	x

3.3 Possible Career Fields

Graduates of the programme are qualified for a wide range of professional activities in the civil engineering sector and are prepared for both technical and managerial responsibilities.

Possible professional fields include:

- structural and building engineering
- infrastructure engineering and construction
- project and construction management
- engineering consulting and planning
- construction materials industry

Typical areas of professional activity for graduates include:

- planning and design of buildings and infrastructure
- management and supervision of construction projects
- technical design and engineering analysis
- consulting and advisory services in engineering projects
- development and implementation of sustainable construction solutions

3.4 Dual Study Programme

In cooperation with selected industry partners, the degree programme can also be completed as a dual study programme. The dual study programme is offered in two formats:

I. as a combined study programme, in which university studies are combined with regular vocational training (apprenticeship), and

II. as a study programme with extended practical phases, in which the regular studies are complemented by intensive practical experience in a partner company.

In both dual study models, university and practical phases alternate regularly throughout the programme, particularly during semester breaks, the practical semester and the preparation of the Bachelor's thesis. Lecture periods in the dual study models correspond to the regular lecture periods at THI.

Due to the extended practical phases, the integration of company-related topics into selected modules and the inclusion of specially designed modules for dual study programmes, students develop strong practical skills as well as company-, discipline- and industry-specific skills. In addition to technical skills, elements of personal development, such as presentation and communication skills, teamwork and work organisation are also promoted. As a result, graduates can be integrated more quickly into departments, projects and processes within construction companies.

The curriculum of the two dual study models differs from the regular study programme as follows:

- In both dual study models, the practical semester is completed in the partner company.
- In both dual study models, the Bachelor's thesis is written in cooperation with the partner company, usually on a practice-oriented topic related to the chosen focus area.

In terms of organisation, the two dual study programme models are characterised by the following components:

- The central contact person for dual students within the faculty is the programme director who organises an annual mentoring meeting with the dual students of the programme.
- Evaluations and surveys conducted at THI for quality assurance of the dual study programme include separate question sections for dual students.
- The event ‘Forum dual’ is organised once a year by the Career Service and Student Advisory Service (CSS). The ‘Forum dual’ promotes professional and organisational exchange between partner companies and the faculty and supports the quality assurance of the dual study programmes. All partner companies, faculty representatives and dual students are invited to participate.

The formal regulations governing dual study programmes at THI are defined in the General Examination Regulations (APO) (§17) and the Enrolment Regulations (§13 (1) sentence 18, §14 (5), §21 (3) sentence 5, §23 (10)).

4 Description of Modules

4.1 Compulsory modules

Mathematics I			
Module abbreviation	SCE_Math_I	**Reg.-Nr.**	1
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	1
Module frequency	only summer term	**Module duration**	1 semester

Responsible for module	Müller, Marvin		
Lecturer(s)	Müller, Marvin		
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 5 SWS		
Workload	Contact hours		58 h
	Self-study		67 h
	Total		125 h
Subjects of the module	Mathematics I		
Lecture types	SU/Ü - lecture with integrated exercises		

Examinations

schrP120 - written exam, 120 minutes

Additional explanations regarding examinations

None

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- work confidently with real and complex numbers.
- solve equations and inequalities with one variable.
- identify function types relevant to engineering.
- apply methods of differential and integral calculus of one variable to engineering problems.
- solve problems in the field of differential and integral calculus.
- perform basic matrix and vector operations.
- examine matrices for invertibility.
- determine solution sets of linear systems of equations.

Personal and social skills - Students are able to:

- discuss and evaluating mathematical solution strategies in a team.
- give constructive feedback on solutions to fellow students.
- present complex mathematical concepts clearly to the group.

Content

- Fundamentals of mathematics (sets and functions, properties of important number systems, introduction to complex numbers)

- Elementary functions and their properties, limits of functions and sequences
- Differential calculus (differentiability, differentiation rules, applications of differential calculus)
- Integral calculus (antiderivatives, definite and indefinite integrals, basic integration rules)
- Fundamentals of linear algebra
  - Vector algebra and matrices
  - Linear mappings and linear systems of equations

Literature

- RILEY, Kenneth F., Michael P. HOBSON und Stephen J. BENCE, 2006. *Mathematical methods for physics and engineering*. Cambridge [u.a.]: Cambridge Univ. Press. ISBN 978-0-521-86153-3, 0-521-86153-5
- FRIEDMAN, Menahem, KANDEL, Abraham, 2011. *Calculus light* [online]. Berlin [u.a.]: Springer PDF e-Book. ISBN 978-3-642-17848-1. Verfügbar unter: https://doi.org/10.1007/978-3-642-17848-1.
- RAHMANI-ANDEBILI, Mehdi, 2021. *Calculus: Practice Problems, Methods, and Solutions* [online]. Cham: Springer International Publishing PDF e-Book. ISBN 978-3-030-64980-7. Verfügbar unter: https://doi.org/10.1007/978-3-030-64980-7.

Additional remarks

Bonus points: none

Mechanics I			
Module abbreviation	SCE_Mech_I	**Reg.-Nr.**	2
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	1
Module frequency	only summer term	**Module duration**	1 semester

Responsible for module	Bochert, Jana Sue		
Lecturer(s)	Bochert, Jana Sue		
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 5 SWS		
Workload	Contact hours		58 h
	Self-study		67 h
	Total		125 h
Subjects of the module	Mechanics I		
Lecture types	Einsetzungstext ist leer!		

Examinations

schrP120 - written exam, 120 minutes

Additional explanations regarding examinations

None

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- Set up and calculate force systems.
- Perform static calculations on simple structural models.
- Translate reality into static systems in order to combine practice with theory.
- Determine support reactions, the centre of gravity and internal forces.

Personal and social skills – Students will be able to:

- develop analytical skills so that they can apply them in plausibility checks of computer-aided structural analyses.

Content

- Static basics: Forces, moments and their composition or decomposition
- Equilibrium on structures
- Section principle
- Center of gravity calculation
- Support reactions and internal forces of statically determinate systems,
- Area moments of inertia
- Statically determinate and indeterminate structures

• Introduction to computer-aided structural analysis
Literature
• GROSS, D., W. HAUGER und W. SCHNELL, . *Engineering Mechanics 1*. • GROSS, Dietmar, EHLERS, Wolfgang, WRIGGERS, Peter, SCHRÖDER, Jörg, MÜLLER, Ralf, 2017. *Statics – formulas and problems: engineering mechanics 1* [online]. Berlin ; Heidelberg: Springer PDF e-Book. ISBN 978-3-662-53854-8. Verfügbar unter: https://doi.org/10.1007/978-3-662-53854-8.
Additional remarks
Bonus points: none

Chemistry & Building Materials			
Module abbreviation	SCE_C&BM	**Reg.-Nr.**	3
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	1
Module frequency	only summer term	**Module duration**	1 semester

Responsible for module	Blask, Oliver		
Lecturer(s)	Blask, Oliver		
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 5 SWS		
Workload	Contact hours		57 h
	Self-study		68 h
	Total		125 h
Subjects of the module	Chemistry & Building Materials		
Lecture types	SU/Ü/PR - seminar based teaching/Exercise course/laboratory		

Examinations

schrP90 - written exam, 90 minutes

Additional explanations regarding examinations

None

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- assess how important substances react with each other.
- assess the environmental impact of the production of important building materials.
- select building materials based on their mechanical and physical properties.
- Derive the mechanical properties of building materials from their structure.
- Use building materials in such a way that high-quality building elements are created.

Content

- Fundamentals of general and inorganic chemistry
- Composition and structure of building materials
- Raw materials and production of building materials
- Mechanical and physical properties of building materials
- Practical experiment: production of concrete

Literature

- TIMBERLAKE, Karen C., 2019. *Chemistry: an introduction to general, organic, and biological chemistry*. New York: Pearson. ISBN 978-1-292-22886-0, 1-292-22886-5

- PAULING, Linus, 2011?. *General chemistry*. [Place of publication not identified]: BN Pub.. ISBN 978-1-60796-298-4, 1607962985
- HUHEEY, J.E., 2008. *Inorganic Chemistry: Principles of Structure and Reactivity*. Boston: Pearson. ISBN 978-8177581300
- KULTERMANN, Eva und William P. SPENCE, 2022. *Construction, materials, methods, and techniques: building for a sustainable future*. Boston, MA: Cengage. ISBN 978-0-357-51383-5
- TAYLOR, G.D., 2013. *Materials in Construction: an introduction* [online]. New York: Routledge PDF e-Book. ISBN 978-1-315-83915-8. Verfügbar unter: https://doi.org/10.4324/9781315839158.

Additional remarks

Bonus points: none

Sustainable Construction

Module abbreviation	SCE_SustainableConstruction	**Reg.-Nr.**	4
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	1
Module frequency	only summer term	**Module duration**	1 semester

Responsible for module	Blask, Oliver		
Lecturer(s)	Pichlmeier, Franziska; Uhde, Julia		
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Sustainable Construction		
Lecture types	SU/Ü - lecture with integrated exercises		

Examinations

schrP120 - written exam, 120 minutes

Additional explanations regarding examinations

None

Prerequisites according examination regulation

none

Recommended prerequisites

none

Objectives

Professional competence - Students will be able to:

- Calculate heat loss through flat wall elements.
- Take measures to prevent mould growth.
- Identify thermal bridges and take measures to prevent them.
- Explain the historical development of key sustainability concepts and apply their core principles to civil engineering issues.
- Assess planetary boundaries, classify energy and resource flows, and derive strategy-driven measures for effective resource and energy management.
- Analyse the 17 Sustainable Development Goals using systemic approaches and assess interactions between ecological, social and economic subsystems with a focus on construction issues.
- Identify relevant methods, management systems and certifications and their areas of application.

Content

Building physics

- Physical fundamentals of building physics
- Fundamentals of thermal insulation
- Fundamentals of moisture protection in buildings

Sustainability • Definition and history • Global challenges • Concepts for evaluation • Approaches and systems for measuring sustainability • United Nations sustainability goals • Stakeholder and shareholder concept • Management systems and standards
Literature
Will be specified at the beginning
Additional remarks
Bonus points: none

Mathematics II			
Module abbreviation	SCE_Math_II	**Reg.-Nr.**	5
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	2
Module frequency	only winter term	**Module duration**	1 semester

Responsible for module	Müller, Marvin		
Lecturer(s)	Müller, Marvin		
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 5 SWS		
Workload	Contact hours		58 h
	Self-study		67 h
	Total		125 h
Subjects of the module	Mathematics II		
Lecture types	SU/Ü - lecture with integrated exercises		

Examinations

LN - written exam, 120 minutes

Additional explanations regarding examinations

None

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- apply methods of differential and integral calculus for multiple variables to engineering problems.
- solve problems in the field of differential and integral calculus.
- solve first-order differential equations and corresponding initial value problems, including:
  - Linear differential equations.
  - Differential equations with separable variables.
- Determine fundamental systems for linear differential equations with constant coefficients (up to second order).

Personal and social skills - Students are able to:

- discuss and evaluating mathematical solution strategies in a team.
- give constructive feedback on solutions to fellow students.
- present complex mathematical concepts clearly to the group.

Content

- Functions of Several Variables
- Differential and integral calculus of functions of several variables

- Differentiation: Partial derivatives (first-order and higher-order), local extrema and saddle points, optimization problems
- Multiple integrals: Double integrals, triple integrals (applications such as volume, center of mass, moments)

- Differential Equations
  - Fundamental concepts (initial value problems)
  - First-order differential equations: Homogeneous and inhomogeneous linear differential equations
  - Second-order differential equations: Homogeneous and inhomogeneous linear differential equations with constant coefficients (applications to mechanical oscillations)

Literature

- RILEY , K. F. , HOBSON , M. P., BENCE , S. J., 2006. *Mathematical Methods for Physics and Engineering: A Comprehensive Guide* [online]. PDF e-Book. ISBN ISBN 978-0-511-16842-0 .
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Additional remarks

Bonus points: none

Mechanics II			
Module abbreviation	SCE_Mech_II	**Reg.-Nr.**	6
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	2
Module frequency	only winter term	**Module duration**	1 semester

Responsible for module	Bochert, Jana Sue		
Lecturer(s)	Bochert, Jana Sue		
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 5 SWS		
Workload	Contact hours		58 h
	Self-study		67 h
	Total		125 h
Subjects of the module	Mechanics II		
Lecture types	SU/Ü - lecture with integrated exercises		

Examinations

schrP120 - written exam, 120 minutes

Additional explanations regarding examinations

None

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- master the fundamentals of the design and dimensioning of structures and components.
- apply basic knowledge of strength of materials and the associated theoretical background.
- analyse more complex but statically determined systems and outline how to deal with deformation and stress calculations.

Personal and social skills – Students will be able to:

- verbalise questions relating to mechanics
- discuss and classify the task, the solution and the results with fellow students and lecturers.

Content

- Terms and basic relationships in elastostatics
- One- and multidimensional stress and strain states
- Transformation of stresses and strains
- Material law of linear elasticity theory
- Elementary elastostatics of rods and beams
- Shear stresses, centre of shear
- Differential equation of the bending line

• Dimensioning of compression bars (torsion of circular profiles)
Literature
• GROSS, D. und W. HAUGER, 2021. *Engineering Mechanics: Vol.2 Elastostatics* . 14. Auflage.
Additional remarks
Bonus points: none

Building Construction I

Module abbreviation	SCE_BuildingConstruction_I	**Reg.-Nr.**	7
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	2
Module frequency	only winter term	**Module duration**	1 semester

Responsible for module	Bergmann, Daniela		
Lecturer(s)			
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		47 h
	Self-study		78 h
	Total		125 h
Subjects of the module	Building Construction I		
Lecture types	SU/Ü - lecture with integrated exercises		

Examinations

PF - Portfolio-Exam (all exams before the examination period)

Additional explanations regarding examinations

- Theoretical fundamentals are examined in a written exam (60 min) during the semester.
- Project examples and individual project work are used to deepen and consolidate the fundamentals. The results are recorded in an examination study paper.
- The grades are weighted 40% (written examinaton) and 60% (examinaton study paper).
- The exact dates will be announced in the lecture and on Moodle.
- If one of the exams is not passed or one of the exams is not taken, the entire course is considered not completed (N).
- A replacement date will be offered upon presentation of a doctor's note (Attest).

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- understand how buildings function in terms of load-bearing structures, bracing, foundations, building envelopes and building physics for different types of construction and materials.
- understand the structure of simple roof, ceiling and wall constructions and develop them themselves.
- understand construction drawings and filter out the information necessary for the erection of the structure.
- to draw simple buildings professionally themselves – both by hand and using CAD.
- apply the basic rules of construction drawings and three-dimensional planning.
- Identify the basics of building law and technical rules and apply them to simple examples.

Content

- Introduction to design
- Functions of a building, Construction methods, structural elements
- Shell construction and finishing work
- joining of simple building components
- main elements of the building envelope, waterproofing, and construction finishing work
- Load transfer and bracing of buildings, excavation pits, foundations
- Analysis and design of simple structures
- Technical drawings and representations
- Constructive geometry of simple construction drawings
- model making
- Introduction to construction law, building and technical regulations

Literature

- JOCHER, Thomas und Sigrid LOCH, 2012. *Raumpilot Grundlagen*. Stuttgart ; Zürich: kraemerverlag. ISBN 978-3-7828-1551-2, 3-7828-1551-3
- METTLER, Daniel, SCHEIDT, Paula, STUDER, Daniel, 2021. *Construction: Manual* [online]. Basel: Birkhäuser PDF e-Book. ISBN 978-3-0356-2229-4. Verfügbar unter: https://doi.org/10.1515/9783035622294.
- VIERHAUS, Bjorn, 2018. *Detail drawing*. Basel: Birkhauser. ISBN 978-3-0356-1392-6
- WATTS, Andrew, 2022. *Modern Construction Handbook*. Basel: Birkhäuser. ISBN 978-3-0356-2496-0
- ALLEN, Edward und Joseph IANO, 2019. *Fundamentals of building construction: materials and methods*. Hoboken, New Jersey: Wiley. ISBN 978-1-119-44619-4
- BADEN-POWELL, Charlotte, Jonathan HETREED und Ann ROSS, 2011. *Architect's pocket book*. Oxford ; Boston: Architectural Press.
- NEUFERT, Ernst und andere, 2025. *Bauentwurfslehre: Grundlagen, Normen, Vorschriften über Anlage , Bau, Gestaltung, Raumbedarf, Raumbeziehungen, Maße für Gebäude, Räume, Einrichtungen, Geräte mit dem Menschen als Maß und Ziel : Handbuch für den Baufachmann, Bauherrn, Lehrenden und Lernenden*. 44. Auflage. Wiesbaden: Springer Vieweg. ISBN 978-3-658-44936-0, 3-658-44936-5
- FOUAD, Nabil A., 2013. *Lehrbuch der Hochbaukonstruktionen*. Wiesbaden: Springer Vieweg. ISBN 978-3-519-35015-6
- HESTERMANN, Ulf und andere, 2025. *Frick/Knöll Baukonstruktionslehre Teil 1 und 2* . 37. Auflage. Wiesbaden: Springer Fachmedien Wiesbaden. ISBN 978-3-658-42178-6
- ALBERT, Andrej und Klaus-Jürgen SCHNEIDER, 2026. *Bautabellen für Ingenieure: mit Entwurfshinweisen und Beispielen*. 27. Auflage. Köln: Reguvis Fachmedien. ISBN 978-3-8462-1635-4

Additional remarks

Script (lecture slides) of the courses. Students are required to take lecture notes.

Bonus points: none

Digital Construction I			
Module abbreviation	SCE_DigitalConstruction_I	**Reg.-Nr.**	8
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	2
Module frequency	only winter term	**Module duration**	1 semester

Responsible for module	Liepert, Tobias		
Lecturer(s)			
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Digital Construction I		
Lecture types	SU/Ü/PR - seminar based teaching/Exercise course/laboratory		

Examinations

PF - Portfolio-Exam (all exams before the examination period)

Additional explanations regarding examinations

None

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- apply selected surveying methods for measuring length, angle and height.
- incorporate surveying information into existing projects or derive it from them.
- Distinguish between surveying data in terms of its origin and quality.
- distinguish between digital tools for creating planning documents.
- Know the basics of technical drawing.
- To represent floor plans, sections and details in CAD and analyse them for possible conflicts.

Personal and social skills - Students are able to:

- Perform simple surveying tasks independently using surveying equipment.
- Use CAD systems.
- Work together as a team to complete a task.

Content

Surveying

- Coordinate systems: reference systems for height and position measurements
- Fundamentals: measurement principles and methods, measurement tolerances
- Hand-held measuring devices: Taking simple measurements with a tape measure and folding rule

- Levelling: Transferring and checking elevation points to create an elevation reference
- Total station: Setting out and surveying buildings
- GNSS: measuring objects
- Georeferencing

CAX

- Design and structure of CAX systems
- Fundamentals of technical drawing
- Floor plan, section, detail

Literature

Will be specified at the beginning

Additional remarks

Bonus points: none

Fluid Mechanics

Module abbreviation	SCE_FluidMechanics	**Reg.-Nr.**	9
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	3
Module frequency	only summer term	**Module duration**	1 semester

Responsible for module	Liepert, Tobias		
Lecturer(s)			
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 5 SWS		
Workload	Contact hours		58 h
	Self-study		67 h
	Total		125 h
Subjects of the module	Fluid Mechanics		
Lecture types	SU/Ü/PR - seminar based teaching/Exercise course/laboratory		

Examinations

PF - Portfolio-Exam (all exams before the examination period)

Additional explanations regarding examinations

The portfolio examination comprises three components (outside the examination period):

- two written examinations, each worth 30 points (in the fourth and ninth week of the lecture period)
- an examination thesis worth 60 points If a student does not take one of the components, zero points will be awarded for that component, which will lower the overall grade.

There is no pass mark for individual components. The grade is calculated from the total points of all components offered during the semester. The exact examination dates will be published on Moodle at the beginning of the semester.

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- Explain the flow processes in pipes and open channels.
- Determine the hydrostatic pressure distribution on any body.
- Quantify the acting impulse forces.
- determine the flow resistance in pipe systems.
- determine the flow rate for closed and open systems.

Personal and social skills - Students will be able to:

- conduct practical experiments in small groups to explore the theory.

Content

- Fundamentals
  - Properties of water
  - Hydrostatic pressure distribution
  - Laws of conservation of mass and energy
  - Potential theory
- Pipe and channel hydraulics:
  - Bernoulli, Torricelli, Poleni, Strickler approaches
  - Impulse theorem
  - Determining flow in pipes, open channels and from openings
  - Pressure losses in pipe systems
  - Bottom shear stress
  - Turbulence
  - Steady vs. unsteady

Literature

- RAPP, Christoph, 2021. *Hydraulik für Ingenieure und Naturwissenschaftler: ein Kurs mit Experimenten und Open-Source Codes* [online]. Wiesbaden: Springer Vieweg PDF e-Book. ISBN 978-3-658-34172-5. Verfügbar unter: https://doi.org/10.1007/978-3-658-34172-5.
- OERTEL, Herbert, BÖHLE, Martin, REVIOL, Thomas, 2015. *Strömungsmechanik: für Ingenieure und Naturwissenschaftler* [online]. Wiesbaden: Springer Fachmedien PDF e-Book. ISBN 978-3-658-07786-0. Verfügbar unter: https://doi.org/10.1007/978-3-658-07786-0.
- Ohne Autor. [online]. PDF e-Book.

Additional remarks

Bonus points: none

Building Construction II

Module abbreviation	SCE_BuildingConstruction_II	**Reg.-Nr.**	10
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	3
Module frequency	only summer term	**Module duration**	1 semester

Responsible for module	Bergmann, Daniela		
Lecturer(s)			
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		47 h
	Self-study		78 h
	Total		125 h
Subjects of the module	Building Construction II		
Lecture types	SU/Ü - lecture with integrated exercises		

Examinations

PF - Portfolio-Exam (all exams before the examination period)

Additional explanations regarding examinations

- Theoretical fundamentals are examined in a written exam (60 min) during the semester.
- Project examples and individual project work are used to deepen and consolidate the fundamentals. The results are recorded in an examination study paper.
- The grades are weighted 40% (written examinaton) and 60% (examinaton study paper).
- The exact dates will be announced in the lecture and on Moodle.
- If one of the exams is not passed or one of the exams is not taken, the entire course is considered not completed (N).
- A replacement date will be offered upon presentation of a doctor's note (Attest).

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- understand the requirements for buildings.
- name the main trades involved in building construction and finishing and define the interfaces between them.
- evaluate, develop and argue for holistic construction solutions for structures and buildings.
- design simple constructions independently and present them professionally in detail.
- produce models and use them as tools for knowledge and communication.
- Identify the essential criteria and certification principles for assessing the sustainability of construction methods and apply these to specific objects and types of construction.

Content

- Functionality of buildings
- Interaction of construction, structure and building physics
- Certification of the sustainability of buildings
- Analysis and design of building structures
- Joining of components and construction details
- Analysis and design of complex building structures
- Communication and argumentation of own ideas
- Technical drawings including detailed drawings
- Descriptive geometry for more complex construction drawings
- Model building
- Fundamentals of sustainability certification

Literature

- ALLEN, Edward und Joseph IANO, 2019. *Fundamentals of building construction: materials and methods*. Hoboken, New Jersey: Wiley. ISBN 978-1-119-44619-4
- WATTS, Andrew, 2022. *Modern Construction Handbook*. Basel: Birkhäuser. ISBN 978-3-0356-2496-0
- MERRITT, Frederick S. und Jonathan T. RICKETTS, 2001. *Building design and construction handbook*. New York: McGraw-Hill. ISBN 0-07-041999-X, 9780070419995
- METTLER, Daniel, SCHEIDT, Paula, STUDER, Daniel, 2021. *Construction: Manual* [online]. Basel: Birkhäuser PDF e-Book. ISBN 978-3-0356-2229-4. Verfügbar unter: https://doi.org/10.1515/9783035622294.
- VIERHAUS, Bjorn, 2018. *Detail drawing*. Basel: Birkhauser. ISBN 978-3-0356-1392-6
- BIELEFELD, Bert, 2024. *Climate-Smart Design and Construction*. Basel: Birkhäuser Verlag. ISBN 978-3-0356-2757-2
- HESTERMANN, Ulf und andere, 2025. *Frick/Knöll Baukonstruktionslehre 1 und 2*. 37. Auflage. Wiesbaden: Springer Fachmedien Wiesbaden. ISBN 978-3-658-42178-6
- ALBERT, Andrej und Klaus-Jürgen SCHNEIDER, 2026. *Bautabellen für Ingenieure: mit Entwurfshinweisen und Beispielen*. 27. Auflage. Köln: Reguvis Fachmedien. ISBN 978-3-8462-1635-4

Additional remarks

Script (lecture slides) of the courses. Students are required to take lecture notes.

Bonus points: none

Digital Modelling			
Module abbreviation	SCE_DigitalModelling	**Reg.-Nr.**	11
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	3
Module frequency	only summer term	**Module duration**	1 semester

Responsible for module	Liepert, Tobias		
Lecturer(s)			
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Digital Modelling		
Lecture types	SU/Ü/PR - seminar based teaching/Exercise course/laboratory		

Examinations

PF - Portfolio-Exam (all exams before the examination period)

Additional explanations regarding examinations

None

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- to conduct structural and airborne sound testing of building components in accordance with DIN standards.
- determine the comfort level of buildings.
- create BIM models of simple buildings and building components.

Personal and social skills – Students will be able to:

- use BIM software so that they can independently design BIM models and work on them in a team.

Content

- Building Physics II
  - Comfort
  - Airborne sound
  - Structure-borne sound
- Building Information Modelling
  - Fundamentals
  - Geometric modelling of buildings and building components
  - Parameterisation of objects

Literature
• JUNG-LUNDBERG, Prof. Dr.-Ing Saman, 2024. *Building Information Modeling (BIM) bei kleineren Wohnungsbauprojekten: DIe Potenziale von BIM in der Anwendung* [online]. Wiesbaden: Springer Fachmedien Wiesbaden PDF e-Book. ISBN 978-3-658-45238-4. Verfügbar unter: https://doi.org/10.1007/978-3-658-45238-4.
Additional remarks
Bonus points: none

Sustainable Construction Materials

Module abbreviation	SCE_Sus_Con_Mat	**Reg.-Nr.**	12
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	3
Module frequency	only summer term	**Module duration**	1 semester

Responsible for module	Blask, Oliver		
Lecturer(s)	Blask, Oliver		
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Sustainable Construction Materials		
Lecture types	SU/Ü/PR - seminar based teaching/Exercise course/laboratory		

Examinations

schrP90 - written exam, 90 minutes

Additional explanations regarding examinations

None

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- assess the sustainability of building materials using objective methods.
- name and distinguish important climate-neutral building materials.
- distinguish between empirical and performance-based methods of service life assessment.
- assess the durability of building materials depending on exposure.
- Select suitable recycling processes for building materials.
- Use recycled materials.

Content

- Sustainable mineral building materials
- Renewable organic building materials
- Durability and corrosion of building materials
- Recycling of building materials and use of recycled materials
- Practical experiments: Production of sustainable concrete

Literature

- BLASS, H. J. und C. SANDHAAS, 2018. *Timber Engineering*. Karlsruhe: KIT Scientific Publishing. ISBN 978-3-7315-0673-7 https://doi.org/10.5445/KSP/1000069616 Kostenfrei

- GREEN, H. J. M., TAGGART, Jim, 2020. *Tall wood buildings: design, construction and performance* [online]. Basel: Birkhäuser PDF e-Book. ISBN 978-3-0356-1886-0. Verfügbar unter: https://doi.org/10.1515/9783035618860.
- SCHROEDER, Horst, 2016. *Sustainable Building with Earth* [online]. Cham: Springer International Publishing PDF e-Book. ISBN 978-3-319-19491-2. Verfügbar unter: https://doi.org/10.1007/978-3-319-19491-2.
- MARTIRENA-HERNANDEZ, Jose Fernando, ALUJAS-DÍAZ, Adrian, AMADOR-HERNANDEZ, Meylin, 2020. *Proceedings of the International Conference of Sustainable Production and Use of Cement and Concrete: ICSPCC 2019* [online]. Cham: Springer International Publishing PDF e-Book. ISBN 978-3-030-22034-1. Verfügbar unter: https://doi.org/10.1007/978-3-030-22034-1.
- PROVIS, John L., VAN DEVENTER, Jannie S. J., 2014. *Alkali Activated Materials: State-of-the-Art Report, RILEM TC 224-AAM* [online]. Dordrecht: Springer Netherlands PDF e-Book. ISBN 978-94-007-7672-2. Verfügbar unter: https://doi.org/10.1007/978-94-007-7672-2.

Additional remarks

Bonus points: none

Strucutral analysis			
Module abbreviation	SCE_Structualanalysis	**Reg.-Nr.**	13
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	3
Module frequency	only summer term	**Module duration**	1 semester

Responsible for module	Bochert, Jana Sue		
Lecturer(s)			
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Strucutral analysis		
Lecture types	SU/Ü - lecture with integrated exercises		

Examinations

schrP120 - written exam, 120 minutes

Additional explanations regarding examinations

None

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- calculate statically determinate and indeterminate structures (2D and 3D).
- apply the displacement method (displacements and rotations) and the rotation angle method under general stresses (load and deformation effects).
- calculate virtual forces and displacements.
- create models of structures with their effects and loads.
- Perform calculations for flat and spatial bar structures, discs and slabs using various computer programmes.

Content

- Partial safety concept, effects and resistances
- Equivalent bar method, spring models
- Spatial systems
- Girders
- Working sets
- Virtual work
- Distance method, rotation angle method

• Bar structures according to second-order theory • Load-bearing capacity method
Literature
Will be specified at the beginning
Additional remarks
Bonus points: none

Construction management

Module abbreviation	SCE_Constructionmanage-ment	**Reg.-Nr.**	14
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Pflichtfach	7
Module frequency	nur Sommersemester	**Module duration**	1 Semester

Responsible for module	Reiter, Thomas		
Lecturer(s)			
Language of instruction	Deutsch	**Language of exams**	Deutsch
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Construction management		
Lecture types	SU/Ü - seminaristischer Unterricht/Übung		

Examinations

PF - Portfolio-Prüfung (alle Teilleistungen vor Prüfungszeitraum)

Additional explanations regarding examinations

Keine

Prerequisites according examination regulation

Keine

Recommended prerequisites

Keine

Objectives

Fachkompetenz - Die Studierenden sind in der Lage:

- Bauprojekte hinsichtlich Zeit-, Kosten- und Ressourcenplanung zu verstehen.
- Instrumente der Bauablaufplanung, Terminsteuerung und Leistungsbewertung anzuwenden.
- Arbeitskalkulationen zu erstellen und deren Abweichungen in der Bauausführung zu bewerten.
- Baustellenlogistik unter Berücksichtigung technischer, wirtschaftlicher und rechtlicher Rahmenbedingungen zu beurteilen.
- organisatorische und wirtschaftliche Zusammenhänge des Baubetriebs zu analysieren.
- Risiken und Störungen im Bauablauf zu beurteilen und geeignete Gegenmaßnahmen zu entwickeln.

Selbst- und Sozialkompetenz - Die Studierenden sind in der Lage:

- lösungsorientiert in Projektteams an komplexen baubetrieblichen Aufgabenstellungen zu arbeiten.
- Kommunikations- und Führungsaspekte auf der Baustelle zu reflektieren.
- Verantwortung für die Bearbeitung und Präsentation von Projektaufgaben zu verteilen.

Content

- Arbeitskalkulation und Nachkalkulation
- Terminplanung und Bauzeitensteuerung

- Bauprozessmanagement und Bauleitung
- Baustelleneinrichtung und Logistikplanung
- Ressourcenmanagement (Personal, Geräte, Material)
- Dokumentation und Berichtswesen im Baubetrieb
- Störungs- und Nachtragsmanagement
- Leistungsfeststellung und Abrechnung
- Digitalisierung im Baubetrieb (Bau-Controlling, BIM-Schnittstellen)
- Sicherheits- und Gesundheitsschutz auf Baustellen
- Nachhaltigkeit und Ressourceneffizienz im Baubetrieb

Literature

- BERNER, Fritz, KOCHENDÖRFER, Bernd, SCHACH, Rainer, JÜNGER, Hans Christian, OTTO, Jens, SUNDERMEIER, Matthias, 2025. *Grundlagen der Baubetriebslehre 3: Baubetriebsführung* [online]. Wiesbaden: Springer Fachmedien Wiesbaden PDF e-Book. ISBN 978-3-658-47553-6. Verfügbar unter: https://doi.org/10.1007/978-3-658-47553-6.

Additional remarks

Bonus points: none

Geotechnics			
Module abbreviation	SCE_Geotechnics	**Reg.-Nr.**	15
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	4
Module frequency	only winter term	**Module duration**	1 semester

Responsible for module	Angerer, Ludwig		
Lecturer(s)			
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Geotechnics		
Lecture types	SU/Ü/PR - seminar based teaching/Exercise course/laboratory		

Examinations

PF - Portfolio-Exam (all exams before the examination period)

Additional explanations regarding examinations

None

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- classify soil as a building material.
- understand the fundamental relationships of soil mechanics in one-dimensional cases.
- describe the non-linear, time-dependent behaviour of soils – particularly with regard to stiffness and groundwater flow in one-dimensional cases.
- explain fracture mechanisms in building ground.
- calculate stress states in soil.
- apply the fundamentals of soil mechanics to selected problems in earthworks and special civil engineering.
- Understand three-dimensional half-space and apply fundamental concepts to describe more complex stress and deformation states in earthworks and special civil engineering.

Personal and social skills - Students are able to:

- independently carry out simple investigations and soil mechanical descriptions in the field and laboratory.

Content

- Introduction to geotechnical engineering as an umbrella term for soil mechanics and special civil engineering
- Stresses in soils

• Density of soils • Stiffness of soils • Groundwater flows in soils • Stress changes in soils • Consolidation of soils • Strength of soils • Soil-structure interaction
Literature
Will be specified at the beginning
Additional remarks
Bonus points: none

Steel Construction

Module abbreviation	SCE_SteelConstr	**Reg.-Nr.**	16
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	4
Module frequency	only winter term	**Module duration**	1 semester

Responsible for module	Feucht, Thilo		
Lecturer(s)	Feucht, Thilo		
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Steel Construction		
Lecture types	SU/Ü - lecture with integrated exercises		

Examinations

PF - Portfolio Exam (with exams before and a written exam 90 min within the examination period)

Additional explanations regarding examinations

The portfolio assessment comprises five components:

- As part of a compulsory laboratory practical (during the 3rd to 5th week of lectures), students carry out practical work on the manufacture of a steel structure. The knowledge acquired is tested in an oral examination (duration 15 minutes) immediately after the practical course.
- Three written examinations (4th/5th, 7th/8th and 10th/11th week of lectures) with a duration of 25 minutes each are held during the semester.
- A written examination lasting 90 minutes will take place during the examination period.

The overall grade is weighted according to the duration of the individual components.

Participation in the practical course and passing the subsequent oral examination is mandatory. In the event of non-attendance at one of the four written partial assessments, zero points will be awarded for the respective partial assessment, which will correspondingly contribute to a deterioration in the overall grade.

The exact examination dates will be published on Moodle at the beginning of the semester.

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- to name the properties of steel as a material.
- to perform load-bearing capacity analyses of beams, bolts and welds in accordance with the Eurocode, taking into account the applicable safety concepts.

- to recognise stability cases and calculate the load-bearing capacity of beam steel components, taking into account buckling and lateral-torsional buckling.
- to know the relevance of the deformation of steel components.
- to independently design steel cross-sections by determining the shape, dimensions and material for given systems.

Personal and social skills:

- Through a laboratory exercise, students gain a visual impression of the elements of a steel structure and a manual impression of its manufacture.
- They will then be aware of the challenges and difficulties associated with the individual production activities.

Content

- Basics and applications of steel construction
- Steel as a material: origin and laws
- Safety concept
- Design of solid wall and truss girders for ultimate limit state
- Design of bolts and weld seams for ultimate limit state
- Basics of stability theory and stability analyses
- Cross-section classes, buckling, lateral torsional-buckling
- Laboratory exercise

Literature

- GARDNER, Leroy und David A. NETHERCOT, 2011. *Designers' guide to Eurocode 3: design of steel buildings: EN 1993-1-1, -1-3 and -1-8*. London: Telford. ISBN 978-0-7277-4172-1
- ALBERT, Andrej, Klaus-Jürgen SCHNEIDER und Alfons GORIS, 2024. *Bautabellen für Ingenieure: mit Berechnungshinweisen und Beispielen*. 26. Auflage. Köln: Reguvis. ISBN 978-3-8462-1479-4, 3-8462-1479-5

Additional remarks

Bonus points: none

Study project			
Module abbreviation	SCE_Studyproject	**Reg.-Nr.**	17
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	4
Module frequency	only winter term	**Module duration**	1 semester

Responsible for module	Feucht, Thilo		
Lecturer(s)			
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Study project		
Lecture types	SU/Ü - lecture with integrated exercises		

Examinations

Exam Study Work

Additional explanations regarding examinations

None

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- design simple structures.
- plan simple structures.
- develop static systems for structures.
- understand the fundamentals of sustainable building design.
- understand the fundamentals of AI and apply them critically in the context of civil engineering.
- Critically reflect on optimisation results.

Personal and social skills - Students are able to:

- Implement interdisciplinary project and team work.
- Carry out and document projects on schedule.
- Familiarise themselves with a new topic independently.

Content

- Fundamentals of design
- Fundamentals of planning
- Design and planning of a typical, practice-relevant structure in interdisciplinary teamwork with reference to sustainability

- Fundamentals of AI
- Visualisation of design and optimisation processes
- Digital modelling
- Fundamentals of project management

Literature

Will be specified at the beginning

Additional remarks

Dual students should take on a task in the project that incorporates the activities they are entrusted with in their partner company. Dual students reflect on how one of the above-mentioned topics is implemented in their training company and actively contribute this to the lecture.

Bonus points: none

Collaborative Scientific Teamwork			
Module abbreviation	SCE_ColloborativeScientific-Teamwork	**Reg.-Nr.**	18
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	4
Module frequency	only winter term	**Module duration**	1 semester

Responsible for module	Reiter, Thomas		
Lecturer(s)			
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Collaborative Scientific Teamwork		
Lecture types	SU/Ü - lecture with integrated exercises		

Examinations

PF - Portfolio-Exam (all exams before the examination period)

Additional explanations regarding examinations

None

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- apply basic methods of scientific work and writing confidently and in accordance with the rules.
- independently develop scientific questions and work on them in a structured manner in a team context.
- conduct systematic research using digital tools (e.g. Citavi) and critically evaluate sources in terms of quality and relevance.
- correctly apply citation rules and reflectively assess the handling of plagiarism and copyright.

Personal and social skills - Students will be able to:

- Present scientific results in a manner appropriate to the audience, practical and using suitable visualisation techniques.
- Analyse team and group dynamics and use appropriate communication and feedback methods in a targeted manner.
- reflect on their own role in scientific teams and contribute constructively to the collaboration.
- Use feedback and feedforward in a targeted manner for personal development and potential development.
- Develop sensitivity to cultural diversity and apply concepts of cultural humility in heterogeneous teams.

Content
• Fundamentals of scientific work and writing • Literature management with Citavi • Research techniques and source evaluation • Structure and organisation of academic work • Developing a scientific question in a team context • Dealing with plagiarism, citation rules and copyright • Academic work in practice • Team/group dynamics (roles, norms, status) • Teamwork techniques and role distribution • Feedback, feedforward and potential development • Time and self-management in group projects
Literature
Will be specified at the beginning
Additional remarks
Dual students reflect on the form of teamwork and communication (internal and external) within their company and actively contribute this to the lecture. Bonus points: none

Timber construction

Module abbreviation	SCE_Timberconstruction	**Reg.-Nr.**	19
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	5
Module frequency	only summer term	**Module duration**	1 semester

Responsible for module	Feucht, Thilo		
Lecturer(s)			
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Timber construction		
Lecture types	SU/Ü - lecture with integrated exercises		

Examinations

PF - Portfolio-Exam (all exams before the examination period)

Additional explanations regarding examinations

None

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- name and classify the properties of wood.
- explain wood-based materials.
- determine the modification values in accordance with EC5 depending on the situation.
- Recognise stability cases.
- calculate the load-bearing capacity of bar-shaped timber components with normal force and bending stress, taking stability into account.
- Analyse the serviceability of bending beams.
- independently perform calculations and verifications of simple beams and columns made of timber.
- Model and statically analyse a simple timber structure with RFEM.

Content

- Fundamentals and areas of application of timber construction
- Properties of the material: wood products, structure and composition, building material tests
- Fundamentals of design according to Eurocode 5: Safety concepts in timber construction, limit states of load-bearing capacity, stability of individual components, deflection verifications, connections in timber construction
- Wood preservation: influence on load-bearing capacity, service classes, structural wood preservation

• Introduction to digital modelling of timber structures using RFEM structural analysis software
Literature
Will be specified at the beginning
Additional remarks
Bonus points: none

Transportation

Module abbreviation	SCE_Transportation	**Reg.-Nr.**	20
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	5
Module frequency	only summer term	**Module duration**	1 semester

Responsible for module	Angerer, Ludwig		
Lecturer(s)			
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Transportation		
Lecture types	SU/Ü - lecture with integrated exercises		

Examinations

PF - Portfolio-Exam (all exams before the examination period)

Additional explanations regarding examinations

The portfolio assessment consists of two assessment components. A written assessment of 60 minutes, accounting for approximately 50% of the overall grade, is conducted mid-semester during the module's scheduled lecture slot. In addition, a second written assessment of 60 minutes, also accounting for approximately 50% of the overall grade, takes place at the end of the semester during the regular examination period. If a student does not attend one assessment component, 0 points will be recorded for that component, which will result in a lower overall grade. There is no separate pass requirement for individual assessment components. The final grade is determined by the sum of the points achieved in both assessment components offered during the semester. The exact examination dates will be published on Moodle at the beginning of the semester. If the overall portfolio assessment is not passed, the portfolio assessment must be repeated. The structure and dates of the assessment components for the resit examination will be determined at the beginning of the semester in non-regular semesters and may differ from the structure used in the regular semester.

Prerequisites according examination regulation

This course can only be taken once the second stage of the degree program has been reached. To qualify, at least 42 ECTS credits from the first stage of the degree program must be documented.

Recommended prerequisites

Successful completion of the module Geotechnical Engineering (NB).

Objectives

Professional competence – Students will be able to:

- Systematically classify transport facilities from a civil engineering perspective.
- Design and dimension road and railway facilities.
- Apply superstructure and earthwork principles in road and railway construction.

• Integrated assessment of building ground and structures in transport infrastructure construction. • Classify trenchless construction methods (microtunnelling, pipe jacking) for crossings. • Understand the fundamentals of port, airport and waterway construction. • Evaluate the construction, maintenance and safety of transport infrastructure. • Classify sustainability aspects in transport infrastructure construction.
Content
• Alignment and design in road and railway construction • Fundamentals of superstructure and substructure • Earthworks, civil engineering, special civil engineering • Tunnel construction and crossings using trenchless construction methods • Introduction to other transport infrastructures such as ports, airports and waterways
Literature
Will be specified at the beginning
Additional remarks
Bonus points: none

Hydraulic engineering			
Module abbreviation	SCE_Hydraulicengineering	**Reg.-Nr.**	21
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	4
Module frequency	only winter term	**Module duration**	1 semester

Responsible for module	Liepert, Tobias		
Lecturer(s)			
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Hydraulic engineering		
Lecture types	SU/Ü/PR - seminar based teaching/Exercise course/laboratory		

Examinations

PF - Portfolio-Exam (all exams before the examination period)

Additional explanations regarding examinations

None

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- understand planning and design tasks in the fields of hydraulic engineering, water management, urban water management and environmental technology.
- Dimension structures for discharge control.
- independently develop and evaluate simple measures in the field of river and dam construction.
- to design simple urban drainage systems mathematically and constructively.

Personal and social skills – Students will be able to:

- Carry out and evaluate hydraulic engineering experiments

Content

- Formation of precipitation and runoff
- River engineering and hydropower
- Formation of floods
- Flood protection
- Construction and operation of dams and river barriers, as well as flood retention basins, dykes and flood polders, and near-natural measures
- Dam construction

• Sediment transport • Legal basis, regulations and standards
Literature
• PATT, Heinz, SPEERLI, Jürg, GONSOWSKI, Peter, 2021. *Wasserbau: Grundlagen, Gestaltung von wasserbaulichen Bauwerken und Anlagen* [online]. Wiesbaden: Springer Fachmedien Wiesbaden PDF e-Book. ISBN 978-3-658-30551-2. Verfügbar unter: https://doi.org/10.1007/978-3-658-30551-2.
Additional remarks
Bonus points: none

Reinforced concrete design

Module abbreviation	SCE_Reinforcedconcretede-sign	**Reg.-Nr.**	22
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	5
Module frequency	only summer term	**Module duration**	1 semester

Responsible for module	Feucht, Thilo		
Lecturer(s)			
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Reinforced concrete design		
Lecture types	SU/Ü - lecture with integrated exercises		

Examinations

PF - Portfolio Exam (with exams before and a written exam 90 min within the examination period)

Additional explanations regarding examinations

The portfolio assessment comprises five components:

- As part of a compulsory laboratory practical (during the 3rd to 5th week of lectures), students carry out practical work on the construction of a reinforced concrete structure. The knowledge acquired is tested in an oral examination (duration 15 minutes) immediately after the practical course.
- Three written examinations (4th/5th, 7th/8th and 10th/11th week of lectures) with a duration of 25 minutes each are held during the semester.
- A written examination lasting 90 minutes will take place during the examination period.

The overall grade is weighted according to the duration of the individual components.

Participation in the practical course and passing the subsequent oral examination is mandatory. In the event of non-attendance at one of the four written partial assessments, zero points will be awarded for the respective partial assessment, which will correspondingly contribute to a deterioration in the overall grade.

The exact examination dates will be published on Moodle at the beginning of the semester.

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

Professional competence - Students will be able to:

- to dimension standard uniaxially tensioned reinforced concrete components in structural engineering, in accordance with Eurocode 2, that are loaded by moment, normal force and shear force.
- to carry out bending and shear force designs of beams subject to bending loads and columns not subject to buckling under centric loading.

- to understand the load-bearing behaviour of reinforced concrete structures.

Personal and social skills:

- Through a laboratory practical, students gain a visual impression of the elements of a reinforced concrete component and a technical impression of their production.
- They will then be aware of the challenges and difficulties associated with the individual manufacturing activities.

Content

- Materials of reinforced concrete construction
- Safety concept in structural engineering
- Load bearing behaviour of reinforced concrete elements
- Load case superimposition, design internal forces
- Ultimate limit state due to bending and longitudinal force, shear force
- Basics of reinforcement detailing
- Commonly used structural elements such as beams and columns
- Laboratory exercise

Literature

Will be specified at the beginning

Additional remarks

Bonus points: none

Digitales Bauen II			
Module abbreviation	SCE_DigitalesBauen_II	**Reg.-Nr.**	23
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Pflichtfach	5
Module frequency	nur Sommersemester	**Module duration**	1 Semester

Responsible for module	Liepert, Tobias		
Lecturer(s)			
Language of instruction	Deutsch	**Language of exams**	Deutsch
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Digitales Bauen II		
Lecture types	SU/Ü - seminaristischer Unterricht/Übung		

Examinations

PF - Portfolio-Prüfung (alle Teilleistungen vor Prüfungszeitraum)

Additional explanations regarding examinations

Keine

Prerequisites according examination regulation

Keine

Recommended prerequisites

Keine

Objectives

Fachkompetenz - Die Studierenden sind in der Lage:

- ein BIM-Modell in einer Softwareumgebung zu erstellen.
- Building Information Modeling (BIM) in verschiedenen Planungsphasen eines Bauprojekts praktisch anzuwenden und interdisziplinär zu koordinieren.
- digitale Gebäudemodelle zu erstellen, zu analysieren und für verschiedene Anwendungsfälle wie Mengenermittlung, Terminplanung oder Kollisionsprüfung zu nutzen.

Selbst- und Sozialkompetenz - Die Studierenden sind in der Lage:

- im Team an einem digitalen Modell zu arbeiten
- modellbasierte Kommunikation und digitale Workflows im Bauprojekt effektiv umzusetzen.

Content

- BIM Grundlagen
- geometrisches BIM-Modell
- Planungsphasen eines Bauprojekts
- Datenhaltung
- Modellanalysen

Literature
Wird zu Beginn bekannt gegeben
Additional remarks
keine Bonuspunkte

Sustainable construction management			
Module abbreviation	SCE_Sust.const.management	**Reg.-Nr.**	24
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Compulsory Subject	4
Module frequency	only summer term	**Module duration**	1 semester

Responsible for module	Reiter, Thomas		
Lecturer(s)			
Language of instruction	English	**Language of exams**	English
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Sustainable construction management		
Lecture types	SU/Ü - lecture with integrated exercises		

Examinations

PF - Portfolio-Exam (all exams before the examination period)

Additional explanations regarding examinations

None

Prerequisites according examination regulation

None

Recommended prerequisites

None

Objectives

To be determined

Content

To be determined

Literature

Will be specified at the beginning

Additional remarks

None

Vertiefungsprojekt

Module abbreviation	SCE_Vertiefungsprojekt	**Reg.-Nr.**	26
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Pflichtfach	7
Module frequency	nur Sommersemester	**Module duration**	1 Semester

Responsible for module	Angerer, Ludwig		
Lecturer(s)			
Language of instruction	Deutsch	**Language of exams**	Deutsch
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Vertiefungsprojekt		
Lecture types	SU/Ü - seminaristischer Unterricht/Übung		

Examinations

PrSA - Prüfungsstudienarbeit

Additional explanations regarding examinations

Keine

Prerequisites according examination regulation

Dieses Fach kann nur belegt werden, wenn der zweite Studienabschnitt erreicht wurde. Dazu müssen mindestens 42 ECTS-Leistungspunkte aus dem ersten Studienabschnitt nachgewiesen werden.

Recommended prerequisites

Keine

Objectives

Fachkompetenz - Die Studierenden sind in der Lage:

- eine ingenieurtechnische Fragestellung zu analysieren und fachübergreifend Lösungsansätze zu entwickeln.
- ein Projekt strukturiert zu planen, Rollen zu definieren, Arbeitspakete zu definieren und Zeitpläne aufzustellen.
- vertieftes Wissen aus dem gewählten Schwerpunktbereich praxisnah und zielgerichtet anzuwenden.
- geeignete Software- und Simulationswerkzeuge (z. B. CAD, BIM, FEM, GIS) zur Modellierung, Berechnung und Dokumentation einzusetzen.

Selbst- und Sozialkompetenz - Die Studierenden sind in der Lage:

- ihre Arbeitsergebnisse adressatengerecht zu präsentieren.
- ihre analytischen Fähigkeiten und ihr technisches Abstraktionsvermögen reflektierend im Team zur Erarbeitung nachhaltige Lösungen einzusetzen
- Lösungen aus unterschiedlichen Perspektiven zu beurteilen.
- im Team eine Abwägung zwischen ökologischen, ökonomischen, etische und sozialen Aspekten zu treffen.

Content
• Entwurf mit Nebenbedingungen • Systemwahl auf Grundlage von Kriterien • Bewertung • BIM
Literature
Wird zu Beginn bekannt gegeben
Additional remarks
Dualstudierende sollen im Projekt eine Aufgabe übernehmen, bei der sie ihre Tätigkeiten einbinden, mit denen sie in ihrem Kooperationsunternehmen betraut sind. Dualstudierende reflektieren, in welcher Weise einer der vorgenannten Inhalte in ihrem Ausbildungsbetrieb umgesetzt wird und bringen dies aktiv in die Vorlesung ein. keine Bonuspunkte

Forschungs- und Entwicklungswerkstatt

Module abbreviation	SCE_FuE	**Reg.-Nr.**	28
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Pflichtfach	7
Module frequency	nur Sommersemester	**Module duration**	1 Semester

Responsible for module	Reiter, Thomas		
Lecturer(s)			
Language of instruction	Deutsch	**Language of exams**	Deutsch
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Forschungs- und Entwicklungswerkstatt		
Lecture types	Dieses Fach kann nur belegt werden, wenn der zweite Studienabschnitt erreicht wurde. Dazu müssen mindestens 42 ECTS-Leistungspunkte aus dem ersten Studienabschnitt nachgewiesen werden.		

Examinations

PF - Portfolio-Prüfung (alle Teilleistungen vor Prüfungszeitraum)

Additional explanations regarding examinations

Keine

Prerequisites according examination regulation

Keine

Recommended prerequisites

Keine

Objectives

Fachkompetenz - Die Studierenden sind in der Lage:

- eigenständig eine forschungsrelevante Fragestellung im Kontext des Bauingenieurwesens zu entwickeln.
- eine gezielte Literaturrecherche durchzuführen und relevante wissenschaftliche Quellen systematisch auszuwerten.
- eine geeignete wissenschaftliche Methode zur Bearbeitung ihrer Fragestellung auszuwählen und diese zu begründen.
- den Forschungsprozess zu strukturieren.
- ein Exposé zu erstellen.
- ihre Vorgehensweise nachvollziehbar, gemäß wissenschaftlichen Standards, zu dokumentieren.

Selbst- und Sozialkompetenz - Die Studierenden sind in der Lage:

- die eigene fachliche Positionierung und Forschungsinteressen zu reflektieren.
- Verantwortung für die Planung eines wissenschaftlichen Projekts zu übernehmen.
- aktiv Betreuungs- und Beratungskontakte zu organisieren und den Austausch im Forschungskontext zu pflegen.

Content
• Entwicklung einer wissenschaftlichen Fragestellung • Themenfindung und Zieldefinition für Bachelorarbeiten • Systematische Literaturrecherche und Quellenanalyse • Einführung in wissenschaftliche Methoden (quantitativ, qualitativ, experimentell, modellbasiert etc.) • Erstellung eines Exposés oder Forschungskonzepts • Strukturierung wissenschaftlicher Arbeiten und Zeitplanung • Wissenschaftliche Argumentation und Nachvollziehbarkeit • Kriterien für Betreuerwahl und Kontaktaufnahme • Einführung in Forschungsdatenmanagement und Dokumentation • Diskussion ethischer, nachhaltiger und gesellschaftlicher Implikationen • Peer-Feedback und kollegiale Beratung • Optional: Beginn der Vorbereitung der Bachelorarbeit (nach individueller Rücksprache)
Literature
Wird zu Beginn bekannt gegeben
Additional remarks
Dualstudierende sollen im Modul eine Forschungsfrage gemeinsam und mit Bezug zu Ihrem Kooperationsunternehmen erarbeiten keine Bonuspunkte

Planungs- und Baurecht

Module abbreviation	SCE_PuB	**Reg.-Nr.**	29
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Pflichtfach	5
Module frequency	nur Sommersemester	**Module duration**	1 Semester

Responsible for module	Liepert, Tobias		
Lecturer(s)			
Language of instruction	Deutsch	**Language of exams**	Deutsch
Credit points / SWS	5 ECTS / 4 SWS		
Workload	Contact hours		45 h
	Self-study		80 h
	Total		125 h
Subjects of the module	Planungs- und Baurecht		
Lecture types	SU/Ü - seminaristischer Unterricht/Übung		

Examinations

LN

Additional explanations regarding examinations

Keine

Prerequisites according examination regulation

Dieses Fach kann nur belegt werden, wenn der zweite Studienabschnitt erreicht wurde. Dazu müssen mindestens 42 ECTS-Leistungspunkte aus dem ersten Studienabschnitt nachgewiesen werden.

Recommended prerequisites

Keine

Objectives

Fachkompetenz - Die Studierenden sind in der Lage:

- die grundlegenden rechtlichen Rahmenbedingungen des öffentlichen und privaten Baurechts zu benennen.
- die rechtlichen Konfliktpotenziale im Planungs- und Genehmigungsprozess zu erkennen und erste Lösungsmöglichkeiten zu skizzieren.
- mit bau- und umweltrechtlichen Texten, Urteilen und Verwaltungsvorgängen zu arbeiten.
- die Rechten und Pflichten, die durch die Bauvorlageberechtigung gem. Art 61 BayBO gegeben sind, einzuordnen.
- die Konformität einfacher Bauvorhaben hinsichtlicher planungsrechtlicher Vorgaben zu beurteilen.
- einen vollständigen Bauantrag für ein Wohngebäude zu erstellen.

Selbst- und Sozialkompetenz - Die Studierenden sind in der Lage:

- die Verantwortung technischer Berufe im Kontext rechtlicher und gesellschaftlicher Anforderungen zu reflektieren.

Content

Vorlesung

- Bauplanungsrecht: Bauleitplanung, Planungsverfahren und Beteiligung, bauplanungsrechtliche Zulässigkeit Baunutzungsverordnung (BauNVO)
- Bayerisches Bauordnungsrecht: Abständsflächen, Bauaufsichtliches Verfahren, bauaufsichtliche Eingriffsbefugnisse

Seminar

- Erstellung eines Bauantrag für ein Wohngebäude

Literature

- HOPPE, Werner, BÖNKER, Christian, GROTEFELS, Susan, GRÜNER, Johannes, SCHIEFERDECKER, Bernd, KÜMPER, Boas, 2024. *Öffentliches Baurecht: Raumordnungsrecht, Städtebaurecht, Bauordnungsrecht* [online]. München: C.H. Beck PDF e-Book. ISBN 978-3-406-79670-8. Verfügbar unter: https://doi.org/10.17104/9783406796708.
- PETERS, Heinz-Joachim, HESSELBARTH, Thorsten, PETERS, Frederike, 2024. *Umweltrecht* [online]. Stuttgart: Verlag W. Kohlhammer PDF e-Book. ISBN 978-3-17-043752-4, 978-3-17-043751-7. Verfügbar unter: https://doi.org/10.17433/978-3-17-043751-7.

Additional remarks

keine Bonuspunkte

Bachelorarbeit

Module abbreviation	SCE_Bachelorarbeit	**Reg.-Nr.**	30
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Pflichtfach	8
Module frequency	Winter- und Sommersemester	**Module duration**	1 Semester

Responsible for module	Angerer, Ludwig		
Lecturer(s)			
Language of instruction	Deutsch	**Language of exams**	Deutsch
Credit points / SWS	15 ECTS / 0 SWS		
Workload	Contact hours		11 h
	Self-study		364 h
	Total		375 h
Subjects of the module	30.1: Bachelorarbeit 30.2: Kolloquium		
Lecture types	30.1: BA - Bachelorarbeit 30.2: SU/Ü - seminaristischer Unterricht/Übung		

Examinations

30.1: BA - Bachelor-Abschlussarbeit
30.2: Koll - Kolloquium

Additional explanations regarding examinations

Keine

Prerequisites according examination regulation

PF der Forschungs- und Entwicklungswerkstatt

Recommended prerequisites

Keine

Objectives

Bachelorarbeit

Fachkompetenz - Die Studierenden sind in der Lage:

- die Grundlagen für wissenschaftliches Arbeiten anzuwenden.
- selbständig wissenschaftliche Fachinformation zu recherchieren und deren Qualität zu beurteilen.
- die Regeln des Zitierens wissenschaftlicher Quellen anzuwenden.
- eine wissenschaftliche Arbeit nach wissenschaftlichen Qualitätsstandards anzufertigen.

Selbst- und Sozialkompetenz - Die Studierenden sind in der Lage:

- unterschiedliche Sichtweisen und Interessen zu reflektrieren
- präzise und fachlich fundiert ihre Einschätzung darzulegen

Kolloquium

Fachkompetenz - Die Studierenden sind in der Lage:

- die Zielsetzung, Methodik und Ergebnisse ihrer Bachelorarbeit strukturiert und nachvollziehbar zu präsentieren.

- ihren Forschungsprozess kritisch zu reflektieren und Stärken sowie Schwächen der eigenen Arbeit zu benennen.
- die Ergebnisse ihrer Arbeit in den aktuellen Stand der Forschung und Praxis im Bauingenieurwesen einzuordnen.

Selbst- und Sozialkompetenz - Die Studierenden sind in der Lage:

- auf Rückfragen und Kritik fachlich fundiert und souverän zu reagieren und ihre Argumentation zu begründen.
- auch komplexe technische Sachverhalte adressatengerecht zu kommunizieren.
- den Einsatz von Präsentationsmedien zur zielgruppenorientierten Darstellung komplexer Inhalte zu beherrschen.

Content

Bachelorarbeit

- **I**ngenieurwissenschaftliche Fragestellung
- Für Dual-Studierende gilt zusätzlich: Für Dual-Studierende ist die Abschlussarbeit in Zusammenarbeit mit dem jeweiligen Dual-Unternehmen anzufertigen. Die inhaltliche Detaillierung und der wissenschaftliche Anspruch wird in Zusammenarbeit von firmenseitiger Betreuung im Dual-Unternehmen und Erstprüferin/Erstprüfer an der Technischen Hochschule sichergestellt.

Kolloquium

- Argumentation der eigenen Position
- Reaktion auf kritische Fragen
- Sachliche Diskussion im wissenschaftlichen Rahmen
- Freies Sprechen und Rhetorik
- Zielgruppenorientierte Sprache
- Umgang mit Nervosität und Lampenfieber
- Gestaltung und Aufbau einer Fachpräsentation
- Einsatz von Präsentationsmedien (PowerPoint, CAD-Pläne, Visualisierungen)
- Visualisierung komplexer technischer Zusammenhänge

Literature

Wird zu Beginn bekannt gegeben

Additional remarks

Bonuspunkte: keine

Praktikum (18 Wochen)

Module abbreviation	SCE_Praktikum	**Reg.-Nr.**	31
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Pflichtfach	6
Module frequency	nur Wintersemester	**Module duration**	1 Semester

Responsible for module	Angerer, Ludwig		
Lecturer(s)			
Language of instruction	Deutsch	**Language of exams**	Deutsch
Credit points / SWS	27 ECTS / 0 SWS		
Workload	Contact hours		0 h
	Self-study		675 h
	Total		675 h
Subjects of the module	Praktikum (18 Wochen)		
Lecture types	Pr - Praktikum		

Examinations

PB - Projekt-/Praxisbericht

Additional explanations regarding examinations

Keine

Prerequisites according examination regulation

Der Eintritt in das Praktikum des praktische Studiensemester setzt neben dem vollen Erbringen der Leistungspunkte aus dem ersten Studienabschnitt die Erbringung von mindestens 20 ECTS-Leistungspunkten aus dem zweiten Studienabschnitt voraus.

Recommended prerequisites

Keine

Objectives

Fachkompetenz - Die Studierenden sind in der Lage:

- bauingenieurtechnische Berechnungen (z. B. Statik, Baugrund, Bauphysik) selbstständig oder im Team auf reale Projekte anzuwenden.
- den Gesamtablauf von Planungs- und Bauprozess nachzuvollziehen und abgeschlossene Teilaspekte davon als Planungs- oder Überwachungsaufgabe zu übernehmen.
- die Kommunikation mit Bauherren, Fachplanern, Behörden und auf der Baustelle professionell zu begleiten.
- den Einfluss technischer Entscheidungen auf Nachhaltigkeit, Ressourcenschonung und Bauqualität zu erkennen und kritisch zu reflektieren.

Selbst- und Sozialkompetenz - Die Studierenden sind in der Lage:

- typische Abläufe in Planung, Ausschreibung und Bauausführung nachvollziehen und aktiv daran mitzuwirken.
- sich in branchenspezifische Software (z. B. CAD, BIM, Statik-Programme) einzuarbeiten.

Content

- Mitarbeit an Projekten und Problemstellungen im Unternehmen

• Anwendung und Vertiefung der gelehrten Kenntnissen, Methoden und Verfahren • Strukturen und Entscheidungsprozesse in Unternehmen • Vorbereitung und Realisierung von Projekten
Literature
Wird zu Beginn bekannt gegeben
Additional remarks
Keine Anmerkungen

Zertifizierungssysteme

Module abbreviation	SCE_Zertifizierung	**Reg.-Nr.**	32
Curriculum	**Study Programme**	**Module type**	**Semester**
	Sustainable Civil Engineering (SPO SS 26)	Pflichtfach	6
Module frequency	nur Wintersemester	**Module duration**	1 Semester

Responsible for module	Reiter, Thomas		
Lecturer(s)			
Language of instruction	Deutsch	**Language of exams**	Deutsch
Credit points / SWS	3 ECTS / 2 SWS		
Workload	Contact hours		23 h
	Self-study		52 h
	Total		75 h
Subjects of the module	Zertifizierungssysteme		
Lecture types	SU/Ü - seminaristischer Unterricht/Übung		

Examinations

PF - Portfolio-Prüfung (alle Teilleistungen vor Prüfungszeitraum)

Additional explanations regarding examinations

Keine

Prerequisites according examination regulation

Dieses Fach kann nur belegt werden, wenn der zweite Studienabschnitt erreicht wurde. Dazu müssen mindestens 42 ECTS-Leistungspunkte aus dem ersten Studienabschnitt nachgewiesen werden.

Recommended prerequisites

Keine

Objectives

Fachkompetenz - Die Studierenden sind in der Lage:

- Ziel, Struktur und Methodik von Gebäudezertifizierungssystemen zu benennen, insbesondere der DGNB. Mit dem Ziel optional DGNB Registered Professional abzulegen.
- Wechselwirkungen zwischen technischer Planung, Betrieb und Zertifizierungszielen zu interpretieren.
- die Bedeutung der Zertifizierung für Bauherren, Investoren und Nutzer zu beurteilen.
- die DGNB mit weiteren Systemen (BNB, LEED, BREEAM) zu vergleichen und deren Einsatzkontexte zu reflektieren.

Selbst- und Sozialkompetenz - Die Studierenden sind in der Lage:

- eigenverantwortlich und strukturiert mit komplexen Bewertungssystemen zu arbeiten.
- Nachhaltigkeitsziele fundiert im Planungs- und Bauprozess zu kommunizieren.
- die Rolle technischer Fachkräfte bei der Qualitätssicherung nachhaltiger Gebäude zu reflektieren.

Content

- Aufbau und Funktionsweise des DGNB-Systems
- DGNB-Kriterienkatalog: Umweltqualität, ökonomische Qualität, soziokulturelle Qualität, technische Qualität, Prozessqualität, Standortqualität

- Bewertungsmethodik und Gewichtung
- Lebenszyklusbetrachtung (LCA, LCC) als integraler Bestandteil der Zertifizierung
- Rolle des DGNB-Auditors und Ablauf des Zertifizierungsprozesses
- Integration von Zertifizierungszielen in Planungsprozesse und Projektsteuerung
- Praxisbeispiele DGNB-zertifizierter Gebäude
- Vergleich mit anderen Bewertungssystemen und Einordnung im internationalen Kontext
- Diskussion von Grenzen, Chancen und Weiterentwicklungen der Zertifizierung
- Aktuelle Entwicklungen (EU-Taxonomie, ESG-Bezug, EU-Green Deal)

Literature

Wird zu Beginn bekannt gegeben

Additional remarks

Bonuspunkte: keine