Vietnamese - German University

HBC. HOCHSCHULE BIBERACH UNIVERSITY OF APPLIED SCIENCES

Module Handbook

Bachelor Degree Program

Civil Engineering and Construction Management

Biberach University of Applied Sciences (HBC)

in cooperation with the

Vietnamese - German University (VGU)

Modification Service

The following module handbook is subject to a modification service. The original documents are located in the assistant room of the Biberach University of Applied Sciences and are maintained there.

The respective last version of the **module handbook** as well as the current version of the **study and examination regulations of the Bachelor Program in Civil Engineering and Construction Management** can be downloaded from the Internet at HBC and VGU

The document can only be read but not modified.

In Module	Page	Modification	Date	Author
All	All	First Draft for distribution	25.05.2020	Glock, Schmidt
All	All	First Official Issue	19.06.2020	Glock, Schmidt
All	All	Addition of the row „Applicability / Acceptability“ on all module overview pages	07.10.2020	Glock, Schmidt
All	All	Adaption of new Study Regulations	04.03.2021	Glock, Schmidt
All	All	Change of program name and updates on lecturers	12.12.2023	Glock

Table of contents

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Structure of Bachelor Program Civil Engineering and Construction Management

		1. Sem	2. Sem	3. Sem	4. Sem	5. Sem	6. Sem
ECTS-Credit Points	Total CP	CP	CP	CP	CP	CP	CP
Level 1 Basics	60	30	30				
Level 2 Basics in Civil Engineering	60			30	30		
Level 3 Major: Structural Engineering	30					20	10
Level 3 Major: Infrastructural Planning Engineering	30					20	10
Level 3 Mandatory and Electives	15					10	5
Level 3 Bachelor Thesis	15					3	12
Total ECTS-Credit Points	180	30	30	30	30	33	27

Abbreviations

BCE	Bachelorprogram in Civil Engineering
CP	ECTS-Creditpoints
Pre	Prerequisit for Examination
Ex	Examination
wE	Written Examination
oE	Oral Examination
gSP	graded Seminar Paper
uSP	ungraded Seminar Paper
P	Presentation
L	Labatory assignment
F	Field assignment

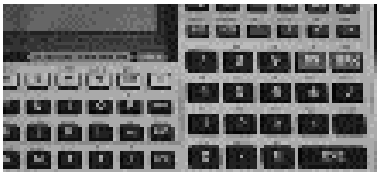
Module code				1. Sem		2. Sem		3. Sem		4. Sem		5. Sem		6. Sem		Examinations		
HBC	VGU	Module / Lecture	CP	SWS	CP	SWS	CP	SWS	CP	SWS	CP	SWS	CP	SWS	CP	Pre	Ex	Min
Level 1			**60**															
BCE 1.1		**Mathematics for Engineers I**	**5**															
BCE1.1-1	*61BCE101*	Analytical Geometry		4	5												wE	90
BCE 1.2		**Engineering Mechanics I**	**5**															
BCE1.2-1	*61BCE102*	Statics		4	5												wE	90
BCE 1.3		**Construction Materials I**	**5**															
BCE1.3-1	*61BCE103*	Construction Materials 1 incl. Construction Chemistry		4	5											L	wE	90
BCE 1.4		**Basics ind Building Construction and Building Physics**	**5**															
BCE1.4-1	*61BCE104*	Basics in Building Construction		2	2												wE	90
BCE1.4-2	*61BCE105*	Basics in Building Physics		2	3													
BCE 1.5		**Information Technology and Communication**	**5**															
BCE1.5-1	*61BCE106*	Component Oriented CAD		2	3												gSP	
BCE1.5-2	*61BCE107*	Teambuilding and Leading in Projects		2	2											uSP		
BCE 1.6		**Geotechnical Engineering I and Geology**	**5**															
BCE1.6-1	*61BCE108*	Engineering Geology		2	2											L	wE	90
BCE1.6-2	*61BCE109*	Geotechnical Engineering I		2	3											L & F		
BCE 2.1		**Mathematics for Engineers II**	**5**															
BCE2.1-1	*61BCE110*	Analysis				4	5										wE	90
BCE 2.2		**Engineering Mechanics II**	**5**															
BCE2.2-1	*61BCE111*	Elastostatics				4	5										wE	90
BCE 2.3		**Construction Materials II**	**5**															
BCE2.3-1	*61BCE112*	Construction Materials II incl. Construction Chemistry				4	5									L	wE	90
BCE 2.4		**Building Construction**	**5**															
BCE2.4-1	*61BCE113*	Building Construction				3	5										gSP	
BCE 2.5		**Construction Management I**	**5**															
BCE2.5-1	*61BCE114*	Construction Process Engineering				2	2										gSP	
BCE2.5-2	*61BCE115*	Ressource Planning und Scheduling				2	3											
BCE 2.6		**Geoinformation**	**5**															
BCE2.6-1	*61BCE116*	Surveying				2	3										wE	90
BCE2.6-2	*61BCE117*	Project Geoinformation				2	2									F,uSP		

Module code				1. Sem		2. Sem		3. Sem		4. Sem		5. Sem		6. Sem		Examinations		
HBC	VGU	Module / Lecture	CP	SWS	CP	SWS	CP	SWS	CP	SWS	CP	SWS	CP	SWS	CP	Pre	Ex	Min
Level 2			**60**															
BCE 3.1		**Structural Analysis I**	**5**															
BCE3.1-1	*61BCE201*	Structural Analysis I						4	5								gSP	
BCE 3.2		**Reinforced Concrete I**	**5**															
BCE3.2-1	*61BCE202*	Reinforced Concrete I						4	5							uSP	wE	90
BCE 3.3		**Steel Construction I**	**5**															
BCE3.3-1	*61BCE203*	Steel Construction I						4	5							uSP	wE	90
BCE 3.4		**Traffic Engineering I**	**5**															
BCE3.4-1	*61BCE204*	Traffic Engineering I						4	5							uSP	wE	90
BCE 3.5		**Hydraulic Engineering I**	**5**															
BCE3.5-1	*61BCE205*	Hydromechanics and Hydraulics						2	3							uSP	wE	90
BCE3.5-2	*61BCE206*	Application in Hydraulic Engineering 1						2	2									
BCE 3.6		**Urban Wastewater Management**	**5**															
BCE3.6-2	*61BCE207*	Urban Drainage						4	5								gSP	
BCE 4.1		**Building Information Modelling and Health and Safety**	**5**															
BCE4.1-1	*61BCE208*	Basics in Building Information Modelling								2	3						gSP	
BCE4.1-2	*61BCE209*	Health and Safety								2	2						uSP	
BCE 4.2		**Construction Management II**	**5**															
BCE4.2-1	*61BCE210*	Estimation								2	3						wE	120
BCE4.2-2	*61BCE211*	Cost Controlling								2	2							
BCE 4.3		**Geotechnical Engineering II**	**5**															
BCE4.3-1	*61BCE212*	Geotechnical Engineering II								4	5					uSP	wE	90
BCE 4.4		**Structural Analysis II**	**5**															
BCE4.4-1	*61BCE213*	Structural Analysis II								4	5					uSP	wE	90
BCE 4.5		**Infrastructure Planning and Traffic Engineering II**	**5**															
BCE4.5-1	*61BCE214*	Traffic Engineering II								4	5					uSP	wE	90
BCE 4.6St		**Reinforced Concrete II**	**5**															
BCE4.6St-1	*61BCE215*	Reinforced Concrete II								4	5					uSP	wE	90
BCE 4.7In		**Hydraulical Engineering II and Urban Water Management**	**5**															
BCE4.7In-1	*61BCE216*	Urban Water Supply								2	3					uSP	wE	90
BCE4.7In-2	*61BCE217*	Application in Hydraulic Engineering 2								2	2							

Module code				1. Sem		2. Sem		3. Sem		4. Sem		5. Sem		6. Sem		Examinations		
HBC	VGU	Module / Lecture	CP	SWS	CP	SWS	CP	SWS	CP	SWS	CP	SWS	CP	SWS	CP	Pre	Ex	Min
Level 3		**Specialization Structural Engineering**	**30**															
BCE 5.1St		**Structural Analysis III and Finite Elements**	**5**															
BCE5.1St-1	61BCE301	Structural Analysis und Finite Elements										4	5			uSP	wE	120
BCE 5.2St		**Reinforced Concrete III**	**5**															
BCE5.2St-1	61BCE302	Reinforced Concrete III										4	5			uSP	wE	120
BCE 5.3St		**Steel Construction II**	**5**															
BCE5.3St-1	61BCE303	Steel Construction II										3	5			uSP	wE	120
BCE 5.4St		**Structural Engineering Project-Study I**	**5**															
BCE5.4St-1	61BCE304	Structural Engineering Project-Study Part 1										2	5				gSP, P	
BCE 6.1St		**Structural Engineering Project-Study II**	**10**															
BCE6.1St-1	61BCE305	Structural Engineering Project-Study Part 2												4	10		gSP, P	

Module code				1. Sem		2. Sem		3. Sem		4. Sem		5. Sem		6. Sem		Examinations		
HBC	VGU	Module / Lecture	CP	SWS	CP	SWS	CP	SWS	CP	SWS	CP	SWS	CP	SWS	CP	Pre	Ex	Min
Level 3		**Specialization Infrastructure Planning**	**30**															
BCE 5.1In		**Traffic Engineering III**	**5**															
BCE5.1In-1	61BCE311	Traffic Engineering III										4	5			uSP	wE	120
BCE 5.2In		**Hydraulic Engineering III**	**5**															
BCE5.2In-1	61BCE312	Hydraulic Engineering III										4	5			uSP	wE	120
BCE 5.3In		**Urban Water Management**	**5**															
BCE5.3In-1	61BCE313	Urban Water Management										3	5			uSP	wE	120
BCE 5.4In		**Infrastructure Planning Project-Study I**	**5**															
BCE5.4In-1	61BCE314	Infrastructure Planning Project-Study Part 1										2	5				gSP, P	
BCE 6.1In		**Infrastructure Planning Project-Study II**	**10**															
BCE6.1In-1	61BCE315	Infrastructure Planning Project-Study Part 2												4	10		gSP, P	

Module code				1. Sem		2. Sem		3. Sem		4. Sem		5. Sem		6. Sem		Examinations		
HBC	VGU	Module / Lecture	CP	SWS	CP	SWS	CP	SWS	CP	SWS	CP	SWS	CP	SWS	CP	Pre	Ex	Min
Level 3		**Mandatory and Electives**	**15**															
BCE 5.5		**Mandatory: Building Information Modelling**	**5**															
BCE5.5-1	61BCE333	Building Information Modeling										3	5				gSP	
BCE 5.6		**Elective: Law and Contract Management**	**5**															
BCE5.6-1	61BCE391	Basics in Puplic and Privat Law								2	2						wE	90
BCE5.6-2	61BCE392	International Contract Management and FIDIC								2	3							
BCE 5.7		**Elective: Level 3 Module from other Major**	**5**															
BCE5.7-1	61BCE393	Module out of the other Major										4	5				other	
BCE 6.2		**Elective: Geotechnical Engineering III**	**5**															
BCE6.2-1	61BCE394	Geotechnical Engineering III												4	5	uSP	wE	120
BCE 6.3		**Elective: Sustainable Energy**	**5**															
BCE6.3-1	61BCE395	Sustainable Energy Management												2	3		wE	120
BCE6.3-2	61BCE396	Renewable Energy												2	2			
BCE 6.4		**Elective: Timber Construction**	**5**															
BCE6.4-1	61BCE397	Timber Construction												4	5	uSP	wE	120
BCE 6.5		**Elective: Interdisciplinary Module**	**5**															
BCE6.5-1	61BCE398	Module out of other Bachelor Programs from the University												0	5		other	
Level 3		**Bachelor Thesis**	**15**															
BCE 6.7		**Bachelor Thesis incl. Preparation Seminar**	**15**															
BCE6.7-1	61BCE360	Preparation Seminar										2	3				gSP, P	
BCE6.7-2	61BCE361	Bachelor Thesis incl. Presentation and Defence												0	12			

BCE 1.1 Mathematics for Engineers I		
Courses	BCE 1.1-1 Analytical Geometry	
Responsible for module	Prof. Dr. Erich Bluhmki	
Correlation to curriculum	Bachelor, Level 1, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering	
Total CPs	5 CP	
Duration	Semester 1	
Pre-requisites due to examination regulations	none	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students will master the basics of vector-algebra and calculus for one and several variable(s), standard differential equations.

Module contents

The following contents are taught in the module “Mathematics for Engineers I”:

- Vector-Algebra
- Differential calculus of one and several real variable(s)
- Integral calculus of one and several real variable(s)
- Standard differential equations and applications

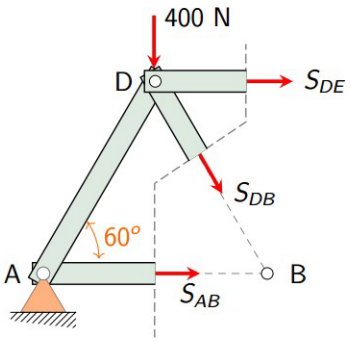
Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 1.1 Mathematics for Engineers	**BCE 1.1-1 Analytical Geometry**	**BCE 1**	**5/150 hours**	**English**

Lecturer(s)	Prof. Dr. Erich Bluhmki
Pre-requisites due to examination regulations	none
Teaching form	☒ Lecture ☐ Student Research Project ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students will master the basics of vector-algebra and calculus for one variable, including numerical procedures.
Course contents	▪ Summary and revision of material in school years 9 and 10, ▪ Real and complex numbers, ▪ Vector-Algebra, ▪ Parameter and polar coordinate descriptions ▪ Types and properties of functions with one real variable, ▪ Limits of sequences, power series and functions, ▪ Differential calculus of one real variable ▪ Integral calculus of one real variable ▪ Newton's iteration procedure ▪ Kepler's approximation rule
Examination	☒ Written examination (90 mins.)
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☐ Script ☒ E-learning
Reading	*Papula, L.:* Mathematik für Ingenieure und Naturwissenschaftler, Band 1 und 2, Wiesbaden, Vieweg + Teubner, 2009. *Rjasanowa, K.:* Mathematik für Bauingenieure, Fachbuchverlag Leipzig im Carl Hanser Verlag, 2006.
Last modification	12.04.2024

BCE 1.2 Engineering Mechanics I

Courses	BCE 1.2-1 Statics
Responsible for module	Dr. Nguyễn Tấn Tiên
Correlation to curriculum	Bachelor, Level 1, mandatory
Applicability / Acceptability	Bachelor Civil Engineering
Total CPs	5 CP
Duration	Semester 1
Pre-requisites due to examination regulations	none
Type of examination	☒ Module examination ☐ Partial module examination



Module goals (knowledge, skills, competences)

The students become familiar with terminology and thinking of an engineer which is essential for the advanced lectures. They are enabled to abstract physical conditions, to reduce them to the significant and to handle the results with mathematical methods. They are enabled to describe systems of forces and bodies as well as the influence of these systems of forces on bodies at rest and in motion.

Module contents

The following contents are taught in the module “Engineering Mechanics I”:

- Basic terminology Newton’s laws
- Vector algebra
- Forces and moments, free-body diagram, objects in equilibrium
- Support reactions
- Center of gravity, center of mass, centroids
- Geometrical stability of plane structures
- Statically determinate trusses, method of joints, method of sections
- Statically determinate beams, frames, arches
- Pointwise construction of the diagrams, integration and boundary conditions, matching conditions
- Spatial structures
- Stability and determinacy of plane structures

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 1.2 Engineering Mechanics I	**BCE 1.2-1 Statics**	**BCE 1**	**5/150 hours**	**English**

Lecturer(s)	Dr. Dr. Nguyễn Tấn Tiên
Pre-requisites due to examination regulations	none
Teaching form	☒ Lectures ☐ Student research project ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The aim of this course is to teach the principles of the statics of rigid bodies for the calculation of structurally-defined load-bearing structures. It acts as a foundation for the further course of mechanics for materials as well as the modules Structural Analysis and the subjects covered in Construction Engineering.
Course contents	▪ Basic terminology Newton's laws ▪ Vector algebra ▪ Forces and moments, free-body diagram, objects in equilibrium ▪ Support reactions ▪ Center of gravity, center of mass, centroids ▪ Geometrical stability of plane structures ▪ Statically determinate trusses, method of joints, method of sections ▪ Statically determinate beams, frames, arches ▪ Pointwise construction of the diagrams, integration and boundary conditions, matching conditions ▪ Spatial structures ▪ Stability and determinacy of plane structures
Examination	☒ Written examination (90 mins.)
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	▪ Hibbeler R.C., Engineering Mechanics-Statics, fourteenth edition, Pearson Prentice Hall. ▪ Merriam J.L., Kraige L.G., Engineering Mechanics, volume 1-Statics, seventh edition, John Wiley & Sons, Inc. ▪ Gross et al., Engineering Mechanics 1-Statics, second edition, Springer.
Last modification	12.04.2024

BCE 1.3 Construction Materials I		
Courses	BCE 1.3-1 Construction Materials 1 incl. Construction Chemistry	
Responsible for module	Prof. Dr.-Ing. Toris	
Correlation to curriculum	Bachelor, Level 1, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering	
Total CPs	5 CP	
Duration	Semester 1	
Pre-requisites due to examination regulations	Laboratory assignment	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students will become familiar with the properties of various building materials and will be able to calculate the important characteristic values.

Module contents

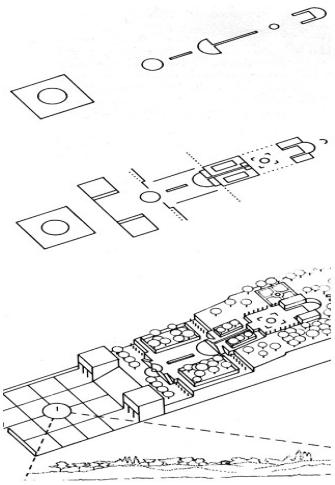
The following contents are taught in the module “Construction Materials”:

- Basic knowledge of building materials
- Basic knowledge of construction chemistry
- Knowledge about steel, metals, timber etc.
- Dynamic stress
- Building product law

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 1.3 Construction Materials I	**BCE 1.3-1 Construction Materials I incl. Construction Chemistry**	**BCE 1**	**5/150 hours**	**English**

Lecturer(s)	Prof. Dr.-Ing. Toris and Dr. Nguyễn Xuân Thanh
Pre-requisites due to examination regulations	Laboratory assignment
Teaching form	☒ Lecture ☐ Student research project ☒ Exercises ☒ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students will become familiar with the properties of various building materials such as steel and other metals, timber etc. and will be able to calculate the important characteristic values.
Course contents	▪ Introduction, Functions and Properties of construction materials ▪ Testing of mechanical Properties ▪ Testing of other Properties ▪ Basics of Chemistry of construction Materials ▪ Safety Concept & Material Properties ▪ Steel and Metals ▪ Timber
Examination	☒ Written examination (90 mins.)
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

BCE 1.4 Basics in Building Construction and Building Physics		
Courses	BCE 1.4-1 Basics in Building Construction BCE 1.4-2 Basics in Building Physics	
Responsible for module	Prof. Dr.-Ing. Martin Spitzner	
Correlation to curriculum	Bachelor, Level 1, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering	
Total CPs	5 CP	
Duration	Semester 1	
Pre-requisites due to examination regulations	none	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students have knowledge of structural engineering with special attention to the cooperation between civil engineer and architect and will know the physical basics, the ecological, economic and physiological relevance. The students will learn the basic design rules and construction elements of building construction on the basis of the knowledge acquired in the subject of building construction. They are capable of designing simple structures in accordance with practice and standards.

Module contents

The following contents are taught in the module “Basics in Building Construction”:

- Knowledge of the basics of building construction
- Knowledge of the constructive measures for building protection
- Knowledge of the supporting elements of building construction
- Ability to prepare input (building application), work and detail plans

The following contents are taught in the module “Basics in Building Physics”:

- Basic concepts: Thermal insulation, diffusion, convection, transient processes thermal bridges
- Basic concepts of moisture protection
- Condensation on surfaces, condensation in the component
- Fundamentals of sound, airborne sound insulation

Last modification	12.04.2024

Module name	***Course***	***Semester***	***CPs/Workload***	***Language***

BCE 1.4 Basics in Building Construction and Building Physics	BC 04-1 Basics in Building Construction	BCE 1	2/60 hours	English

Lecturer(s)	NN VGU
Pre-requisites due to examination regulations	none
Teaching form	☒ Lecture ☒ Student research project ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students have knowledge of structural engineering with special attention to the cooperation between civil engineer and architect. They have learned the basic design rules and construction elements of building construction on the basis of the knowledge acquired in the subject of building construction. The students are capable of designing simple structures in accordance with practice and standards and to present them in a manner ready for execution.
Course contents	▪ Knowledge of the basics of building construction ▪ Construction elements and design principles of building construction and their combination to one building ▪ Dealing with the different building materials and working techniques under special attention to sustainability ▪ Knowledge of the constructive measures for building protection, thermal and sound, moisture and fire protection in building construction ▪ Knowledge of the supporting elements of building construction ▪ Ability to prepare input (building application), work and detail plans
Examination	☒ Written module examination (90 mins.)
Frequency	Once a year
Workload	60 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 1.4 Basics in Building Construction and Building Physics	**BCE 1.4-2 Basics in Building Physics**	**BCE 1**	**3/90 hours**	**English**

Lecturer(s)	Prof. Dr.-Ing. Martin Spitzner
Pre-requisites due to examination regulations	none
Teaching form	☒ Lecture ☐ Student research project ☐ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	Building physics means heat, moisture and sound insulation. The students know the physical basics, the ecological, economic and physiological relevance as well as the relevant rules of technology. They learn about diffusion and convection as well as reverse diffusion in summer.
Course contents	▪ Basic concepts: Thermal insulation, diffusion, convection, transient processes thermal bridges ▪ Windows ▪ Current Energy standards ▪ Basic concepts of moisture protection ▪ Condensation on surfaces, condensation in the component ▪ Renovations ▪ Summer sun protection ▪ Leaks, air tightness ▪ Fundamentals of sound, airborne sound insulation, impact sound insulation, flank sound, noise protection
Examination	☒ Written module examination (60 mins.)
Frequency	Once a year
Workload	90 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

BCE 1.5 Information Technology and Communication		
Courses	BCE 1.5-1 Component Oriented CAD BCE 1.5-2 Teambuilding and Leading in Projects	
Responsible for module	Academic Coordinator	
Correlation to curriculum	Bachelor, Level 1, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 1	
Pre-requisites due to examination regulations	none	
Type of Examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students know the theoretical fundamentals of model-based working methods, and the classification of digital tools in the process landscape of planning and building, and are familiar with the requirements of cross-disciplinary collaboration.
They can practically apply the BIM-based working method and the corresponding software.
They are able to select the construction and materials for a planning project taking into account the aforementioned points, to assess the effects of the selection, justify their selection, and incorporate it into the model-/BIM-based project work.
Design and construction of projects is always carried out in multidisciplinary teams. The students will learn the theoretical fundamentals of teamwork, team dynamics and team rolls. They will learn how to communicate efficiently.

Module contents

Fundamentals of building informatics and BIM, modelling, technical and coordination models, interfaces, software products, digital twin. BIM processing plans and client information requirements
Fundamentals of component-oriented CAD; use of Autodesk Revit, incl. templates, component families, specialist models, component lists, and derivation of planning documents. Creation of a building in individual exercises, implementation of the structural and design fundamentals under the aspects of digital, component-oriented planning using BIM
Theoretical fundamentals of teamwork, leadership, HR-management and case studies with role plays

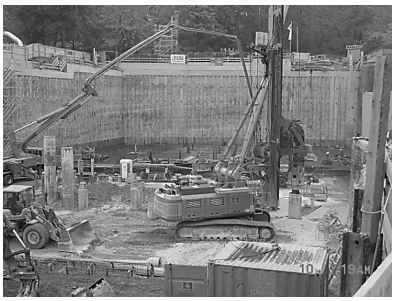
Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 1.5 Information Technology and Communication	**BCE 1.5-1 Component Oriented CAD**	**BCE 1**	**3/90 hours**	**English**

Lecturer(s)	Richard Sugandha, M. Sc.
Pre-requisites due to examination regulations	none
Teaching form	☒ Lectures ☐ Student research project ☒ Exercises ☒ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The aim of the lecture is to obtain an application-oriented understanding of the BIM-based way of working. To this end, students are enabled to relate theoreti-cal knowledge to practical application. The students acquire the skills to use the BIM CAD software fundamentally and thereby fulfil the prerequisite for the further use of the models for the digitalisation of construction processes.
Course contents	• Fundamentals of component-oriented CAD • Integration of the model data in the processes of planning and • construction • Application of the BIM CAD software Autodesk Revit • Structure of the programme • Creating projects and central models • Dealing with project templates • Creation of components • Creation of type and copy parameters • Fundamentals of the creation of component families • Referencing of professional models • Dimensioning of components • Preparation of component lists • Derivation of planning documents • Program-based extensions • Creation of a building in individual exercises • Insight into the export options of open and closed BIM
Examination	☒ Graded Seminar Paper
Frequency	Once a year
Workload	90 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*Software desciptions*
Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 1.5 Information Technology and Communication	**BCE 1.5-2 Teambuilding and Leading in Projects**	**BCE 1**	**2/60 hours**	**English**

Lecturer(s)	Dr. Stéphane-Laure Caubet, PhD
Pre-requisites due to examination regulations	Ungraded Seminar Paper
Teaching form	☒ Lecture ☐ Student research project ☐ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students learn the basics for team compositions and dynamics and efficient team work. They know the fundamentals about motivation and how employees should be managed. They will know the the fundamentals of engagement and leadership. They learn that employees are the essential potential in a company and must be supported accordingly.
Course contents	▪ Different typs of characters using the four basic elements ▪ Intrinsic and extrinsic motivation ▪ Dynamics and roles in teams ▪ Leadership versus Management ▪ HR- Management The theoretical fundamentals will be trained by the students in case studies and roleplays. These will then be reflected and discussed in groups.
Examination	☒ Graded Seminar Paper
Frequency	Once a year
Workload	60 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*Susanne Madsen:* The Power of Project Leadership form Project Manager to Project Leader, 2nd edition *Rory Burke and Steve Barron:* Project Management Leadership: Building Creative Teams *Manfred Gellert und Claus Nowak:* Teamarbeit, Teamentwicklung, Teamberatung: Ein Praxisbuch für Arbeit in und mit Teams Further literature will be posted on the Internet before the semester begins
Last modification	12.04.2024

BCE 1.6 Geotechnical Engineering I and Geology		
Courses	BCE 1.6-1 Engineering Geology BCE 1.6-2 Geotechnical Engineering I	
Responsible for module	Prof. Rolf Schrodi	
Correlation to curriculum	Bachelor, Level 1, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 1	
Pre-requisites due to examination regulations	BCE 1.6-1: Laboratory assignment BCE 1.6-2: Laboratory and field assignment	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students can recognize and determine the most important types of rock and draw initial constructional conclusions about the behavior of the rocks as building ground and building material. They know the basics of the earth's structure and dynamics and have basic knowledge of earthquake-resistant construction.

The students also learn about the important soil physical parameters and their determination methods as well as the basics of soil mechanics. They will be able to classify soils, describe rock, plan and calculate dewatering and draw conclusions for structural engineering relationships.

Module contents

The following contents are taught in the module “Geology and Geotechnical Engineering”:

- Introduction to mineralogy
- Field exercises and laboratory practices

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 1.6 Geotechnical Engineering I and Geology	**BCE 1.6-1 Engineering Geology**	**BCE 1**	**2/60 hours**	**English**

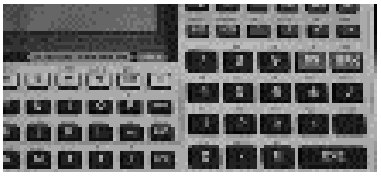
Lecturer(s)	Prof. Dr. Benno Rothstein
Pre-requisites due to examination regulations	Laboratory assignment
Teaching form	☒ Lecture ☒ Student research project ☒ Exercises ☐ Working as a team ☒ Laboratory assignment ☒ E-learning
Module goals (knowledge, skills, competences)	The students can recognize and determine the most important types of rock and draw initial constructional conclusions about the behavior of the rocks as building ground and building material. They know the geoscientific basics of Engineering Geology (e.g. earth's structure, surface and dynamics), can assess a potential earthquake hazard for buildings and have basic knowledge of earthquake-resistant construction. The students can read and interpret simple geological maps. They have basic knowledge of assessing groundwater conditions and the use of geothermal energy. The overall aim of the module is to combine geoscientific knowledge with technical aspects in order to develop the interface competence of the students.
Course contents	The focus of this lecture is the geoscientific aspects of Engineering Geology. Therefore the scientific basics of Geology and Geomorphology are covered: ▪ Fundamental views and structure of geomorphology and geology ▪ Geological basics, endogenous dynamics (e.g. earthquakes, rock formation) and structural forms (e.g. folds, overthrusts) ▪ Minerals and rocks ▪ Weathering ▪ Gravitational mass movements ▪ Fluvial processes and forms ▪ Glacial processes and forms ▪ Periglacial processes and forms ▪ Karst ▪ Aeolian processes and forms ▪ Littoral processes and forms In addition, the technical aspects of engineering geology are covered, such as ▪ Earthquake safety ▪ Geological maps and their application in engineering practice ▪ Behaviour of the rocks as building ground and building material ▪ Geothermal energy

Examination	☒ Written module examination (90 mins.)
Frequency	Once a year
Workload	60 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*Ahnert, F.:* Einführung in die Geomorphologie. Stuttgart: UTB, 5. Auflage, 2015. *Baumhauer, R./Kneisel, C./ Möller, S./Schütt, B./Tressel,E.:* Einführung in die Physische Geographie. Darmstadt: Wissenschaftl. Buchgesell., 3. Auflage, 2017. *Fecker, E.:* Baugeologie. Springer Spektrum, 3. Auflage, 2019. *Goudie, A.:* Physische Geographie – Eine Einführung. Heidelberg: Springer Spektrum, 4. Auflage., 2014. *Klengel, K.J. / Wagenbreth, O.:* Ingenieurgeologie für Bauingenieure, Wiesbaden und Berlin: Bauverlag GmbH, 1987. *Press, F.; Siever, R.:* Allgemeine Geologie. Heidelberg: Spektrum Akademischer Verlag, 7. Auflage, 2016. *Prinz, H./Strauß, R.:* Ingenieurgeologie. Springer Spektrum, 6. Auflage, 2018. Internet ▪ http://www.webgeo.de/ ▪ https://disc.gsfc.nasa.gov/ ▪ https://www.egu.eu/ ▪ https://www.mdpi.com/journal/geosciences ▪ https://pubs.geoscienceworld.org/
Last modification	12.04.2024

Module name	*Course*	*Semester*	*CPs/Workload*	*Language*
BCE 1.6 Geotechnical Engineering I and Geology	**BCE 1.6-2 Geotechnical Engineering I**	**BCE 1**	**3/90 hours**	**English**

Lecturer(s)	Prof. Dipl.-Ing. Rolf Schrodi
Pre-requisites due to examination regulations	Laboratory and field assignment
Teaching form	☒ Lecture ☒ Student research project ☒ Exercises ☒ Working as a team ☒ Laboratory and field assignment ☒ E-learning
Module goals (knowledge, skills, competences)	The students learn about the most important soil physical parameters and their determination methods as well as the basics of soil mechanics. They will be able to classify soils, describe rock, plan and calculate dewatering and draw conclusions for structural engineering relationships. In the practical courses in soil mechanics, students carry out soil mechanical investigations independently under the supervision of a specialist and are thus able to apply the basics of soil mechanics they have learnt or to better assess the scope and duration of investigations and the limits of laboratory investigations.
Course contents	**Lecture Basics of Geotechnics:** ▪ Soil physical parameters for the determination of the soil type and soil condition ▪ Soil classification for engineering purposes ▪ Soil and rock classes in earthworks ▪ Ground frost ▪ Site investigation ▪ Water in building ground, drainage in building pits ▪ Field exercise rock slope **Practical training in soil mechanics:** ▪ Field exercise: Execution and evaluation of a drilling and dynamic probing and taking soil samples ▪ Laboratory exercise on soil classification: implementation and evaluation of the classification tests on the soil samples taken ▪ Earthworks laboratory exercise - carrying out and evaluating the tests required for a sufficient compaction and bearing capacity, laboratory and field tests, demonstration tests for soil improvement with binders ▪ Laboratory exercise to demonstrate water permeability and infiltration
Examination	☒ Written module examination (90 mins.)

Frequency	Once a year
Workload	90 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

BCE 2.1 Mathematics for Engineers II		
Courses	BCE 2.1-1 Analysis	
Responsible for module	Prof. Dr. Erich Bluhmki	
Correlation to curriculum	Bachelor, Level 1, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 2	
Pre-requisites due to examination regulations	none	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students will master the analysis of experiments and systems of linear / non-linear equations.

Module contents

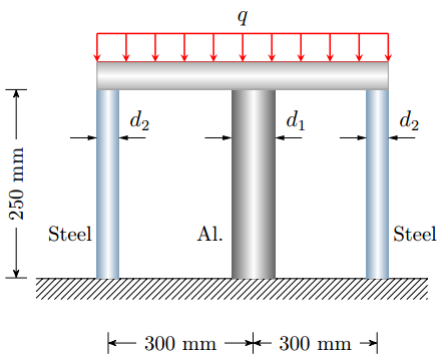
The following contents are taught in the module “Mathematics for Engineers II”:

- Analysis of experiments including correlation and regression
- Linear and non-linear systems of equations

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 2.1 Mathematics for Engineers II	**BCE 2.1-1 Analysis**	**BCE 2**	**5/150 hours**	**English**

Lecturer(s)	Dr. Phạm Thành Dương
Pre-requisites due to examination regulations	none
Teaching form	☒ Lecture ☐ Student Research Project ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students will be able to calculate and solve equations, functions and differential equations.
Course contents	▪ Kepler's approximation rule ▪ Summary and revision of work covered in the first semester ▪ Standard differential equations including approximation processes for problems with initial value ▪ Functions of several variables including extrema with additional conditions ▪ Analysis experiments including correlation and regression ▪ Matrices / linear equations ▪ Non-linear equations ▪ Application of differential equations to issues such as vibration, bounda value problems and buckling
Examination	☒ Written examination (90 mins.)
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☐ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

BCE 2.2 Engineering Mechanics II		
Courses	BCE 2.2-1 Elastostatics	
Responsible for module	Dr. Nguyễn Tấn Tiên	
Correlation to curriculum	Bachelor, Level 1, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 2	
Pre-requisites due to examination regulations	none	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students become familiar with terminology and thinking of an engineer which is essential for the advanced lectures. They are enabled to abstract physical conditions, to reduce them to the significant and to handle the results with mathematical methods. The students are able to observe insight into the physical mechanisms and structures governed by material based formulations that beneficial in engineering design.

Module contents

The following contents are taught in the module “Engineering Mechanics II”:

- Fundamentals of the mechanics of deformed bodies: stresses, strains
- Tension and compression in bars
- Constitutive equations
- Moments of area (2nd order)
- Off-center normal force, core areas
- Longitudinal stress in beams as a result of biaxial bending with longitudinal force
- Deformation as a result of uneven bending (bending lines)
- Work and potential energy, principle of virtual work

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 2.2 Engineering Mechanics II	**BCE 2.2-1 Elastostatics**	**BCE 2**	**5/150 hours**	**English**

Lecturer(s)	Dr. Nguyễn Tấn Tiên
Pre-requisites due to examination regulations	none
Teaching form	☒ Lectures ☐ Student research project ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students become familiar with terminology and thinking of an engineer which is essential for the advanced lectures. They are enabled to abstract physical conditions, to reduce them to the significant and to handle the results with mathematical methods. The students are able to observe insight into the physical mechanisms and structures governed by material based formulations that beneficial in engineering design.
Course contents	▪ Fundamentals of the mechanics of deformed bodies: stresses, strains ▪ Tension and compression in bars ▪ Constitutive equations ▪ Moments of area (2nd order) ▪ Off-center normal force, core areas ▪ Longitudinal stress in beams as a result of biaxial bending with longitudinal force ▪ Deformation as a result of uneven bending (bending lines) ▪ Work and potential energy, principle of virtual work The lecture is complemented by numerous applications and examples.
Examination	☒ Written examination (90 mins.)
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	▪ Merriam J.L., Kraige L.G., Engineering Mechanics, volume 1-Statics, seventh edition, John Wiley & Sons, Inc. ▪ Gross et al., Engineering Mechanics 2, Mechanics of Materials, second edition, Springer. ▪ Hibbeler R.C., Mechanics of Materials, eighth edition, Pearson Prentice Hall
Last modification	12.04.2024

BCE 2.3 Construction Materials II		
Courses	BCE 2.3-1 Construction Materials II incl. Construction Chemistry	
Responsible for module	Prof. Dr.-Ing. Toris	
Correlation to curriculum	Bachelor, Level 1, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 1	
Pre-requisites due to examination regulations	Laboratory assignment	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students will become familiar with the properties of various building materials such as glass, concrete etc. and will be able to calculate the important characteristic values.

Module contents

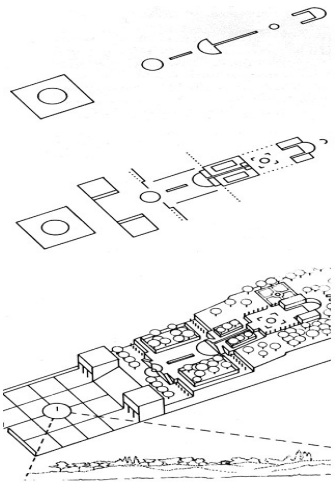
The following contents are taught in the module “Construction Materials”:

- Basic knowledge of building materials
- Basic knowledge of construction chemistry
- Knowledge about concrete, masonry and brickwork, plastics
- Dynamic stress
- Building product law

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 2.3 Construction Materials II	**BCE 2.3-1 Construction Materials II incl. Construction Chemistry**	**BCE 2**	**5/150 hours**	**English**

Lecturer(s)	Dr. Dinh Hung and Dr. Nguyễn Xuân Thanh
Pre-requisites due to examination regulations	Laboratory assignment
Teaching form	☒ Lecture ☐ Student research project ☒ Exercises ☒ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students will know about the properties of various building materials such as glass, wood, metals, concrete etc. and will be able to calculate the important characteristic values.
Course contents	▪ Aggregates for Concrete ▪ Cement, Additions, Admixtures ▪ Properties of fresh and early age concrete ▪ Properties of hardened concrete ▪ Special concrete ▪ Masonry ▪ Mortars and Plasters ▪ Polymers & composites ▪ Glass ▪ Regulations and approval for trade and use of construction materials ▪ Innovation approaches
Examination	☒ Written examination (90 mins.)
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

BCE 2.4 Building Construction		
Courses	BCE 2.4-1 Building Construction	
Responsible for module	Prof. Dr.-Ing. Martin Spitzner	
Correlation to curriculum	Bachelor, Level 1, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 2	
Pre-requisites due to examination regulations	none	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students have knowledge of structural engineering with special attention to the cooperation between civil engineer and architect and will know the physical basics, the ecological, economic and physiological relevance. The students will learn the basic design rules and construction elements of building construction on the basis of the knowledge acquired in the subject of building construction. They are capable of designing simple structures in accordance with practice and standards.

Module contents

The following contents are taught in the module “Building Construction”:

- Knowledge of the basics of building construction
- Knowledge of the constructive measures for building protection
- Knowledge of the supporting elements of building construction
- Ability to prepare input (building application), work and detail plans

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 2.4 Building Construction	**BCE 2.4-1 Building Construction**	**BCE 2**	**5/150 hours**	**English**

Lecturer(s)	Prof. Dipl.-Ing. Gerhard Lutz
Pre-requisites due to examination regulations	none
Teaching form	☒ Lecture ☒ Student research project ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	Based on the knowledge acquired in the subject Basics in Building Construction, the students have deepened the basic design rules and construction elements. They are able to design buildings with the finishing elements in a practical and standard-compliant manner and to present them ready for execution. The students should be introduced to the design / constructive processing of buildings. They master the basics of construction drawing and design and have the basic knowledge of structural design including the bracing of buildings, the design of masonry as well as simple timber structures. They also have knowledge of the basic structure of building components and detail points of a building construction. The students were taught about the measures that have to be taken to avoid damage to buildings and building components.
Course contents	▪ Construction elements and construction principles of the carcass and finishing with the different building materials and working techniques with special consideration of sustainability in skeleton constructions (in the carcass and finishing). ▪ Waterproofing of buildings. ▪ Basics of the design of load-bearing structures, masonry and simple timber structures. ▪ Measures to prevent damage to buildings and building components.
Examination	☒ Graded seminar paper
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

BCE 2.5 Construction Management I		
Courses	BCE 2.5-1 Construction Process Engineering BCE 2.5-2 Resource Planning and Scheduling	
Responsible for module	Prof. Dr.-Ing. Alexander Glock	
Correlation to curiculum	Bachelor, Level 1, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 2	
Pre-requisites due to examination regulations	none	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

This first module of Construction Management will provide the students with a general understanding of construction management issues within construction project management that enables a person to understand the preparation and execution of construction measures from the contractor's point of view. The students know the basic principles of planning in the fields of construction process engineering, resource planning, scheduling and calculation. Using selected project examples from the construction industry, students acquire methodical skills for holistic problem analysis and problem solving. The students are able to carry out the necessary construction management tasks - process selection, resource planning, construction site equipment planning, scheduling and offer calculation - largely independently.

Module contents

In the module "Construction Management I" the following contents are taught:

- Planning basics for construction operations
- Overview and classification of construction machinery
- Construction methods in earthwork, reinforced concrete construction, methods in bridge construction
- Performance coordination Wage-intensive work
- Performance tuning Machine-intensive work
- Basics of scheduling, network planning, cycle planning
- Planning of construction site equipment

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 2.5 Construction Management I	**BCE 2.5-1 Construction Process Engineering**	**BCE 2**	**2/60 hours**	**English**

Lecturer(s)	Prof. Dr.-Ing. Alexander Glock
Pre-requisites due to examination regulations	none
Teaching form	☒ Lecture ☐ Student research project ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students will understand the different roles (client, designer, prime contractor, subcontractors, consultant, etc..) and the special challenges of construction projects. The students will gain an overview of essential areas of construction process engineering. They know the essential construction methods and can select suitable construction methods and equipment. The students are able to develop a work preparation concept for a construction project.
Course contents	▪ Work-Breakdown-Structures ▪ Construction management technology in construction management ▪ Process engineering and selection ▪ Overview and classification of construction machinery ▪ Lifting equipment in building construction ▪ Selection of construction machines and their fields of application ▪ Construction methods in earthworks ▪ Construction methods in reinforced concrete construction (formwork, reinforcement, concreting) ▪ Bridge construction method
Examination	☒ Graded Seminar Paper
Frequency	Once a year
Worklaod	60 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*During lectures*
Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 2.5 Construction Management I	**BCE 2.5-2 Resource Planning and Scheduling**	**BCE 2**	**3/90 hours**	**English**

Lecturer(s)	Prof. Dr.-Ing. Alexander Glock
Pre-requisites due to examination regulations	none
Teaching form	☒ Lecture ☐ Student research project ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students gain in-depth knowledge of time and capacity planning: labor-intensive work, machine-intensive work, stages of process planning as well as overall scheduling and detailed planning in construction operations. They will be able to carry out performance and capacity calculations independently and create a time schedule.
Course contents	▪ Planning bases for construction operations ▪ Different process principles ▪ Practice and familiarization ▪ Effort values and performance values ▪ Performance review of wage-intensive work ▪ Construction time control and performance control ▪ Performance tuning machine-intensive work ▪ Coordination of production chains ▪ Cycle planning and scheduling
Pre-requisites due to examination regulations	none
Examination	☒ Graded Seminar Paper
Frequency	Once a year
Worklaod	90 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*During lectures*
Last modification	12.04.2024

BCE 2.6 Geoinformation

Courses	BCE 2.6-1 Surveying BCE 2.6-2 Project Geoinformation
Responsible for module	Dr. Nguyễn Đình Hùng
Correlation to curriculum	Bachelor, Level 1, mandatory
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management
Total CPs	5 CP
Duration	Semester 2
Pre-requisites due to examination regulations	BCE 2.6-1: Field assignment, ungraded seminar paper
Type of examination	☒ Module examination ☐ Partial module examination

Module goals (knowledge, skills, competences)

The students know the most important surveying measurement, evaluation and visualization techniques and can independently apply basic surveying skills. By knowing the achievable accuracies, the students are able to assess the reasonable use of different measurement methods and to evaluate the results of measurements. The students will have the ability to apply their theoretical knowledge to a concrete project, analyze the work, assess and present the results. As the work will be carried out in groups, teamwork skills will be developed.

Module contents

The following contents are taught in the module “Geoinformation”:

- Surveying fundamentals, measuring instruments
- Surveying calculations including quantity calculations
- CAD, photogrammetry, geoinformation systems
- Public surveying

Within the practical implementation of the project

- Automation in conventional surveying technology,
- Satellite surveying systems (GNSS),
- Laser scanning, computer-aided evaluation (e.g. CAD) and geoinformation.

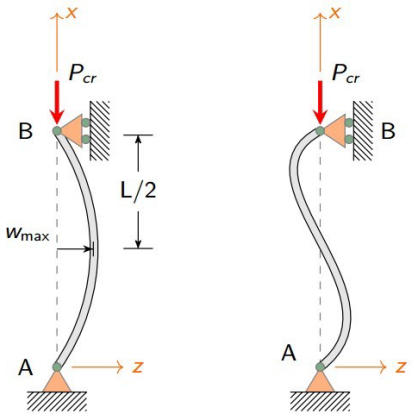
Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 2.6 Geoinformation	**BCE 2.6-1 Surveying**	**BCE 2**	**3/90 hours**	**English**

Lecturer(s)	Dr. Nguyễn Đình Hùng
Pre-requisites due to examination regulations	none
Teaching form	☒ Lecture ☐ Student research project ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students know the most important surveying measurement, evaluation and visualization techniques and can independently apply basic surveying skills. By knowing the achievable accuracies, the students are able to assess the reasonable use of different measurement methods and to evaluate the results of measurements.
Course contents	▪ Surveying fundamentals ▪ Measuring instruments: height measurement, position measurement and three-dimensional determination ▪ Surveying calculations including quantity calculations ▪ CAD, photogrammetry, geoinformation systems ▪ Public surveying ▪ Basic geodata
Examination	☒ Written module examination (90 mins.)
Frequency	Once a year
Workload	90 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☐ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 2.6 Geoinformation	**BCE 2.6-2 Project Geoinformation**	**BCE 2**	**2/60 hours**	**English**

Lecturer(s)	Dr. Nguyễn Đình Hùng
Pre-requisites due to examination regulations	Field assignment and ungraded seminar paper
Teaching form	☒ Lecture ☒ Student research project ☒ Exercises ☐ Working as a team ☒ Field assignment ☒ E-learning
Module goals (knowledge, skills, competences)	The students will have the ability to apply their theoretical knowledge to a concrete project, analyze the work, assess and present the results. As the work will be carried out in groups, teamwork skills will be developed.
Course contents	Within the practical implementation of the project ▪ Automation in conventional surveying technology, ▪ Satellite surveying systems (GNSS), ▪ Laser scanning, ▪ Computer-aided evaluation (e.g. CAD) and ▪ Geoinformation systems.
Examination	☒ Written module examination (90 mins.)
Frequency	Once a year
Workload	90 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

BCE 3.1 Structural Analysis I		
Courses	BCE 3.1-1 Structural Analysis I	
Responsible for module	Dr. Nguyễn Tấn Tiên	
Correlation to curiculum	Bachelor, Level 2, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 3	
Pre-requisites due to examination regulations	none	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students are deal with analyzing beams, trusses, floor girders, buckling behavior and computer programs. They can determine the decisive load positions from lines of influence and know how to effectively control computer results.

Module contents

The following contents are taught in the module “Structural Analysis I”:

- Shear stresses in beams
- Torsion
- Influence lines for force and displacement variables of statically determinate structures
- Determination of most unfavorable (dangerous) position of moving loads using influence lines
- Buckling of columns
- Dealing with computer programs

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 3.1 Structural Analysis I	**BCE 3.1-1 Structural Analysis I**	**BCE 3**	**5/150 hours**	**English**

Lecturer(s)	Dr. Nguyễn Tấn Tiên
Pre-requisites due to examination regulations	none
Teaching form	☒ Lecture ☐ Student research project ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students are enabled to abstract physical conditions, to reduce them to the significant and to handle the results with mathematical methods. The students are able to observe insight into the physical mechanisms and structures that beneficial in engineering design. The students are also deal with analyzing beams, trusses, floor girders, buckling behavior and computer programs. They can determine the decisive load positions from lines of influence and know how to effectively control computer results.
Course contents	▪ Shear stresses in beams ▪ Torsion (for circular shaft, thin-walled closed/open cross-sections) ▪ Influence lines for force and displacement variables of statically determinate structures ▪ Determination of most unfavorable (dangerous) position of moving loads using influence lines ▪ Envelope of maximum influence-line values ▪ Buckling of columns ▪ Dealing with computer programs (introduction to the SAP200/ETABS programs) and checking computer results The lecture is complemented by numerous applications and examples.
Examination	☒ Graded Seminar Paper
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	▪ Hibbeler R.C., Structural Analysis, tenth edition, Pearson Prentice Hall, 2019. ▪ Gross et al., Engineering Mechanics 1, 2, Mechanics of Materials, second edition, Springer. ▪ William M. C. McKenzie, Examples in Structural Analysis, second edition, CRC Press, Taylor & Francis.
Last modification	12.04.2024

BCE 3.2 Reinforced Concrete I		
Courses	BCE 3.2-1 Reinforced Concrete I	
Responsible for module	Dr.-Ing. Habil. Trần Ngọc Linh	
Correlation to curriculum	Bachelor, Level 2, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 3	
Pre-requisites due to examination regulations	Ungraded seminar paper	
Tpye of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students understand the basic load-bearing behavior of reinforced concrete based on the building material properties of concrete and reinforcing steel. They are able to design simple beam structures in the ultimate limit states for bending and shear force, taking into account the safety concept of EC 2.

Module contents

The following contents are taught in the module “Reinforced Concrete I”:

- Historical development of reinforced and prestressed concrete construction
- Basic considerations on load-bearing behavior
- German and European standards
- Mechanical properties and classifications of building materials
- Environmental influences and durability
- The security concept of Eurocode 2

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE3.2 Reinforced Concrete I	**BCE 3.2-1 Reinforced Concrete I**	**BCE 3**	**5/150 hours**	**English**

Lecturer(s)	Dr.-Ing. Habil. Trần Ngọc Linh
Pre-requisites due to examination regulations	Ungraded seminar paper
Teaching form	☒ Lecture ☐ Student research project ☒ Exercises ☐ Working as a team ☒ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students understand the basic load-bearing behavior of reinforced concrete based on the building material properties of concrete and reinforcing steel. They are able to design simple beam structures in the ultimate limit states for bending and shear force, taking into account the safety concept of EC 2.
Course contents	▪ Historical development of reinforced and prestressed concrete construction ▪ Basic considerations on load-bearing behavior ▪ German and European standards; regulations and directives ▪ Mechanical properties and classifications of building materials ▪ Environmental influences and durability; exposure classes ▪ Concrete cover; types of products and bending forms of reinforcement ▪ The security concept of Eurocode 2
Examination	☒ Written examination (90 mins.)
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

BCE 3.3 Steel Construction I		
Courses	BCE 3.3-1 Steel Construction I	
Responsible for module	Prof. Dr. Daniel Rubin	
Correlation to curriculum	Bachelor, Level 2, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 3	
Pre-requisites due to examination regulations	Ungraded seminar paper	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students know the special features of steel as a building material and its production, various process technologies and construction elements.
The students are able to independently carry out the most important verifications of the load-bearing capacity of simple beam structures as well as of welded and bolted connections.

Module contents

The following contents are taught in the module “Steel Construction I”:

- History, standardization, literature.
- Steel production, steel grades, steel properties and testing.
- Design and construction of standard components (beams, columns)
- Welded and screwed connections, assembly and production-ready design.

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 3.3 Steel Construction I	**BCE 3.3-1 Steel Construction I**	**BCE 3**	**5/150 hours**	**English**

Lecturer(s)	Prof. Dr. Daniel Rubin
Pre-requisites due to examination regulations	Ungraded seminar paper
Teaching form	☒ Lecture ☒ Student research project ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students are able to independently carry out the most important verifications of the load-bearing capacity of simple beam structures as well as of welded and bolted connections. They know the special features of steel as a building material and its production, various process technologies and construction elements. Furthermore, the students are able to independently carry out the most important verifications of the load-bearing capacity of simple beam structures as well as of welded and bolted connections.
Course contents	▪ History, standardization, literature. ▪ Steel production, steel grades, steel properties and testing. ▪ Design and construction of standard components (beams, columns) on bending with lateral force, tension, compression. ▪ Welded and screwed connections, assembly and production-ready design.
Examination	☒ Written examination (90 mins.)
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	DIN EN 1993: Part 1-1, 1-8, 1-10 *Luis Simoes da Silva, Rui A. D. Simoes*: Design of Steel Structures: Eurocode 3 - Design of Steel Structures, Part 1-1 - General Rules and Rules for Buildings, 2nd edition 2016 *Da Silva, Lamas, Jaspart, Bjorhovde, Kuhlmann*: Design of Joints in Steel Structures, Part 1-8, Ernst & Sohn, 2017 *Alfredo Boracchini*: Design and Analysis of Connections in Steel Structures, Ernst & Sohn, 2018 *S. K. Duggal*: Design of Steel Structures, Tata McGraw-Hill, 3rd edition 2009 *Roger L. Brockenbrough, Frederick S. Merritt*: Structural Steel Designer's Handbook, McGraw-Hill, 3rd edition 1999 *N. Subramanian*: Steel Structures – Design and Practice, Oxford University Press/YMCA Library Building, Jai Singh Road, New Delhi 2010
Last modification	12.04.2024

BCE 3.4 Traffic Engineering I		
Courses	BCE 3.4-1 Traffic Engineering I	
Responsible for module	Prof. Dr.-Ing. Florian Schäfer	
Correlation to curriculum	Bachelor, Level 2, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 3	
Pre-requisites due to examination regulations	Ungraded Seminar Paper	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students acquire the cognitive and practical ability

- to design roads outside built-up areas.
- to design intersections outside built-up areas.
- of dimensioning road structures.

Module contents

The following contents are taught in the module “Traffic Engineering I”:

- Road design
- Basics of vehicle dynamics
- Routing in the site plan
- Routing in the elevation plan
- Visibility (stop/overtaking visibility)
- Fundamentals of cross-sectional design
- Basics of spatial line management
- Junction design

Last modification	12.04.2024

Module name	Veranstaltung	Semester	CPs/Workload	Language
BCE 3.4 Traffic Engineering I	**BCE 3.4-1 Traffic Engineering I**	**BCE 3**	**5/150 hours**	**English**

Lecturer(s)	Prof. Dr.-Ing. Florian Schäfer
Pre-requisites due to examination regulations	Ungraded Seminar Paper
Teaching form	☒ Lecture ☐ Student research project ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students acquire the cognitive and practical ability ▪ to design roads outside built-up areas. ▪ to design intersections outside built-up areas.
Course contents	<u>Topic: Road design outside built-up areas</u> Students acquire theoretical and practical knowledge in the following subject areas: ▪ Road design ▪ Basics of vehicle dynamics ▪ Routing in the site plan ▪ Routing in the elevation plan ▪ Visibility (stop/overtaking visibility) ▪ Fundamentals of cross-sectional design ▪ Basics of spatial line management ▪ Junction design Students will also acquire skills in the independent analysis and conflict resolution of interdisciplinary problems in road planning within the framework of the independent work on the study research project.
Examination	☒ Written examination (90 mins.)
Frequency	Once a year
Workload	90 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	Script, as well as mandatory extracts from the FGSV guidelines and other secondary literature. Literature sources will be listed successively in the lecture according to the progress of the lecture.
Last modification	12.04.2024

BCE 3.5 Hydraulic Engineering I		
Courses	BCE 3.5-1 Hydromechanics and Hydraulics BCE 3.5-2 Application in Hydraulic Engineering	
Responsible for module	Prof. Dr.-Ing. Gerhard Haimerl	
Correlation to curriculum	Bachelor, Level 2, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 3	
Pre-requisites	none	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students know the physical laws of resting and moving liquids. They have the skills to work independently on hydrostatic tasks. They are able to analyze hydrodynamic tasks and to use one-dimensional flow analysis to solve basic hydraulic tasks in pipe and channel hydraulics.

Using hydromechanics as an example, they acquire the skills to analyze technical problems and to apply methods based on physical conservation and equilibrium theorems to solve technical tasks.

Module contents

The following contents are taught in the module “Hydraulic Engineering I”:

- Physical properties of water
- Hydrostatics
- Hydrodynamics of ideal fluids
- Hydrodynamics of real fluids
- Pipe flows
- Coagulation currents
- Outflow and spillover flows

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 3.5 Hydraulic Engineering I	**BCE 3.5-1 Hydromechanics and Hydraulics**	**BCE 3**	**3/90 hours**	**English**

Lecturer(s)	Dr. Đoàn Văn Bình
Pre-requisites due to examination regulations	Ungraded Seminar Paper
Teaching form	☒ Lecture ☒ Ungraded Seminar Paper ☐ Exercises ☐ Working as a team ☒ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students ▪ are capable of basic fluid mechanics concepts and to name and explain connections ▪ can apply them to simple flow mechanical problems ▪ are able to effectively apply textbooks, collections of formulae and tables to classical questions and problems and to solve flow-mechanical questions of everyday work ▪ can calculate forces in still water and dimension operating equipment such as gate valves and weir gates including the associated drives ▪ know the basic principle of floating stability and can dimension application examples, e.g. construction equipment on pontoons ▪ know the laws of stationary pipe flow, can calculate pipe losses and dimension pipelines ▪ know the laws of channel flow in flowing and shooting discharge ▪ know the energy equation (Bernoulli) and can assess the influence of crosssectional changes (e.g. bridge piers) on the outflow ▪ can explain the flood design of weirs ▪ can calculate and know the performance of weirs' constructive basics fo the dimensioning and planning of weir systems ▪ know the basics of geohydraulic processes and can perform verification for buoyancy and hydraulic failure of hydraulic structures

Course contents	▪ Water properties ▪ Hydrostatic water pressure, forces and areas ▪ Buoyancy and buoyancy stability ▪ Basic equations of hydrodynamics: continuity, conservation of energy / ▪ Bernoulli equation, conservation of momentum, supporting force ap- proach ▪ Stationary pipe hydraulics: linear and local losses ▪ Pump and turbine performance ▪ Stationary channel hydraulics: flow, closing, normal discharge, alternati jump ▪ Weir hydraulics: overflow and underflow gates, stilling basin design ▪ Measuring weirs ▪ Basic hydraulic engineering terms: DIN 19700 Dams and river barrages, construction of weirs and weir gates ▪ Geohydraulics, bottom water pressure, buoyancy and hydraulic ground fracturing of hydraulic structures The lectures are supplemented by a laboratory practical.
Examination	☒ Written module examination (90 mins.)
Frequency	Once a year
Workload	90 hours
Media	☒ Beamer/Laptop ☐ Blackboard ☒ Script ☒ E-learning
Reading	*Chadwick, A., Morfett, J.:* Hydraulics in civil and environmental engineering. 2nd ed. London, 1994. ISBN 0-419-18160-1 *Chow, Ven te:* Open-channel hydraulics. McGraw-Hill, New York 1959.
Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 3.5 Hydraulic Engineering I	**BCE 3.5-2 Application in Hydraulic Engineering**	**BCE 3**	**2/60 hours**	**English**

Lecturer(s)	Prof. Dr. Jian-hua Meng
Pre-requisites due to examination regulations	none
Teaching form	☒ Lecture ☐ Student research project ☐ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students ▪ know the interrelationships in the water cycle and have basic knowledge about the formation of above-ground runoff and determination of design discharges ▪ can carry out and evaluate discharge measurements at a gauge ▪ can develop water management indicators and solve design tasks with it ▪ can calculate water levels and bed load transport in flowing waters with basic hydraulic and hydromorphological equations ▪ can provide evidence of the stability of riverbeds and embankments and design river engineering measures based on this ▪ know the functioning of hydropower plants and various turbine types ▪ can calculate the output and annual work of a hydroelectric power plant ▪ know the requirements of passability and fish protection on transverse structures and hydroelectric power plants ▪ can examine the current political framework conditions with regard to discuss energy system transformation critically with fellow students and support their personal opinion on this topic with expert arguments. ▪ know the concept of flood risk management and the effectiveness of the most important technical flood protection measures
Course contents	▪ Basics of hydrology: precipitation, evaporation, runoff, hydrological regionalization ▪ Water level and discharge measurements, gauges, hydrographic figures ▪ Hydraulics, morphology, bed load transport ▪ Hydropower, passability and fish protection ▪ Flood risk management, technical flood protection

	The lecture units are supplemented by an off-road practical course and excursions.
Exam	☒ Written module examination (90 mins.)
Frequency	Once a year
Workload	60 hours
Media	☒ Beamer/Laptop ☐ Blackboard ☒ Script ☒ E-learning
Reading	*Chen, S.:* Hydraulic Structures, Springer Berlin, Heidelberg, 2015. *Mujtba, M.* S.: Small Hydro Electric Power Plant Schemes: Designing Hydro Electric Power Plant Scheme using Pelton Wheel over low water heads. LAP LAMBERT Academic Publishing 2012. *Bureau of Reclamation:* Design of Small Dams. United Department of the Interior. New York University Press 1987.
Last modification	12.04.2024

BCE 3.6 Urban Wastewater Management

Courses	BC E 3.6-1 Urban Drainage
Responsible for module	Prof. Dr.-Ing. Albrecht Heckele
Correlation to curriculum	Bachelor, Level 2, mandatory
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management
Total CPs	5 CP
Duration	Semester 3
Pre-requisites due to examination regulations	none
Type of examination	☒ Module examination ☐ Partial module examination

Module goals (knowledge, skills, competences)

The students are able to dimension and design simple systems for wastewater collection, wastewater discharge and simple wastewater treatment plants and thus possess the essential basics to produce designs ready for construction.

They are familiar with concepts for modern rainwater management and flood protection for development sites.

Module contents

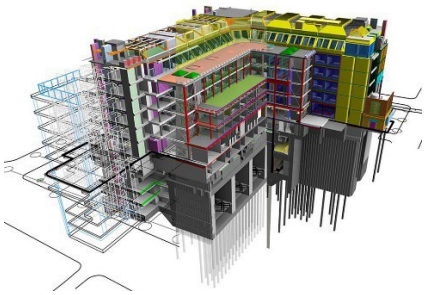
The following contents are taught in the module “Urban Wastewater Management”:

- Waste water characteristics
- Drainage systems, modern stormwater management
- Property drainage
- Structures in the drainage network
- Calculation methods for sewer discharge (including Rational method)
- Hydraulic design of sewer pipes
- Stormwater and combined sewage treatment
- Retention and infiltration systems
- Design and function of sewage treatment plants
- Basics of wastewater treatment

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 3.6 Urban Wastewater Management	**BCE 3.6-1 Urban Drainage**	**BCE 3**	**5/150 hours**	**English**

Lecturer(s)	Prof. Dr.-Ing. Albrecht Heckele
Pre-requisites due to examination regulations	none
Teaching form	☒ Lecture ☒ Student research project ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students are able to dimension and design simple systems for wastewater collection, wastewater discharge and simple wastewater treatment plants and thus possess the essential basics to produce designs ready for construction. They are familiar with concepts for modern rainwater management and flood protection for developments.
Course contents	▪ Waste water characteristics ▪ Drainage systems, modern stormwater management ▪ Property drainage ▪ Structures in the drainage network ▪ Calculation methods for sewer discharge (including Rational method) ▪ Hydraulic design of sewer pipes ▪ Stormwater and combined sewage treatment ▪ Retention and infiltration systems ▪ Design and function of sewage treatment plants ▪ Basics of wastewater treatment ▪ Calculation and design of important unit processes (sedimentation tanks, aeration tanks, digesters, filters)
Examination	☒ Graded Seminar Paper
Frequency	Once a year
Workload	90 hours
Media	☒ Beamer/Laptop ☐ Blackboard ☐ Script ☒ E-learning
Reading	*Butler, David; Christopher James Digman et al.:* Urban Drainage. 4th Edition, Taylor & Francis, CRC Press New York, 2018. *Mark J. Hammer, Sr. amd Mark J. Hammer, Jr.:* Water and waste Water Technology. 7th Edition, Pearson Education Limited, 2012. *Mtecalf Eddy, Inc. Wastewater Engineering:* Treatment and Resource Recovery. 5th Edition, McGrow-Hill Education, New York 2014.
Last modification	12.04.2024

BCE 4.1 Building Information Modelling and Health and Safety		
Courses	BCE 4.1-1 Basics in Building Information Modelling BCE 4.1-2 Health and Safety	
Responsible for module	Prof. Dr.-Ing. Alexander Glock	
Correlation to curriculum	Bachelor, Level 2, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 4	
Pre-requisites due to examination regulations	none	
Type of examination	☐ Module examination ☒ Partial module examination	

Module goals (knowledge, skills, competences)

The students will be taught in the application possibilities and potentials of Building Information Modelling (BIM) and its influence on the way how projects are designed, tendered and delivered. They will also get to know the basic principles of occupational health and safety system in USA, Europe and Vietnam.
The students know the theoretical fundamentals of model-based working methods, and the classification of digital tools in the process landscape of planning and building, and are familiar with the requirements of cross-disciplinary collaboration.
The students can practically apply the BIM-based working method and the basic requirements to create a safe working environment to a construction project.

Module contents

Fundamentals of building informatics and BIM, modelling, technical and coordination models, interfaces, software products, digital twin. BIM processing plans and client information requirements
Fundamentals of component-oriented CAD; use of Autodesk Revit, incl. templates, component families, specialist models, component lists, and derivation of planning documents. Creation of a building in individual exercises, implementation of the structural and design fundamentals under the aspects of digital, component-oriented planning using BIM; impact of design and structural decisions on the planning process; the mutual influence of these aspects.
Overview of the occupational health and safety system in USA, Europe and Vietnam.
Importance and principles of risk assessments and method statements.

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 4.1 Building Information Modelling and Health and Safety	**BCE 4.1-1 Basics in Building Information Modelling**	**BCE 4**	**3/90 hours**	**English**

Lecturer(s)	Richard Sugandha, M.Sc.
Pre-requisites due to examination regulations	none
Teaching form	☒ Lecture ☐ Student research project ☒ Exercises ☒ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students know the theoretical foundations of the model-based approach. They will learn how to classify building information technology topics. Furthermore, the lecture focuses on the integration of digital tools into the process landscape of planning and construction, as well as the requirements for interdisciplinary cooperation..
Course contents	Theoretical foundations • Digitalisation in the construction industry • Fundamentals of building informatics • Information modelling • Fundamentals of cooperation between project participants • Model-based use cases • Dealing with programme interfaces • Interaction of technical and coordination models • Overview technologies • Software products and their use • Types of digital twins • Automation and robotics Application-oriented fundamentals • BIM development plans • Client information requirements
Frequency	Once a year
Workload	90 hours
Examination	☒ Graded Seminar Paper
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*BIM Handbook:* A Guide to Building Information Modeling for Owners, Engineers and Contractors
Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 4.1 Building Information Modelling and Health and Safety	**BCE 4.1-2 Health and Safety**	**BCE 4**	**2/60 hours**	**English**

Lecturer(s)	Dr. Nguyễn Tấn Hưng
Pre-requisites due to examination regulations	none
Teaching form	☒Lecture ☐Student research project ☒Exercises ☐ Working as a team ☐ Laboratory ☒E-learning
Module goals (knowledge, skills, competences)	Provide an overview of the occupational health and safety system in USA, Europe and Vietnam; and of the consequences for construction planning and construction management; as well as special knowledge of health and safety in construction measures and skills for risk assessment and preventive hazard prevention in construction planning and execution.
Course contents	1. Basic principles of occupational health and safety ▪ Occupational safety system / construction site ordinance ▪ Institutions and organization of occupational health and safety ▪ Responsibility and liability for occupational health and safety ▪ Literature and working materials 2. Technical and social occupational health and safety 3. Occupational safety during construction work ▪ Planning and operation of the construction site equipment ▪ Excavation pits and trenches and securing adjacent buildings ▪ Fall protection and scaffolding
Examination	☒ Ungraded Seminar Paper
Frequency	Once a year
Workload	60 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	Possibilities for research and obtaining occupational health and safety regulations and other documents will be discussed in the course
Last modification	12.04.2024

BCE 4.2 Construction Management II		
Courses	BCE 4.2-1 Estimation BCE 4.2-2 Cost Controlling	
Responsible for module	Prof. Dr.-Ing. Alexander Glock	
Correlation to curriculum	Bachelor, Level 2, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 4	
Pre-requisites due to examination regulations	none	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students know the basic principles of acquisition, tendering, cost estimation, cost control and cost management. They know which principles of mass determination must be taken into account for the creation of a bill of quantities and how bills of quantities are structured. The students are taught the cost estimation and influences on the prices in construction projects. The focus here is on bid estimation. Students acquire in-depth knowledge in project controlling of construction projects. They know the business management processes for determining the actual costs, as well as the construction management methods for calculating the respective project status in forms of cost management.

Module contents

The following contents are taught in the module “Construction Management II”:

- Structure of the bills of quantities and standard service
- Costing using elements based in DIN 276
- Bid estimation with direct costs, indirect cost, site overhead, company overhead.
- Cost codes and cost centers
- Types of estimation
- Definition and task of technical controlling in the construction industry
- Cost management before, during and after the execution of a construction project

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 4.2 Construction Management II	**BCE 4.2-1 Estimation**	**BCE 4**	**3/90 hours**	**English**

Lecturer(s)	Prof. Dr.-Ing. Falk Huppenbauer
Pre-requisites due to examination regulations	Knowledge of the contents of the module BCE 2.5 Construction Management I
Teaching form	☒ Lecture ☐ Student research project ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The lecture estimation teaches students how to determine costs and prices in the construction business. The main focus here is on the calculation of construction bids in infrastructures and building projects. The students are able to solve smaller calculation tasks independently.
Course contents	▪ Relationship between tender, offer and award of contract ▪ Costs and prices ▪ Cost codes, cost elements and cost centers ▪ Direct costs, indirect costs ▪ Influences on costs ▪ Types of calculation
Examination	☒ Written module examination (120 mins.)
Frequency	Once a year
Workload	90 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*Jacob, Dieter; Müller, Clemens:* Estimating in Heavy Construction, Ernst&Sohn Verlag (2017) KLR Bau, Kosten-, Leistungs- und Ergebnisrechnung der Bauunternehmen, 8. Auflage, 2016, Verlagsgesellschaft Rudolf Müller Baugeräteliste via online access: https://www.bgl-online.info/en/
Last modification	12.04.2024

Module name	*Course*	*Semester*	*CPs/Workload*	*Language*
BCE 4.2 Construction Management II	**BCE 4.2-2 Cost Controlling**	**BCE 4**	**2/60 hours**	**English**

Lecturer(s)	Prof. Dipl.-Ing. Klaus Rössner
Pre-requisites due to examination regulations	Knowledge of the contents of the module BCE 2.5 Construction Management I
Teaching form	☒ Lecture ☐ Student research project ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	Students receive an overview and knowledge of the costing methods according to DIN 276. They will be able to prepare and control cost using practical examples. The students know the procedure, risks and are able to discuss the results with the project participants / experts.
Course contents	▪ Definition / standards – Cost planning according to DIN 276 ▪ Creation, development and structuring of cost estimates ▪ Overview of cost calculation in international projects ▪ Areas and room volumes according to DIN 276 ▪ Calculation of rental space ▪ Cost calculation with construction elements ▪ Cost control / forecast ▪ Cost control / measures ▪ Cash flow planning
Examination	☒ Written module examination (120 mins.)
Frequency	Once a year
Workload	60 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*PMBOK® Guide:* A Guide to the Project Management Body of Knowledge, Sixth Edition (2017) *PMBOK® Guide:* The Practice Standard for Earned Value Management - Second Edition (2019) *DIN 276*
Last modification	12.04.2024

BCE 4.3 Geotechnical Engineering II

Courses	BCE 4.3-1 Geotechnical Engineering II
Responsible for module	Prof. Rolf Schrodi
Correlation to curriculum	Bachelor, Level 2, mandatory
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management
Total CPs	5 CP
Duration	Semester 4
Pre-requisites due to examination regulations	Ungraded Seminar Paper
Type of examination	☒ Module examination ☐ Partial module examination

Module goals (knowledge, skills, competences)

The students master the most important design methods for stability and serviceability in Geotechnics. They are able to perform all necessary geotechnical checks for the dimensioning of single and strip foundations. All basic knowledge in the field of Geotechnics is imparted, which is necessary for an independent activity as a site manager, structural engineer or planning civil engineer.

Module contents

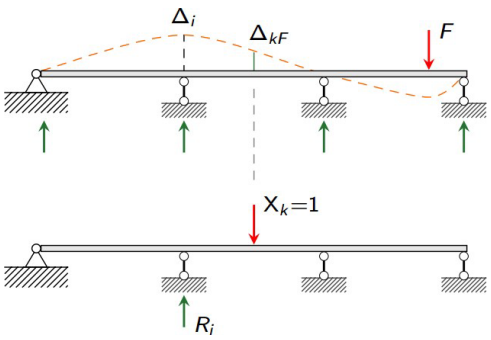
The following contents are taught in the module “Geotechnical Engineering II”:

- Basic terms of geotechnics, loads, load cases, limit states
- Compressibility of soil
- Plot vertical ground tension
- Settlement calculation
- Groundbreak calculation
- Foundation design in general cases
- Slopes and slope calculation
- Introduction to earthworks

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 4.3 Geotechnical Engineering II	**BCE 4.3-1 Geotechnical Engineering II**	**BCE 4**	**5/150 hours**	**English**

Lecturer(s)	Prof. Rolf Schrodi
Pre-requisites due to examination regulations	Ungraded Seminar Paper
Teaching form	☒ Lecture ☒ Ungraded Seminar Paper ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students master the most important design methods for stability and serviceability in geotechnics. They are able to perform all necessary geotechnical checks for the dimensioning of single and strip foundations. All basic knowledge in the field of geotechnics is imparted, which is necessary for an independent activity as a site manager, structural engineer or planning civil engineer.
Course contents	▪ Basic terms of geotechnics, loads, load cases, limit states ▪ Compressibility of soil ▪ Plot vertical ground tension ▪ Settlement calculation ▪ Shear strength of the soil -Soil properties ▪ Earth printing ▪ Building pits ▪ Groundbreak calculation ▪ Area foundations, pile foundations ▪ Foundation design in general cases ▪ Buoyancy and buoyancy control ▪ Slopes and slope calculation ▪ Improvement of building ground ▪ Underpinning ▪ Anchoring ▪ Introduction to earthworks
Examination	☒ Written examination (90 mins.)
Frequency	Once a year
Workload	90 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

BCE 4.4 Structural Analysis II		
Courses	BCE 4.4-1 Structural Analysis II	
Responsible for module	Dr. Nguyễn Tấn Tiên	
Correlation to curiculum	Bachelor, Level 2, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 4	
Pre-requisites due to examination regulations	Ungraded seminar paper	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students are able to determine bearing forces, internal forces, state lines, individual deformations and bending lines.

Module contents

The following contents are taught in the module “Structural Analysis II”:

- Strain energy and complementary strain energy
- Work and energy theorems
- Principle of virtual work/virtual displacement
- Force method for statically indeterminate systems
- Displacement method for statically indeterminate systems
- Stiffness method
- Influence lines for statically indeterminate structures

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 4.4 Structural Analysis II	**BCE 4.4St-1 Structural Analysis II**	**BCE 4**	**5/150 hours**	**English**

Lecturer(s)	Dr. Nguyễn Tấn Tiên
Pre-requisites due to examination regulations	Ungraded seminar paper
Teaching form	☒ Lecture ☐ Student research project ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students are enabled to develop a deep understanding of the physical mechanisms and structures that are critical in engineering design. Through the module, students will learn to abstract physical conditions and reduce them to significant parameters that can be analyzed using mathematical methods. Students will be able to analyze beams and trusses using energy methods, determining the deformation, shear stresses, and the influence of these factors on the structural behaviors. They will also be able to analyze the warping and shear center of beams to make informed decisions about design choices, and will be well-equipped to tackle a wide range of engineering problems.
Course contents	▪ Strain energy and complementary strain energy ▪ Work and energy theorems ▪ Principle of virtual work/virtual displacement ▪ Deformation ▪ Force method for statically indeterminate systems ▪ Displacement method for statically indeterminate systems ▪ Stiffness method ▪ Influence lines for statically indeterminate structures The lecture is complemented by numerous applications and examples.
Examination	☒ Written examination (90 mins.)
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

BCE 4.5 Infrastructure Planning and Traffic Engineering II		
Courses	BC 4.5-1 Traffic Engineering II	
Responsible for module	Prof. Dr.-Ing. Florian Schäfer	
Correlation to curriculum	Bachelor, Level 2, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 4	
Pre-requisites due to examination regulations	Ungraded Seminar Paper	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students acquire the cognitive and practical ability

- to design roads outside built-up areas.
- to design intersections outside built-up areas.
- of dimensioning road structures.

Module contents

The following contents are taught in the module “Infrastructure Planning and Traffic Engineering II”:

- Design of the roadway superstructure
- Road construction materials
- Base courses and road surfaces
- Renewal of roads
- Equipment and marking of roads
- Drainage facilities
- Calculation of noise immissions and measures to reduce noise

Last modification	12.04.2024

Module name	Veranstaltung	Semester	CPs/Workload	Language
BCE 4.5 Infrastructure Planning and Traffic Engineering II	**BCE 4.5-1 Traffic Engineering II**	**BCE 4**	**5/150 hours**	**English**

Lecturer(s)	Prof. Dr.-Ing. Florian Schäfer
Pre-requisites due to examination regulations	Ungraded Seminar Paper
Teaching form	☒ Lecture ☐ Student research project ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students acquire the cognitive and practical ability ▪ of dimensioning road structures ▪ to equip a road with the necessary elements.
Course contents	<u>Topic: Road construction</u> Students acquire theoretical and practical knowledge in the following subject areas: ▪ Design of the roadway superstructure ▪ Road construction materials ▪ Base courses and road surfaces ▪ Renewal of roads ▪ Equipment and marking of roads ▪ Drainage facilities ▪ Calculation of noise immissions and measures to reduce noise Students will also acquire skills in the independent analysis and conflict resolution of interdisciplinary problems in road planning within the framework of the independent work on the study research project.
Examination	☒ Written examination (90 mins.)
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	Script, as well as mandatory extracts from the FGSV guidelines and other secondary literature. Literature sources will be listed successively in the lecture according to the progress of the lecture.
Last modification	12.04.2024

BCE 4.6St Reinforced Concrete II		
Courses	BCE 4.6St-1 Reinforced Concrete II	
Responsible for module	Dr.-Ing. Habil. Trần Ngọc Linh	
Correlation to curriculum	Bachelor, Level 2, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 4	
Pre-requisites due to examination regulations	Ungraded seminar paper	
Tpye of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students are able to perform the serviceability requirements and know the structural design of beams.

Module contents

The following contents are taught in the module “Reinforced Concrete II”:

- Special features of internal forces calculation for beam structures
- The ultimate limit state for bending with and without longitudinal force / for lateral force
- Structural design of beams and columns with reinforcing steel
- Representation in technical construction documents

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 4.6St Reinforced Concrete II	**BCE 4.6St-1 Reinforced Concrete II**	**BCE 4**	**5/150 hours**	**English**

Lecturer(s)	Dr.-Ing. Habil. Trần Ngọc Linh
Pre-requisites due to examination regulations	Reinforced Concrete I
Teaching form	☒ Lecture ☐ Student research project ☒ Exercises ☐ Working as a team ☒ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students are able to perform the service ability requirements and know the structural design of beams.
Course contents	▪ Special features of internal forces calculation for beam structures ▪ The ultimate limit state for bending with and without longitudinal force ▪ The ultimate limit state for lateral force ▪ The serviceability limit states: determination and ▪ Limiting stresses, limiting crack widths, the Bending slenderness ▪ Structural design of beams and columns with reinforcing steel ▪ Representation in technical construction documents
Pre-requisites due to examination regulations	Ungraded seminar paper
Examination	☒ Written examination (90 mins.)
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

BCE 4.6In Hydraulical Engineering II and Urban Water Management		
Courses	BCE 4.6In-1 Urban Water Supply BCE 4.6In-2 Application in Hydraulic Engineering II	
Responsible for module	Prof. Dr.-Ing. Albrecht Heckele	
Correlation to curriculum	Bachelor, Level 2, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 4	
Pre-requisites due to examination regulations	none	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students are able to measure and dimension simple systems for water supply (especially distribution, storage, pumping) and thus possess the essential basics to produce designs ready for construction.

The students are able to dimension and design simple systems for wastewater collection, wastewater discharge and simple wastewater treatment plants and thus possess the essential basics to produce designs ready for construction.

They are familiar with concepts for modern rainwater management and flood protection for development sites.

Module contents

The following contents are taught in the module
“Hydraulical Engineering II and Urban Water Management II”:

- Requirements for drinking water
- Types of water, process for water treatment
- Water demand, supply pressure
- Pipe dimensioning, pipe characteristics

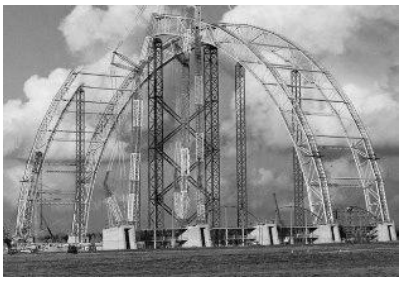
Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 4.6In Hydraulical Engineering II and Urban Water Management	**BCE 4.6In-1 Urban Water Supply**	**BCE 4**	**3/90 hours**	**English**

Lecturer(s)	Prof. Dr.-Ing. Albrecht Heckele
Pre-requisites due to examination regulations	Ungraded Seminar Paper
Teaching form	☒ Lecture ☒ Ungraded Seminar Paper ☒ Exercises ☐ Working as a team ☐ Laboratory ☐ E-learning
Module goals (knowledge, skills, competences)	The students are able to measure and dimension simple systems for water supply (especially distribution, storage, pumping) and thus possess the essential basics to produce designs ready for construction.
Course contents	▪ Requirements for drinking water ▪ Types of water, process for water treatment ▪ Water demand, supply pressure ▪ Pipe dimensioning, pipe characteristics ▪ Pumping stations (calculation, pump characteristic curve, design) ▪ Water storage (calculation, design) ▪ Water distribution (branching network, ring network incl. calculation, fittings)
Examination	☒ Written module examination (90 mins.)
Frequency	Once a year
Workload	90 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*Gray, Nick:* Water Science and Technology – an Introduction, 4th Edition, Taylor & Francis, CRC Press New York, 2017. *Mark J. Hammer, Sr and Mark J. Hammer, Jr.:* Water and Waste Water Technology. 7th Edition, Pearson Education Limited, 2012. *Brandt Malcolm J, Johnson K. Michael et al.:* Twort's Water Supply. 7th Edition, Butterworth-Heinemann, 2016.
Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 4.6In Hydraulical Engineering II and Urban Water Management	**BCE 4.6In-2 Application in Hydraulic Engineering I**	**BCE 4**	**2/60 hours**	**English**

Lecturer(s)	Prof. Dr. Jian-hua Meng
Pre-requisites due to examination regulations	none
Teaching form	☒ Lecture ☐ Student research project ☐ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	▪
Course contents	
Exam	☒ Written module examination (90 mins.)
Frequency	Once a year
Workload	60 hours
Media	☒ Beamer/Laptop ☐ Blackboard ☒ Script ☒ E-learning
Reading	*Chen, S.:* Hydraulic Structures, Springer Berlin, Heidelberg, 2015. *Mujtba, M.* S.: Small Hydro Electric Power Plant Schemes: Designing Hydro Electric Power Plant Scheme using Pelton Wheel over low water heads. LAP LAMBERT Academic Publishing 2012. *Bureau of Reclamation:* Design of Small Dams. United Department of the Interior. New York University Press 1987.
Last modification	12.04.2024

BCE 5.1St Structural Analysis III and Finite Elements		
Courses	BCE 5.1St-1 Structural Analysis and Finite Elements	
Responsible for module	Dr. Trần Tuấn Minh	
Correlation to curriculum	Bachelor, Level 3, mandatory, Specialization Structural Engineering	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 5	
Pre-requisites due to examination regulations	Bachelor Level 1, all modules of semester BCE 3	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students are able to carry out, document, question and control calculations by hand with the help of computer calculations according to the deformation method (WGV, FEM).
They know the approximate character and problems (e.g. singularities) of the FE-method and are able to evaluate calculations with regard to their convergence.
They know the basics and the load-bearing behavior of plane surface structures.

Module contents

The following contents are taught in the module “Structural Analysis III and Finite Elements”:

- General value-sizing procedure for plane bar structures
- Iteration procedure according to Cross
- The finite element method (derivation on beam elements)
- Technical disc theory and calculation of discs
- Kirchhoff's plate theory and calculation of plates
- Patch test, convergence, singularities
- Calculation of plane surface structures with computer programs (RFEM)
- Calculation strategies and control options

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 5.1St Structural Analysis III and Finite Elements	**BCE 5.1St-1 Structural Analysis III and Finite Elements**	**BCE 5**	**5/150 hours**	**English**

Lecturer(s)	Dr. Trần Tuấn Minh
Pre-requisites due to examination regulations	Bachelor Level 1, all modules of semester BCE 3
Teaching form	☒ Lecture ☒ Student research project ☐ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students are able to carry out, document, question and control calculations by hand with the help of computer calculations according to the deformation method (WGV, FEM). They know the approximate character and problems (e.g. singularities) of the FE-method and are able to evaluate calculations with regard to their convergence. They know the basics and the load-bearing behavior of plane surface structures.
Course contents	▪ General value-sizing procedure for plane bar structures ▪ Iteration procedure according to Cross ▪ The finite element method (derivation on beam elements) ▪ Technical disc theory and calculation of discs ▪ Kirchhoff's plate theory and calculation of plates ▪ Patch test, convergence, singularities ▪ Calculation of plane surface structures with computer programs (RFEM) ▪ Calculation strategies and control options
Examination	☒ Written examination (120 mins.)
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	*Werkle, H.:* Finite Elements in Structural Analysis – Theoretical Concepts and Modeling Procedures in Statics and Dynamics of Structures. Springer, Cham, Switzerland, 2020.
Last modification	12.04.2024

BCE 5.2St Reinforced Concrete III		
Courses	BCE 5.2St-1 Reinforced Concrete III	
Responsible for module	Dr.-Ing. Habil. Trần Ngọc Linh	
Correlation to curriculum	Bachelor, Level 3, mandatory, Specialization Structural Engineering	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 5	
Pre-requisites due to examination regulations	Bachelor Level 1, all modules of semester BC 3	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students can safely apply calculation and verification methods for reinforced concrete beam structures and slabs with linear bearings and plan their structural design.
The students can assess and safely prove the load-bearing behavior of point-supported slabs and foundations. They can apply the basics of disk theory to wall-like beams and develop simple truss models for the solution. For storey buildings they are able to develop standard solutions for bracing.

Module contents

The following contents are taught in the module “Reinforced Concrete 2”:

- Design of slender reinforced concrete compression members
- Advanced methods of internal force calculation
- Torque-curvature relationship and proof of rotatability
- Reinforcing with welded wire mesh
- Single-axis and biaxially tensioned, line-supported solid panels
- Special features of the foundation design
- Wall-like beams
- Design on the basis of framework models
- Absorption of horizontal loads in storey buildings by bracing components

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 5.2St Reinforced Concrete III	**BCE 5.2St-1 Reinforced Concrete III**	**BCE 5**	**5/150 hours**	**English**

Lecturer(s)	Dr.-Ing. Habil. Trần Ngọc Linh
Pre-requisites due to examination regulations	Bachelor Level 1, all modules of semester BCE 3
Teaching form	☒ Lecture ☐ Student research project ☒ Exercises ☒ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students can safely apply calculation and verification methods for reinforced concrete beam structures and slabs with linear bearings and plan their structural design. They can apply the basics of disk theory to wall-like beams and develop simple truss models for the solution. For storey buildings they are able to develop standard solutions for bracing.
Course contents	▪ Design of slender reinforced concrete compression members ▪ Advanced methods of internal force calculation ▪ Torque-curvature relationship and proof of rotability ▪ Reinforcing with welded wire mesh ▪ Single-axis and biaxially tensioned, line-supported solid panels ▪ Point supported plates and the proof against punching through ▪ Special features of the foundation design ▪ Wall-like beams ▪ Design on the basis of framework models ▪ Absorption of horizontal loads in storey buildings by bracing components
Examination	☒ Written examination (120 mins.)
Frequency	Once a year
Workload	120 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☐ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

BCE 5.3St Steel Construction II		
Courses	BCE 5.3St-1 Steel Construction II	
Responsible for module	Prof. Dr. Daniel Rubin	
Correlation to curriculum	Bachelor, Level 3, mandatory, Specialization Structural Engineering	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 5	
Pre-requisites due to examination regulations	none	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students are able to perform elastic and plastic cross-sectional checks for frames and frameworks, calculation methods for systems with non-linear load-bearing behavior and stability checks (e.g. bending buckling). Furthermore, they have knowledge of the spatial stabilization of load-bearing structures as well as of structures and connections of structural steelwork.
The students master the basics of the load bearing behavior, design and calculation of steel-concrete composite girders.

Module contents

The following contents are taught in the module “Steel Construction II”:

- Checks of the ultimate limit state for plastic cross-section utilization
- Detailed basics of non-linear load bearing behavior
- Stability checks according to EC 3
- Use of standard software for the ultimate limit state design
- Steel building construction.
- Flow joint theory
- St. Venant torsion and basics of torsional buckling
- Spatial stability of bars, checks against torsional flexural buckling
- Basics of fatigue strength and check formats according to Eurocode 3-1-9

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 5.3St Steel Construction II	**BCE 5.3St-1 Steel Construction II**	**BCE 5**	**5/150 hours**	**English**

Lecturer(s)	Prof. Dr.-Ing. Christof Hausser
Pre-requisites due to examination regulations	Bachelor Level 1, all modules of semester BCE 3
Teaching form	☒ Lecture ☒ Ungraded Seminar Paper ☐ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students are able to perform elastic and plastic cross-sectional checks for frames and frameworks, calculation methods for systems with non-linear load-bearing behavior and stability checks (e.g. bending buckling). Furthermore, they have knowledge of the spatial stabilization of load-bearing structures as well as of structures and connections of structural steelwork. They know the criteria for the utilization of plastic system reserves (yielding joint theory), the load-bearing behavior of twisted bars, the spatial stability of single bars (torsional flexural buckling), of multi-section bars as well as the plate buckling behavior, in each case with associated verification procedures.
Course contents	▪ Checks of the ultimate limit state for plastic cross-section utilization, positional safety, serviceability. ▪ Detailed basics of non-linear load bearing behavior, structural stability, theory II. Order, imperfections. ▪ Stability checks according to EC 3. ▪ Use of standard software for the ultimate limit state design ▪ Steel building construction: Load assumptions, spatial stabilization, bracings, girders, frames and frame corners, columns and column bases, bolted and welded connections, typified connections, hall walls, hall roofs. ▪ Flow joint theory: Determination of the plastic limit load, verification. ▪ St. Venant torsion and basics of torsional buckling. ▪ Spatial stability of bars, checks against torsional flexural buckling, application of standard software. ▪ Multi-part bars: load-bearing behavior, special features, standard design ▪ Checks of the buckling safety of plates. ▪ Basics of fatigue strength and check formats according to ▪ Eurocode 3-1-9
Examination	☒ Written examination (120 mins.)
Frequency	Once a year

Workload	150 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	DIN EN 1993: Part 1-1, 1-8, 1-9, 1-10 *Luis Simoes da Silva, Rui A. D. Simoes*: Design of Steel Structures: Eurocode 3 - Design of Steel Structures, Part 1-1 - General Rules and Rules for Buildings, 2nd edition 2016 *Beg, Kuhlmann, Davaine, Braun*: Design of Plated Structures, Part 1-5, Ernst & Sohn, 2018 *Da Silva, Lamas, Jaspart, Bjorhovde, Kuhlmann*: Design of Joints in Steel Structures, Part 1-9, Ernst & Sohn, 2017 *Nussbaumer, Borges, Davaine*: Fatigue Design of Steel and CompositeStructures, Part 1-8, Ernst & Sohn, 2018 *Alfredo Boracchini*: Design and Analysis of Connections in Steel Structures, Ernst & Sohn, 2018 *S. K. Duggal*: Design of Steel Structures, Tata McGraw-Hill, 3rd edition 2009 *Roger L. Brockenbrough, Frederick S. Merritt*: Structural Steel Designer's Handbook, McGraw-Hill, 3rd edition 1999 *N. Subramanian*: Steel Structures – Design and Practice, Oxford University Press/YMCA Library Building, Jai Singh Road, New Delhi 2010
Last modification	12.04.2024

BCE 5.4St Structural Engineering Project-Study I		
Courses	BCE 5.4St-1 Structural Engineering Project-Study Part I	
Responsible for module	Prof. Dr.-Ing. Alexander Glock Dr. Nguyễn Tấn Tiên	
Correlation to curriculum	Bachelor, Level 3, mandatory, Specialization Structural Engineering	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 5	
Pre-requisites due to examination regulations	Bachelor Level 1, all modules of semester BCE 3	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students can plan, design, calculate and construct a concrete project in the field of structural engineering and construction management using engineering and scientific methods. The students will learn the challenges at the interface of design and Construction contains and learn how to search for a holistic optimization in terms of value engineering.
The students' solution competence, basic research and teamwork will be particularly pronounced. The project will be supervised by at least two lecturers.

Module contents

The module “Structural Engineering Project-Study I” is always supervised by two lecturers to ensure that the students are exposed to the different aspects of structural engineering and construction management. Independent processing of a manageable project by the students in a team with defined interim presentations and a final presentation and a final project report.

The final report must include a “Leassons Learnt” section.

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 5.4St Structural Engineering Project-Study I	**BCE 5.4St-1 Structural Engineering Project-Study Part I**	**BCE 5**	**5/150 hours**	**English**

Lecturer(s)	Prof. Dr.-Ing. Alexander Glock Dr. Nguyễn Tấn Tiên
Pre-requisites due to examination regulations	Bachelor Level 1, all modules of semester BCE 3
Teaching form	☒ Lecture ☒ Student research project ☒ Exercises ☒ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students can plan, design, calculate and construct a concrete project in the field of structural engineering and construction management using engineering and scientific methods. The students will learn the challenges at the interface of design and construction contains and learn how to search for a holistic optimization in terms of value engineering. The students' solution competence, basic research and teamwork will be particularly pronounced. The project will be worked on and presented in cooperation with students of architecture (interdisciplinary design), if thematically and organizationally possible.
Course contents	The module “Structural Engineering Project-Study I” is always supervised by two lecturers to ensure that the students are exposed to the different aspects of structural engineering and construction management. Independent processing of a manageable project by the students in a team with defined interim presentations and a final presentation and a final project report. The final report must include a “Leassons Learnt” section.
Examination	☒ Graded Seminar Paper and Presentation
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	Project-specific literature will be announced at the beginning of the term.
Last modification	12.04.2024

BCE 6.1St Structural Engineering Project-Study II		
Courses	BCE 6.1St-1 Structural Engineering Project-Study Part II	
Responsible for module	Prof. Dr. Daniel Rubin, Dr. Nguyễn Đình Hùng	
Correlation to curriculum	Bachelor, Level 3, mandatory, Specialization Structural Engineering	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	10 CP	
Duration	Semester 6	
Pre-requisites due to examination regulations	Bachelor Level 1, all modules of semester BCE 3	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students will be able to determine the principles, the competence to solve problems and the ability to work in a team (e.g. self-organization) and solve, optimize a real planning task applying all relevant aspects of Civil Engineering and Construction Management.
The students will start this large project study with reviewing the "Lessons Learnt-Report" from the Project Study I.

Module contents

The module "Structural Engineering Project-Study Part II" is always supervised by two lecturers to ensure that the students are exposed to the different aspects of structural engineering and construction management. Independent processing of a manageable project by the students in a team with defined interim presentations and a final presentation and a final project report.

The following contents are taught in the module "Structural Engineering Project-Study II":

- Compilation and interpretation of project data
- Development of proposals and variant solutions
- Reporting / presentation of results with discussion

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 6.1St Structural Engineering Project-Study II	**BCE 6.1St-1 Structural Engineering Project-Study Part II**	**BCE 6**	**10/300 hours**	**English**

Lecturer(s)	Prof. Dipl.-Ing. Martin Schubert, Dr. Nguyễn Đình Hùng
Pre-requisites due to examination regulations	Bachelor Level 1, all modules of semester BCE 3
Teaching form	☒ Lecture ☐ Student research project ☒ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students can plan, design, calculate and construct a concrete project in the field of structural engineering and construction management using engineering and scientific methods. The students' solution competence, basic research and teamwork will be particularly pronounced. The project will be worked on and presented in cooperation with students of architecture (interdisciplinary design), if thematically and organizationally possible.
Course contents	Independent processing of a manageable project in a team with defined interim presentations and a final presentation. The students will start this large project study with reviewing the "Lessons Learnt-Report" from the Project Study I. Possible topics. ▪ Inventory determination, determination of requirements, location d termination ▪ Implementation of special investigations (e.g. discharge measurements, quality measurements) ▪ Compilation and interpretation of project data ▪ Development of proposals and variant solutions ▪ Reporting / presentation of results with discussion
Examination	☒ Graded Seminar Paper and Presentation
Frequency	Once a year
Workload	300 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	Project-specific literature will be announced at the beginning of the term.
Last modification	12.04.2024

BCE 5.1In Traffic Engineering III		
Courses	BCE 5.1In-1 Traffic Engineering III	
Responsible for module	*Is not offered in the establishment phase*	
Correlation to curriculum	Bachelor, Level 3, mandatory, Specialization Infrastructure Planning	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 5	
Pre-requisites due to examination regulations	Bachelor Level 1, all modules of semester BCE 3	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students know the theory and procedures for dimensioning of intersections and road sections. Due to their interdisciplinary knowledge they are able to determine the quality of traffic flow (LOS). They acquire the cognitive and practical ability to design urban streets within built-up areas.
In the second part the students will learn the basics of the railway system, the railway construction and the routing of the railway.

Module contents

The following contents are taught in the module “Traffic Engineering III”:

- Basics of the traffic flow.
- And determination of the Level of Service (LOS).
- Road safety.
- Railway law.
- Railway superstructures.
- Routing railways.

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 5.1In Traffic Engineering III	**BCE 5.1In-1 Traffic Engineering III**	**BCE 5**	**5/150 hours**	**English**

Lecturer(s)	*Is not offered in the establishment phase*
Pre-requisites due to examination regulations	Bachelor Level 1, all modules of semester BCE 3
Teaching form	☒ Lecture ☒ Ungraded Seminar Paper ☐ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	On the 1st topic: Traffic planning and road design within built-up areas: The students have ▪ Basic knowledge of traffic flow theory ▪ Ability to determinate the Level of Service (LOS). ▪ Competence to create own urban street designs ▪ Basic knowledge in road safety On the 2nd topic: Fundamentals of rail-bound transport: The students have ▪ Basic knowledge of railway law ▪ Basic knowledge of railway superstructure ▪ Basic knowledge of the driving dynamics of railways Ability to route railways
Course contents	In order to achieve the module goals, students are taught knowledge in On the 1st topic: Traffic planning and road design within built-up areas: ▪ Basics of the traffic flow. Calculation method for traffic flow and determination of the Level of Servic (LOS). ▪ Light signal control ▪ History of urban development ▪ Fundamentals of the design and operation of street equipment ▪ Urban design according to guidelines and regulations ▪ Road safety with black spot management and audits ▪ Visualization and presentation of results in the plenum. On the 2nd topic: Rail-bound transport: ▪ Basics of railway law ▪ Physical basics of railways, superstructure design, track components, forces on ballast and slab track

	▪ Dimensioning of the routing elements taking into account their reciprocal influence ▪ Construction of the route in layout and elevation plan under consideration of constrained points and structures ▪ Inclusion of switches in the track plan ▪ Visualization and presentation of the results in the plenum.
Examination	☒ Written examination (120 mins.)
Media	☒ Beamer/Laptop ☒ Blackboard ☐ Script ☒ E-learning
Reading	*The literature sources will be announced successively in the lecture according to the progress of the lecture.*
Last modification	12.04.2024

BCE 5.2In Hydraulic Engineering III		
Courses	BCE 5.2In-1 Hydraulic Engineering III	
Responsible for module	*Is not offered in the establishment phase*	
Correlation to curriculum	Bachelor, Level 3, mandatory, Specialization Infrastructure Planning	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 5	
Pre-requisites due to examination regulations	Bachelor Level 1, all modules of semester BCE 3	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students

- know the essential hydrological relationships (precipitation, evaporation, discharge) and related calculation methods.
- can apply precipitation-runoff models.
- can use statistical methods to determine and apply design discharges and design floods.
- know measures for flood protection and are able to dimension the flood retention basin.

Module contents

The following contents are taught in the module “Hydraulic Engineering III”:

- Hydraulic dimensioning and design of river barriers / weirs in site plan and essential sections
- Construction of closing elements and stilling basins
- Basics for planning and dimensioning of hydroelectric power plants
- Ecological passability, design and planning of fish ladders
- Hydrology, precipitation-runoff models, flood analysis and calculation
- Flood risk management, heavy rain risk management
- Mobile flood protection

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 5.2In Hydraulic Engineering III	BCE 5.2In-1 Hydraulic Engineering III	BCE 5	5/150 hours	English

Lecturer(s)	*Is not offered in the establishment phase*
Pre-requisites due to examination regulations	Bachelor Level 1, all modules of semester BC 3
Teaching form	☒ Lecture ☒ Ungraded Seminar Paper ☐ Exercises ☒ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students ▪ know the terms and the essential standards and design principles in hydraulic engineering. ▪ are associated with basic design principles of weirs and are familiar with the associated operating equipment. ▪ can calculate the performance of weir systems and dimension the required freeboard dimensions. ▪ can dimension and design weirs. ▪ know the functioning of hydroelectric power plants and the different types of plants and can be a hydroelectric power plant in dimensioning the main features. ▪ know the essential current legal framework conditions (WHG, EEG). ▪ know the tension field between power generation and water protectio and can implement measures for ecological improvement in design of waters. ▪ know the basic principles of building fish ladders and can dimension a fish ladder hydraulically and constructively. ▪ know the construction principles of dams as well as dam and dike structures. ▪ can name geohydraulic processes and describe them. ▪ calculate manual calculations and computer programs. ▪ can perform static and geohydraulic analyses of dams and run dikes. ▪ know different construction methods for interior and exterior substrate waterproofing. ▪ can design and construct a dam construction and, based on this, prepare a quantity and cost calculation. ▪ know the legal and technical requirements for the operation of hydraulic engineering facilities.

	▪ can explain the objectives of flood risk management and heavy rainfall risk management. The students ▪ can, on the basis of the acquired expertise and basic process, critically deal with the results of the different engineering measurements. ▪ are able to structure and network knowledge logically. ▪ can work reflexively and self-critically. ▪ are able to work independently with technical regulations, professional articles and textbooks. ▪ can present their work results in a comprehensible and compact way as well as in explanatory reports in writing. ▪ (on the basis of the acquired expertise and basic process) have an ▪ understanding to critically deal with the results of the different engineering measurements. ▪ are able to structure and network knowledge logically. ▪ can work reflexively and self-critically. ▪ are able to work independently with technical regulations, professional articles and textbooks. ▪ can present their work results in a comprehensible and compact way ▪ as well as in written explanatory reports
Course contents	▪ DIN 19.700, design bases and load cases, freeboard ▪ Hydraulic dimensioning and design of river barriers / weirs in site plan and essential sections ▪ Construction of closing elements and stilling basins ▪ Crashes, ramps, sliding on the floor ▪ Basics for planning and dimensioning of hydroelectric power plants, operating modes and selection criteria of different turbine types, electrotechnical aspects of plant operation ▪ Ecological passability, design and planning of fish ladders ▪ Hydrology, precipitation-runoff models, flood analysis and calculation, reservoir design, flood retention basin ▪ Dams and their operating facilities, dam walls, dam and dike construction, earth static and geohydraulic analyses of dam structures including exemplary calculation programs ▪ Interior and substrate waterproofing

	▪ Design, construction, calculation of a dam construction ▪ System operation ▪ Flood risk management, heavy rain risk management ▪ Mobile flood protection ▪ Main features of protective hydraulic engineering against alpine hazards The lecture units are supplemented by project work and excursions. In lectures, individual lecture contents are exemplarily deepened and additional hydraulic engineering topics (e.g. Hydraulic engineering for traffic, …) are presented.
Examination	☒ Written examination (120 mins.)
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☐ Blackboard ☐ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

BCE 5.3In Urban Water Management

Courses	BCE 5.3In-1 Urban Water Management
Responsible for module	*Is not offered in the establishment phase*
Correlation to curriculum	Bachelor, Level 3, mandatory, Specialization Infrastructure Planning
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management
Total CPs	5 CP
Duration	Semester 5
Pre-requisites due to examination regulations	Bachelor Level 1, all modules of semester BCE 3
Type of examination	☒ Module examination ☐ Partial module examination

Module goals (knowledge, skills, competences)

The students are able to design, dimension and construct rainwater treatment plants as a prerequisite for design planning. They know the determining properties of aquifers, can plan and evaluate simple pumping tests, create numerical groundwater models and thus simulate interventions in the groundwater regime, e.g. through a well. They know the basics for the planning of plants for wastewater treatment and sludge treatment and are able to prepare a design of a wastewater treatment plant considering process engineering aspects.

Module contents

The following contents are taught in the module “Urban Water Management”:

- Aquifer parameters, pumping tests, numerical groundwater modeling
- Project work: Creation of a groundwater model for a groundwater development
- Water Framework Directive
- Rainwater management and flood protection
- Combined sewerage treatment
- Further rainwater treatment in retention soil filters
- Interaction of sewer system, stormwater treatment and sewage treatment plants

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 5.3In Urban Water Management	BCE 5.3 In-1 Urban Water Management	BCE 5	5/150 hours	English

Lecturer(s)	*Is not offered in the establishment phase*
Pre-requisites due to examination regulations	Bachelor Level 1, all modules of semester BCE 3
Teaching form	☒ Lecture ☒ Ungraded Seminar Paper ☐ Exercises ☒ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students are able to design, dimension and construct rainwater treatment plants as a prerequisite for design planning. They know the determining properties of aquifers, can plan and evaluate simple pumping tests, create numerical groundwater models and thus simulate interventions in the groundwater regime, e.g. through a well. The students know the basics for the planning of plants for wastewater treatment and sludge treatment and are able to prepare a design of a wastewater treatment plant considering process engineering aspects.
Course contents	▪ Aquifer parameters, pumping tests, numerical groundwater modeling ▪ Project work: Creation of a groundwater model for a groundwater development ▪ Water Framework Directive, environmental quality standards, policy approaches ▪ Indirect discharger ▪ Local water balance - change through building development ▪ Rainwater management and flood protection for property drainage ▪ Combined sewerage treatment (design + equipment of stormwater tanks, performance control of the operation, design principles) ▪ Further rainwater treatment in retention soil filters ▪ Interaction of sewer system, stormwater treatment and sewage treatment plant ▪ Inspection of executed rainwater treatment plants ▪ Monitoring of sewage treatment plants, data evaluation, basics of balancing ▪ Mechanical wastewater treatment ▪ Coarse materials (rakes, sieves) ▪ Sand and grease (sand trap, grease trap) ▪ Settable substances (preliminary sedimentation) ▪ Biological wastewater treatment and nutrient elimination - principles, procedures and design ▪ C-Elimination

	▪ Nitrification / Denitrification ▪ Phosphate elimination ▪ Activation plants (aeration tanks and secondary clarifiers) ▪ Dimensioning / Sizing ▪ Design ▪ Trace substance elimination ▪ Sludge types and quantities / sewage sludge disposal ▪ Sludge treatment ▪ Thickening ▪ Anaerobic stabilization (digestion) Sludge dewatering ▪ Internal chargeback Excursion to executed (large) wastewater treatment plants.
Examination	☒ Written examination (120 mins.)
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☐ Blackboard ☐ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

BCE 5.4In Infrastructure Planning Project-Study I		
Courses	BCE 5.4In-1 Infrastructure Planning Project-Study Part I	
Responsible for module	*Is not offered in the establishment phase*	
Correlation to curriculum	Bachelor, Level 3, mandatory, Specialization Infrastructure Planning	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 5	
Pre-requisites due to examination regulations	Basics from Bachelor Level 2	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students are able to familiarize themselves with a real problem in the field of water supply, traffic planning or waste management and construction management to solve and present the problem in the form of a study using scientific methods. The students will learn the challenges at the interface of design and Construction contains and learn how to search for a holistic optimization in terms of value engineering.
The students' solution competence, basic research and teamwork will be particularly pronounced.

Module contents

The module “Infrastructure Planning Project-Study Part I” is always supervised by two lecturers to ensure tha the students are exposed to the different aspects of infrastructure planning and construction management.

Independent processing of a manageable project by the students in a team with defined interim presentation and a final presentation and a final project report.

The final report must include a “Leassons Learnt” section.

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 5.4In Infrastructure Planning Project-Study I	BCE 5.4In-1 Infrastructure Planning Project-Study Part I	BCE 5	5/150 hours	English

Lecturer(s)	*Is not offered in the establishment phase*
Pre-requisites due to examination regulations	Basics from Bachelor Level 2
Teaching form	☒ Lecture ☒ Student research project ☐ Exercises ☒ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students are able to familiarize themselves with a real problem in the field of water supply, traffic planning or waste management and construction management to solve and present the problem in the form of a study using scientific methods. The students will learn the challenges at the interface of design and Construction contains and learn how to search for a holistic optimization in terms of value engineering. The students' solution competence, basic research and teamwork will be particularly pronounced. The students are able to familiarize themselves with a concrete problem in the field of water supply, traffic planning or waste management and to solve and present the problem in the form of a study using scientific methods. The students will be able to determine the basic principles, the competence to solve problems and the ability to work in a team (e.g. self-organization).
Course contents	The module “Infrastructure Planning Project-Study I” is always supervised by two lecturers to ensure that the students are exposed to the different aspects of infrastructure planning and construction management. Independent processing of a manageable project by the students in a team with defined interim presentations and a final presentation and a final project report. The final report must include a “Leassons Learnt” section.
Examination	☒ Graded Seminar Paper and Presentation
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☐ Blackboard ☐ Script ☒ E-learning
Reading	Project documents (depending on task)
Last modification	12.04.2024

BCE 6.1In Infrastructure Planning Project-Study II		
Courses	BCE 6.1In-1 Infrastructure Planning Project Study Part II	
Responsible for module	*Is not offered in the establishment phase*	
Correlation to curriculum	Bachelor, Level 3, mandatory, Specialization Infrastructure Planning	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	10 CP	
Duration	Semester 6	
Pre-requisites due to examination regulations	Basics from Bachelor Level 2	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students will be able to determine the principles, the competence to solve problems and the ability to work in a team (e.g. self-organization) and solve, optimize a real planning task applying all relevant aspects of Civil Engineering and Construction Management.
The students will start this large project study with reviewing the “Lessons Learnt-Report” from the Project Study I.

Module contents

The module “Infrastructure Planning Project-Study Part II” is always supervised by two lecturers to ensure that the students are exposed to the different aspects of infrastructure planning and construction management. In-dependent processing of a manageable project by the students in a team with defined interim presentations and a final presentation and a final project report.

The following contents are integrated in the module “Infrastructure Planning Project-Study II”:

- Compilation and interpretation of project data
- Development of proposals and variant solutions
- Reporting / presentation of results with discussion

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 6.1In Infrastructure Planning Project-Study II	**BCE 6.1In-1 Infrastructure Planning Project-Study Part II**	**BCE 6**	**10/300 hours**	**English**

Lecturer(s)	*Is not offered in the establishment phase*
Pre-requisites due to examination regulations	Basics from Bachelor Level 2
Teaching form	☒ Lecture ☒ Student research project ☐ Exercises ☒ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students are able to familiarize themselves with a concrete problem in the field of water supply, traffic planning or waste management and to solve and present the problem in the form of a study using scientific methods. The students will be able to determine the basic principles, the competence to solve problems and the ability to work in a team (e.g. self-organization).
Course contents	Independent processing of a manageable project in a team with defined interim presentations and a final presentation. The students will start this large project study with reviewing the "Lessons Learnt-Report" from the Project Study I. Possible topics. ▪ Inventory determination, determination of requirements, location determination ▪ Implementation of special investigations (e.g. discharge measurements, quality measurements) ▪ Compilation and interpretation of project data ▪ Development of proposals and variant solutions ▪ Reporting / presentation of results with discussion
Exam	☒ Graded Seminar Paper and Presentation
Frequency	Once a year
Workload	120 hours
Media	☒ Beamer/Laptop ☐ Blackboard ☐ Script ☒ E-learning
Reading	Project documents (depending on task)
Last modification	12.04.2024

BCE 5.5 Mandatory: Building Information Modelling		
Courses	BCE 5.5-1 Building Information Modelling	
Responsible for module	Prof. Dr.-Ing. Hannes Schwarzwälder	
Correlation to curriculum	Bachelor, Level 3, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 5	
Pre-requisites due to examination regulations	Bachelor Level 1 and all modules from semester BCE 3	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students will learn how to collaborate with various project partners and designers using Building Information Modelling (BIM) in the different phases of the life cycle of a project. They will understand the role of a BIM-Manager during the design, construction and facility management.

Module contents

The following contents are taught in the module “BIM”:

- Collaboration of Project Partners in BIM
- Design and Interface Management in BIM
- Usage of VR and AR in real estate and facility management

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 5.5 Mandatory: Building Information Modelling	**BCE 5.5-1 Building Information Modelling**	**BCE 5**	**5/150 hours**	**English**

Lecturer(s)	Richard Sugandha, M.Sc.
Pre-requisites due to examination regulations	Bachelor Level 1, all modules from semester BCE 3
Teaching form	☒ Lecture ☒ Student project study ☐ Exercises ☒ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students will learn how to collaborate with various project partners and designers using Building Information Modelling (BIM). They will understand the need and principals of interface management. They will work with different BIM-Designers and various models. They will be able to run clash detections.
Course contents	▪ Working with different designer models in one BIM model in Revit ▪ Importing and exporting data ▪ Clash detection using specialized software ▪ Usage of BIM in facility management ▪ Visualisation using specialized software ▪ Optimisation using VR-Glasses ▪ BIM in facility management
Examination	☒ Graded Seminar Paper
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☐ Blackboard ☐ Script ☒ E-learning
Reading	Will be provided in class
Last modification	12.04.2024

BCE 5.6 Elective: Law and Contract Management		
Courses	BCE 5.6-1 Basics in Public and Private Law BCE 5.6-2 International Contract Management and FIDIC	
Responsible for module	Prof. Dr.-Ing. Alexander Glock	
Correlation to curriculum	Bachelor, Level 3, elective	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 5	
Pre-requisites due to examination regulations	Bachelor Level 1 and all modules from semester BCE 3	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students will be introduced to the different types of contracts used in the design and construction of projects. They will understand the role and tasks of a Contract Manager in major international projects. The students will be sensitized to the contractual risks involved in international projects. They are able to discuss these adequately with a specialist lawyer.

Module contents

The following contents are taught in this module:

- Introduction to the different types of Contract and to the FIDIC contract model
- Special features in Anglo-American contracts
- Applicable law for international projects
- Claim management from the perspective of the construction company
- Cultural differences of the contracting parties

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 5.6 Elective: Law and Contract Management	BCE 5.6-1 Basics in Public and Private Law	BCE 4	2/60 hours	English

Lecturer(s)	Visiting lecturer from Vietnam
Pre-requisites due to examination regulations	none
Teaching form	☒ Lecture ☐ Student research project ☐ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students learn the basics of public and private law in Vietnam. They will get to know the federal building code and the municipal urban land use planning. Further they will learn the fundamentals of private law and its importance for construction projects.
Course contents	▪ Relationship between public and private building law ▪ Basic principles of urban land use planning ▪ Building planning law requirements for projects ▪ Building code requirements for projects including the relevant approval procedures ▪ Basics of public building law in Vietnam ▪ Basic of private law in Vietnam
Examination	☒ Written module examination (90 mins.)
Frequency	Once a year
Workload	60 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	will be provided in class
Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 5.6 Elective: Law and Contract Management	BCE 5.6-2 International Contract Management (FIDIC)	BCE 4	3/90 hours	English

Lecturer(s)	Dr. Stéphane-Laure Caubet, PhD
Pre-requisites due to examination regulations	Bachelor Level 1, all modules from semester BCE 3
Teaching form	☒ Lecture ☒ Student project study ☐ Exercises ☒ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students know the standard procedures of world bank and international financed construction projects; their tendering and selection critirias. Further the students will understand the tasks of a contract manager and how to deal with Anglo-American-dominated international contracts, such as FIDIC. They are sensitized to the contractual risks involved in international projects and are able to discuss these adequately with a specialist lawyer.
Course contents	▪ Procurement Process ▪ Worldbank tendering precedures ▪ Applicable law for international projects ▪ Introduction to the contract model FIDIC ▪ What is contract management and contract administration ▪ Claim management under FIDIC Contracts ▪ Cultural differences of the contracting parties ▪ Negotiation strategies ▪ Alternative Dispute Resolution Methods ▪ Disputes Adjudication Board ▪ International Arbitration ▪
Examination	☒ Written module examination (90 mins.)
Frequency	Once a year
Workload	90 hours
Media	☒ Beamer/Laptop ☐ Blackboard ☐ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

BCE 5.7 Elective: Module from other Specialization		
Courses	BCE 5.7-1 Module out of the other Major	
Responsible for module	Academic Coordinator	
Correlation to curriculum	Bachelor, Level 3, elective	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 5	
Pre-requisites due to examination regulations	Bachelor Level 1, all modules from semester BCE 3	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)
Too enable a broad education in different aspects of Civil Engineering, that suits the personality and characters of students, they have the possibility to add a Module from the Specialization
Module contents
The contents are vary depend on the chosen Module.

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 5.7 Elective: Level 3 Module from other Spesialization	**BCE 5.7-1 Module out of the other Specialization**	**BCE 5**	**5/150 hours**	**English**

Lecturer(s)	From other Specialization
Pre-requisites due to examination regulations	Bachelor Level 1, all modules from semester BCE 3
Teaching form	☒ Lecture ☒ Student project study ☐ Exercises ☒ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	Students with the Spezialization Structural Engineering may choose one of the following Modules: • BCE 4.6In Hydraulical Engineering II and Urban Water Management • BCE 5.1In Traffic Engineering III • BCE 5.2In Hydraulik Engineering III • BCE 5.3In Urban Water management Students with the Spezialization Infrastructure Planning may choose one of the following Modules: • BCE 4.6St Reinforced Concrete II • BCE 5.1St Structural Analysis III and Finite Elemets • BCE 5.2St Reinforced Concrete III • BCE 5.3St Steelconstruction II
Course contents	Please refer to the respective Module.
Examination	Please refer to the respective Module.
Frequency	Please refer to the respective Module.
Workload	150 hours
Media	☒ Beamer/Laptop ☐ Blackboard ☐ Script ☒ E-learning
Reading	Please refer to the respective Module.
Last modification	12.04.2024

BCE 6.2 Elective: Geotechnical Engineering III		
Courses	BCE 6.2-1 Geotechnics III	
Responsible for module	NN	
Correlation to curriculum	Bachelor, Level 3, elective	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 6	
Pre-requisites due to examination regulations	Bachelor Level 1, all modules from semester BCE 3	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students know the basics of rock construction, are able to assess the stability of rock slopes and plan and dimension possible safety measures. They are also capable of designing, planning and dimensioning earthworks, describing drill cores and results of Interpret dynamic probing and developing soil profiles from it.
The students can construct groundwater level plans and aquifer base maps, create numerical groundwater models and thus simulate interventions in the groundwater regime, such as dewatering for excavation pits.

Module content

The following contents are taught in the module “Geotechnical Engineering III”:

- Introduction to site-specific geology
- Detailed recording of the geometry and structure of rock slopes
- Planning and dimensioning of structural safety measures
- Geotechnical conception of dams
- Soil improvement and soil consolidation
- Conception of subsoil investigations in application examples
- Applications of methods of soil investigation according to DIN 4020
- Design and dimensioning of building pit enclosures
- Calculation of slope and slope stability
- Special foundation engineering methods

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 6.2 Elective: Geotechnical Engineering III	**BCE 6.2-1 Geotechnics III**	**BCE 6**	**5/150 hours**	**English**

Lecturer(s)	NN
Pre-requisites due to examination regulations	Bachelor Level 1, all modules from semester BCE 3
Teaching form	☒ Lecture ☒ Student project study ☐ Exercises ☒ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students know the basics of rock construction and are able to assess the stability of rock slopes and plan and dimension possible safety measures. The students are capable of designing, planning and dimensioning earthworks. The handling of contaminated soils and of recycled construction materials in accordance with legal requirements is mastered. The tender for planning of earthworks using geosynthetics is implemented for standard applications. The design of appropriate ground investigations can be carried out depending on the geological, hydrogeological boundary conditions and the requirements of the building. The requirements of the geotechnical trades for tendering of construction works can be taken into account. The students are qualified to design pile foundations according to EC 7. The students can describe drill cores, results of Interpret dynamic probing and develop soil profiles from it. They can construct groundwater level plans and aquifer base maps, create numerical groundwater models and thus simulate interventions in the groundwater regime, such as dewatering for excavation pits. Students can plan and dimension structures in foundation engineering and special civil engineering. The design and calculation of excavation pit stabilization as well as of slopes and slope stabilization is mastered. By using common software, the problems of the use of computers in geotechnical engineering are recognized and the verification of the calculation results is implemented with simple rollover checks. The interaction between subsoil and structure can be converted into calculations for simple area foundations.
Course contents	▪ Introduction to site-specific geology ▪ Detailed recording of the geometry and structure of rock slopes ▪ Describing and classifying the rock ▪ Evaluation of the measured data and conversion into a microstructure model ▪ Evaluation of the stability of rock slopes ▪ Planning and dimensioning of structural safety measures ▪ Foundations, avalanche and erosion protection ▪ Geotechnical conception of dams ▪ Soil improvement and soil consolidation ▪ Use and application of recycled building materials, reuse of con-

	taminated soil ▪ Application and use of geosynthetics, dimensioning of buildings with geosynthetics ▪ Scope of subsoil investigations ▪ Scope and content of a geotechnical report according to DIN 4020 ▪ Conception of subsoil investigations in application examples ▪ Soil and rock classes in the VOB Part C / Soil and rock class classification according to homogeneous areas ▪ Special contractual conditions for special foundation engineering ▪ Dimensioning of pile foundations ▪ Aquifer parameters ▪ Numerical groundwater modeling ▪ Applications of methods of soil investigation according to DIN 4020 ▪ Each participant creates a numerical groundwater model for a concrete area and uses it to simulate water management applications for excavation pits. ▪ Design and dimensioning of anchorages / building pit enclosures ▪ Calculation of slope and slope stability ▪ Base plates and pile plate foundations ▪ Numerical methods in geotechnics ▪ Special foundation engineering methods
Examination	☒ Written examination (120 mins.)
Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☐ Blackboard ☐ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

BCE 6.3 Elective: Sustainable Energy

Course	BCE 6.3-1 Sustainable Energy Management BCE 6.3-2 Renewable Energy
Responsible for module	Prof. Dr. habil. Benno Rothstein
Correlation to curriculum	Bachelor, Level 3, elective
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management
Total CPs	5 CP
Duration	Semester 5 and 6
Pre-requisites due to examination regulations	Bachelor Level 1, all modules from semester BCE 3
Type of examination	☒Module examination ☐ Partial module examination

Module goals (knowledge, skills, competences)

The students have an overview of all Installations for the exploitation of energy resources and of all facilities for the generation of electrical energy both through conventional thermal large-scale power plants (lignite, hard coal, nuclear power) and through renewable energies (water, wind, solar, biogas, geothermal energy). The students know the importance of renewable energies in Germany and abroad and their future development trends. They have a good basic knowledge of the types of building structures that are necessary for this energy production. They are able to contribute their knowledge to the planning and construction of these facilities. They also have a good basic knowledge of how to integrate these systems into nature.

Subject-specific knowledge:

- Students are familiar with the most important players in the energy industry in Germany and Europe.
- Students are familiar with the fundamentals of the energy industry in the areas of generation, transportation and consumption.

Methodological skills:

- Students have the ability to holistically evaluate electricity generation and transmission technologies.

Interdisciplinary competences:

- Students are able to contextualize the further course content in the context of the energy industry situation in Germany and Europe.

Module contents

The following contents are taught in the module “Elective: Sustainable Energy”:

- Overview of conventional energy resources and conventional electricity generation
- Energy supply as a critical infrastructure
- Importance of renewable energies for future energy production
- Development trends in energy production from renewable energies
- Integration of nature conservation into the planning of power generation plants

Last modification	10.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 6.3 Elective: Sustainable Energy	BCE 6.3-1 Sustainable Energy Management	BCE 6	3/90 hours	English

Lecturer(s)	Prof. Dr. habil. Benno Rothstein (HTWG Konstanz)
Pre-requisites due to examination regulations	Bachelor Level 1, all modules from semester BCE 3
Teaching form	☒Lecture ☒Student project study ☐Exercises ☒Working as a team ☐Laboratory ☒E-learning
Module goals (knowledge, skills, competences)	The students know the most important players in the energy industry in Germany, Europe and the world. They are familiar with the conventional resp. fossil energy resources in terms of their extraction, processing, use and environmental impact. Students are aware of the basics of the energy industry in the sectors of production, transport and consumption. Students are able to place the further study contents in the context of the energy economic situation.
Course contents	**I a. General Introduction** *Images of Environmental Destruction, Global Change, the Invention of Sustainability* **I b. Introduction Energy – What is energy?** *Basics, Forms of Energy, Energy Sources, Development of Energy Consumption* **II Energy Resources** **a. Coal:** *Introduction, Overall Potential, Production and Prices, Conclusion* **b. Crude oil:** *Discharge, Genesis of Natural Resources (Crude Oil, Natural Gas), Overall Potential, Production and Prices, Safeguard Energy Supplies in the Event of a Crisis, Conclusion* **c. Natural Gas:** *Introduction, Excursus: Unconventional Natural Gas, Total Potential, Production and Prices, Conclusion* **d. Uranium:** *Introduction, Overall Potential, Production and Prices, Conclusion* **III Conventional Generation of Electricity** *Basic Aspects of Electricity Generation, Thermal Power Plants in General, Coal-fired Power Plants, Nuclear Power Plants* **IV Energy and Climate Change** *Climate Change, Vulnerabilities and Adaptation Options of the Electricity Industry, Concluding Remarks on Energy Supply* **V Energy supply as a critical infrastructure** *Importance of critical infrastructures, consequences of a power failure, resilience strategies*

Examination	☒Written module examination (120 mins.)
Frequency	Once a year
Workload	90 hours
Media	☒Beamer/Laptop ☐Blackboard ☐Script ☒E-learning
Reading	• Linnemann, M. (2021): Energiewirtschaft für (Quer-)Einsteiger: Einmaleins der Stromwirtschaft. Springer. Heidelberg. • Schiffler, H.-W. (2023): Einführung in die Energiewirtschaft: Ressourcen und Märkte. Springer. Heidelberg. • Kaltschmitt, M.; Stampfer, K. (2024): Energie aus Biomasse – Ressourcen und Bereitstellung. Springer. Wiesbaden. • Kaltschmitt, M. (2020): Erneuerbare Energien. Systemtechnik, Wirtschaftlichkeit, Umweltaspekte. Springer Vieweg. Berlin. • Ströbele, W. (2022): Energiewende einfach erklärt – von guten Absichten und unbequemen Fakten. Springer. Wiesbaden. • Quaschning, V. (2024): Regenerative Energiesysteme – Technologie, Berechnung, Klimaschutz. Hanser. München. • Lecture notes Internet: ▪ Zeitschrift für Energiewirtschaft (ZfE): https://www.springer.com/journal/12398/ ▪ Renewable Energy: https://www.journals.elsevier.com/renewable-ener ▪ https://www.erneuerbareenergien.de/ ▪ http://www.energiewelten.de/elexikon/lexikon/index3.htm
Last modification	10.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 6.3 Elective: Sustainable Energy	BCE 6.3-2 Renewable Energy	BCE 6	2/60 hours	English

Lecturer(s)	Prof. Dr. habil. Benno Rothstein
Pre-requisites due to examination regulations	Bachelor Level 1, all modules from semester BCE 3
Teaching form	☒Lecture ☐Student project study ☐Exercises ☒Working as a team ☐Laboratory ☒E-learning
Module goals (knowledge, skills, competences)	The students know the importance of renewable energies in Germany, Europe and the world and their future development trends. They have a good basic knowledge of the types of building structures that are necessary for this energy production. They are able to contribute their knowledge to the planning and construction of these facilities. They also have a good basic knowledge of how to integrate these systems into nature.
Course contents	**I Renewable Generation of Electricity: General Aspects** *Introduction Renewable Energies in General* **II Renewable Generation of Electricity: Hydropower** *Introduction Hydropower, History of Use, Hydropower Use, Future Trends* **III Renewable Generation of Electricity: Wind Energy** *Introduction of Wind Energy, Wind Energy Use, Advantages and Disadvantages, Wind Energy Feed-in into the Grid, Future Trends* **IV Renewable Generation of Electricity and Heat – Part 1 Photovoltaics and Solar Thermal Energy** *Introduction, Photovoltaics, Solar Thermal Energy, Advantages and Disadvantages, Outlook, Conclusion* **V Renewable Generation of Electricity and Heat – Part 2 Bioenergy** a. **Introduction:** *Basics, Definitions, Potentials* b. **Provision of biomass:** *Biomass from Forestry, Biomass from Agriculture* c. **Wood Pellets:** *Preliminary Remark: Usage Competition, Introduction Wood Pellets, Production of Wood Pellets, Supply and Storage of Wood Pellets, Applications of Wood Pellets, Economic Efficiency, Costs and Support, Global Pellet Market* d. **Wood chips:** *Introduction Wood Chips, Production of Wood Chips, Possible Applications of Wood Chips, Summary* e. **Short-rotation Plantations** f. **Biogas:** *Introduction of Biogas, Description of Selected Substrates, Production of Biogas, Possible Applications of Biogas, Excursus: Heat Utilisation* g. **Fuels from Biomass:** *Fuels from Biomass, Bioenergy and Sustainability* **VI Renewable Generation of Electricity and Heat – Part 3 Geothermal Energy** *Introduction Geothermal Energy, Geothermal Utilisation Options, Conclu- sion*

	VII Renewable Generation of Electricity and Heat – Part 4 Conclusion *Excursus: What colour is electricity?, Conclusion*
Examination	☒Written module examination (120 mins.)
Frequency	Once a year
Workload	60 hours
Media	☒Beamer/Laptop ☐Blackboard ☐Script ☒E-learning
Reading	• Linnemann, M. (2021): Energiewirtschaft für (Quer-)Einsteiger: Einmaleins der Stromwirtschaft. Springer. Heidelberg. • Schiffler, H.-W. (2023): Einführung in die Energiewirtschaft: Ressourcen und Märkte. Springer. Heidelberg. • Kaltschmitt, M.; Stampfer, K. (2024): Energie aus Biomasse – Ressourcen und Bereitstellung. Springer. Wiesbaden. • Kaltschmitt, M. (2020): Erneuerbare Energien. Systemtechnik, Wirtschaftlichkeit, Umweltaspekte. Springer Vieweg. Berlin. • Ströbele, W. (2022): Energiewende einfach erklärt – von guten Absichten und unbequemen Fakten. Springer. Wiesbaden. • Quaschning, V. (2024): Regenerative Energiesysteme – Technologie, Berechnung, Klimaschutz. Hanser. München. • Lecture notes Internet: ▪ Zeitschrift für Energiewirtschaft (ZfE): https://www.springer.com/journal/12398/ ▪ Renewable Energy: https://www.journals.elsevier.com/renewable-ener ▪ https://www.erneuerbareenergien.de/ ▪ http://www.energiewelten.de/elexikon/lexikon/index3.htm
Last modification	10.04.2024

BCE 6.4 Elective: Timber Construction		
Courses	BCE 6.4-1 Timber Construction	
Responsible for module	Prof. Dr.-Ing. Habil. Jörg Schänzlin	
Correlation to curriculum	Bachelor, Level 3, elective	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 6	
Pre-requisites due to examination regulations	Bachelor Level 1, all modules from semester BCE 3	
Type of examination	☒ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)

The students know the properties of building materials (technology of wood and wooden materials, stiffness and strength properties). They are familiar with the basics of design in timber construction. They can safely apply them to solve simple structural tasks.
They will be able to perform the most important checks on load-bearing capacity (bending, shear, double bending, tension, compression, simple stability cases, combinations, etc.) as well as pin-shaped mechanical fasteners independently.
The students are able to control the combination of actions on a structure and the influence of the coefficient k_mod, which is important in timber construction.

Module contents

The following contents are taught in the module “Timber Construction”:

- Technology of wood
- Stiffness and strength properties of wood
- Sustainability through timber construction
- Principles of design
- Load capacity checks (bending, shear, double bending, tension, compression, support pressure)
- Stability checks (buckling, tilting)
- Basics of fasteners
- Proof of pin-shaped fasteners (rod dowels)

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 6.4 Elective: Timber Construction	BCE 6.4-1 Timber Construction	BCE 6	5/150 hours	English

Lecturer(s)	Prof. Dr.-Ing. Habil. Jörg Schänzlin
Pre-requisites due to examination regulations	Bachelor Level 1, all modules from semester BCE 3
Teaching form	☒ Lecture ☒ Student project study ☐ Exercises ☒ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students know the properties of building materials (technology of wood and wooden materials, stiffness and strength properties). They are familiar with the basics of design in timber construction. They can safely apply them to solve simple structural tasks. The students know the properties of wood as a building material and the design principles of timber engineering and timber house construction. They will be able to perform the most important checks on load-bearing capacity (bending, shear, double bending, tension, compression, simple stability cases, combinations, etc.) as well as pin-shaped mechanical fasteners independently. The students are able to control the combination of actions on a structure and the influence of the coefficient k_mod, which is important in timber construction. They have a sound knowledge of timber bridges and old buildings, of structural and constructive wood preservation and non-destructive examination methods. They gain in-depth experience in fire protection.
Course contents	▪ Technology of wood ▪ Stiffness and strength properties of wood ▪ Sustainability through timber construction ▪ Principles of design ▪ Combination rules for action ▪ Load capacity checks (bending, shear, double bending, tension, compression, support pressure) ▪ Stability checks (buckling, tilting) ▪ Contact connections ▪ Basics of fasteners ▪ Proof of pin-shaped fasteners (rod dowels) ▪ Wooden bridges ▪ Renovation of old buildings, ▪ Constructive and structural wood preservation ▪ Excursion Condition assessment timber bridges and old buildings ▪ Non-destructive testing methods (wood moisture) ▪ Deepened fire protection
Examination	☒ Written examination (120 mins.)

Frequency	Once a year
Workload	150 hours
Media	☒ Beamer/Laptop ☐ Blackboard ☐ Script ☒ E-learning
Reading	*Will follow shortly*
Last modification	12.04.2024

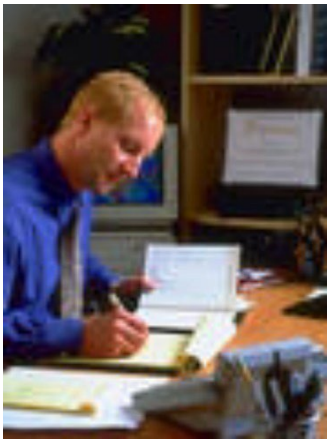
BCE 6.5 Elective: Interdisciplinary Module		
Courses	BCE 6.5-1 Module out of other Bachelor Programs from the University	
Responsible for module	Academic Coordinator	
Correlation to curriculum	Bachelor, Level 3, elective	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	5 CP	
Duration	Semester 6	
Pre-requisites due to examination regulations	Bachelor Level 1, all modules from semester BCE 3	
Type of examination	☐ Module examination ☐ Partial module examination	

Module goals (knowledge, skills, competences)
To enable a broad interdisciplinary education and include knowledge, skills and competences from other disciplines, students have the possibility to choose modules and courses from other Bachelor Programs of the VGU or the HBC in their studies. Prior to any selection the consultation of the responsible academic coordinator of the BCE program is required.
Module contents
The contents are depend on the chosen Module.

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 6.5 Elective: Interdisciplinary Module	**BCE 6.5-1 Module out of other Bachelor Programs from the University**	**BCE 6**	**5/150 hours**	**English**

Lecturer(s)	Academic Coordinator
Pre-requisites due to examination regulations	Bachelor Level 1, all modules from semester BCE 3
Teaching form	☒ Lecture ☒ Student project study ☐ Exercises ☒ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students must consult the academic coordinator before selecting a module from another program to ensure its acceptance within the Bachelor program Civil Engineering and Construction Management. Text einfügen über den Wahl und Anerkennungsvorgang Vgl. Anerkennungsatzung der HBC
Course contents	Please refer to the respective Module.
Examination	Please refer to the respective Module.
Frequency	Please refer to the respective Module.
Workload	150 hours
Media	☒ Beamer/Laptop ☐ Blackboard ☐ Script ☒ E-learning
Reading	Please refer to the respective Module.
Last modification	12.04.2024

BCE 6.7 Bachelor Thesis incl. Preparation Seminar		
Courses	BCE 6.7-1 Preparation Seminar BCE 6.7-2 Bachelor Thesis incl. Presentation and Defence	
Responsible for module	Academic Director and Academic Coordinator	
Correlation to curriculum	Bachelor, Level 3, mandatory	
Applicability / Acceptability	Bachelor Civil Engineering and Construction Management	
Total CPs	15 CP	
Duration	Semester 5 and 6	
Pre-requisites due to examination regulations	All modules from level 1 and 2 are completed. For the advanced module, to which the topic of the Bachelor thesis is assigned, the preliminary examination performance of the 5th semester was successfully completed.	
Type of examination	☐ Module examination ☒ Partial module examination ☒ Bachelor Thesis	

Module goals (knowledge, skills, competences)

The student has sufficient knowledge to comprehensively work on the topic of the Bachelor thesis. He or she has the engineering skills to work on the topic. He/she has the competence to apply existing knowledge to new issues and to independently work on a problem from the subject according to scientific methods within a given period of time.

Module contents

- The topic of the Bachelor's thesis is located in a subject area relevant to the course of study. The chosen area of specialization must be taken into account.
- The topic and content of the Bachelor's thesis are determined by the supervisor.
- The Bachelor's thesis should be written according to scientific principles. The bachelor thesis will be presented in a colloquium. The form and content of the colloquium will be determined by the supervisor.
- One copy of the thesis has to be handed in at the examination office; number and form (e.g. as PDF) of further copies to be handed in are determined by the supervisor. In addition, a short version of the Bachelor's thesis and a poster must be submitted.

Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 6.7 Bachelor Thesis incl. Preparation Seminar	**BCE 6.7-1 Preparation Seminar**	**BCE 5**	**3/90 hours**	**English**

Lecturer(s)	Dipl. Volkswirtin Carolin Halder, Nguyen Thi Kim Tri
Pre-requisites due to examination regulations	None
Teaching form	☐ Lecture ☒ Student research project ☐ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The students ▪ know the most important forms of publication, as well as techniques to efficiently search for literature and information, ▪ acquire basic knowledge of the functioning of literature management programmes using Citavi as an example, ▪ learn methods for evaluating the information found, ▪ can identify their information needs, research independently in library catalogues and subject databases and evaluate the results found according to subject-specific criteria, ▪ are able to formulate a scientific question and work on it independently by obtaining, evaluating and processing the required information according to the principles of scientific work.
Course contents	▪ Topic identification and selection ▪ Effective time management (work organisation and time planning) ▪ Search strategies (preparing and conducting searches) ▪ Forms of publication and information resources (catalogues, databases) ▪ Evaluate and analyse literature ▪ Citation technique Structure and formulation of scientific papers
Examination	Written assessment / seminar paper
Frequency	Once a year
Workload	90 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	Study and examination regulations; topic-specific literature
Last modification	12.04.2024

Module name	Course	Semester	CPs/Workload	Language
BCE 6.7 Bachelor Thesis incl. Preparation Seminar	**BCE 6.7-2 Bachelor Thesis incl. Presentation and Defence**	**BCE 6**	**12/360 hours**	**English**

Lecturer(s)	Professors from HBC and VGU
Pre-requisites due to examination regulations	All modules from level 1 and 2 are completed. For the advanced module, to which the topic of the Bachelor thesis is assigned, the preliminary examination performance of the 5th semester was successfully completed.
Teaching form	☐ Lecture ☒ Student research project ☐ Exercises ☐ Working as a team ☐ Laboratory ☒ E-learning
Module goals (knowledge, skills, competences)	The student has sufficient knowledge to comprehensively work on the topic of the Bachelor thesis. He or she has the engineering skills to work on the topic. He/she has the competence to apply existing knowledge to new issues and to independently work on a problem from the subject according to scientific methods within a given period of time.
Course contents	▪ The topic of the Bachelor thesis is located in a subject area relevant to the course of study. The chosen area of specialization must be taken into account. ▪ The topic and content of the Bachelor thesis are determined by the supervisor. ▪ The Bachelor thesis should be written according to scientific principles. The Bachelor thesis will be presented in a colloquium. The form and content of the colloquium will be determined by the supervisor. ▪ One copy of the thesis has to be handed in at the examination office; number and form (e.g. as PDF) of further copies to be handed in are determined by the supervisor. In addition, a short version of the Bachelor thesis and a poster must be submitted.
Examination	☒ Graded Seminar Paper ☒ Presentation
Frequency	Twice a year and on demand
Workload	360 hours
Media	☒ Beamer/Laptop ☒ Blackboard ☒ Script ☒ E-learning
Reading	Study and examination regulations; topic-specific literature
Last modification	12.04.2024