

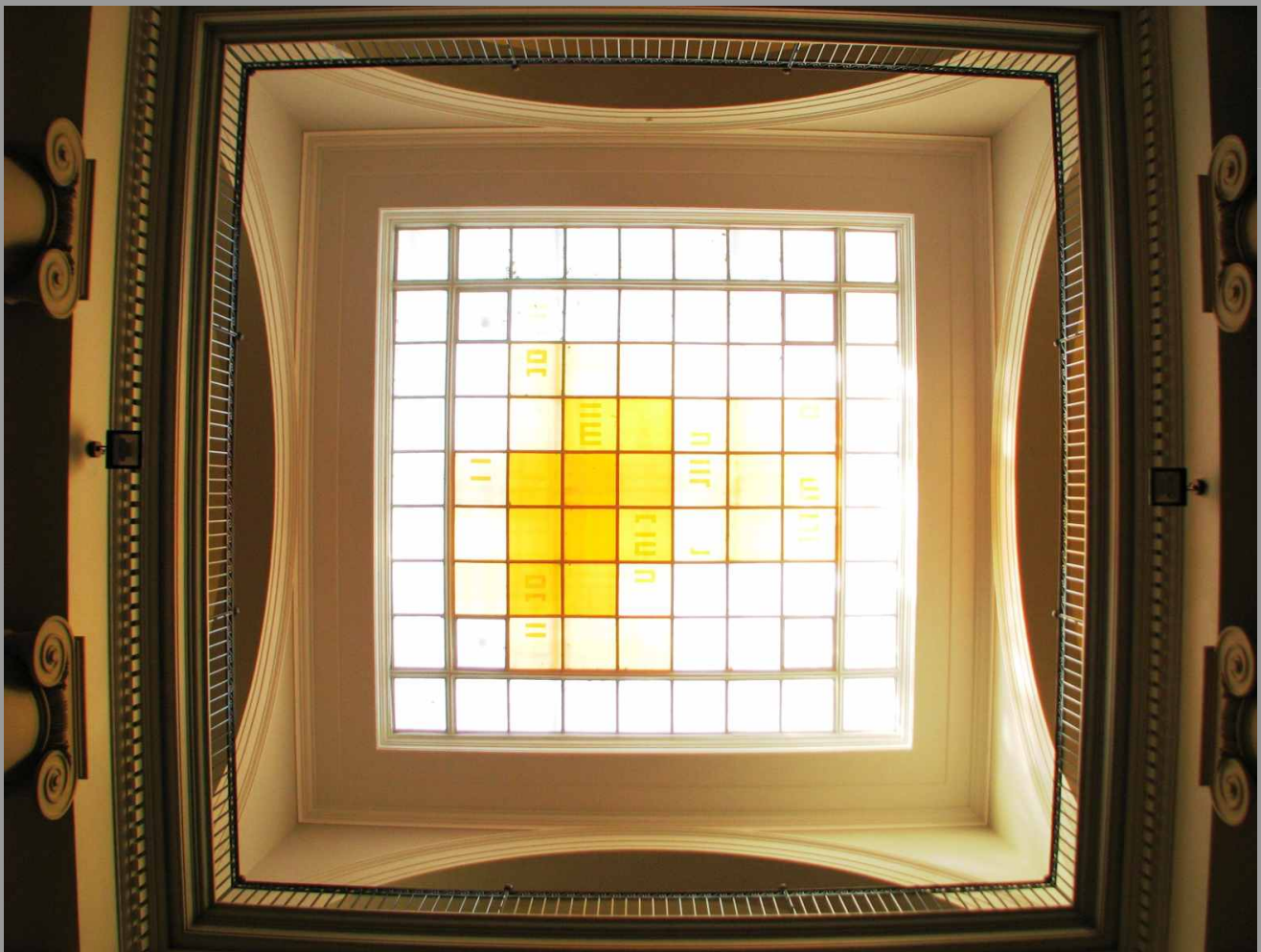
Module Handbook Civil Engineering ER/SPO 2011 (B.Sc.)

Summer Term 2014

Long version

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Department of Civil Engineering, Geo- and Environmental Sciences



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Studienplan für den Bachelorstudiengang Bauingenieurwesen - gemäß amtlicher Satzungsänderung vom 24.03.2011 - Stand 17.02.2014

		Fach	Modul	Kurs	Modulcode	1. FS		2. FS		3. FS		4. FS		5. FS		6. FS		Σ	LN	LP	
						V	Ü	V	Ü	V	Ü	V	Ü	V	Ü	V	Ü	SWS			
Grundstudium	Pflicht	Mechanik	Statik starrer Körper		bauIBGP01-TM1	3	2											5	sP, 100 min., OP	7	
			Festigkeitslehre		bauIBGP02-TM2			4	2									6	sP, 100 min.	9	
			Dynamik		bauIBGP03-TM3					2	2							4	sP, 100 min.	6	
			Hydromechanik		bauIBGP04-HYDRO					2	2							4	sP, 100 min.	6	
		Mathematik	Analysis und lineare Algebra		bauIBGP05-HM1	4	2												6	sP, 90 min.	9
			Integralrechnung und Analysis mehrerer Veränderlicher		bauIBGP06-HM2			4	2										6	sP, 90 min.	9
			Angewandte Statistik		bauIBGP07-STATS			1	1										2	sP, 60 min.	3
			Differentialgleichungen		bauIBGP08-HM3					2	1								3	sP, 60 min.	4
		Baustoffe	Baustoffkunde		Konstruktionsbaustoffe	bauIBGP09-BSTOF			1	1									2	sP, 60 min., OP	3
			Bauphysik			bauIBGP10-BKONS			1	1			4	2					6	sP, 120 min.	9
		Baukonstruktionen	Baukonstruktionslehre								2	2							2	sP, 60 min., OP	3
																			4	sP, 90 min.	6
		Planungsmethodik			bauIBGP11-PLANM	1	1												2	sS, 2x30 min.	2
		Projektmanagement			bauIBGP12-PMANG	1	1												2	sS, 45 min.	2
		Geologie im Bauwesen			bauIBGP13-GEOL			1	1										2	sS, 20 min.	2
		SUMME PFLICHT							15	20	21								56		80
Wahlpflicht		Schlüsselqualifikationen			bauIBGW0-SQUAL				2	2								4		6	
		Bauchemie		bauIBGW1-BCHEM	1	1												2	sS, 30 min.	2	
		Umweltchemie		bauIBGW2-UCHEM	1	1												2	sS, 30 min.	2	
		Umweltphysik/Energie		bauIBGW3-UPHYS	1	1												2	test. Übungsbl.	2	
		Informationsverarbeitung im Bauwesen	Bauinformatik I	bauIBGW4-IVBAU	1	1													2	sS, 30 min.	4
			Bauinformatik II				1	1											2	(Vorleistung: test. Prog.aufg.)	
		Technisches Darstellen		bauIBGW5-TECDS	1	1													2	3 Hausübungen, Gruppenüb. mit Präsent.	2
		Laborpraktikum		bauIBGW6-LABOR	0	2													2	4 Versuche	2
SUMME WAHLPFLICHT (mindestens 6 LP auszuwählen + 6 LP Schlüsselqual.)							12	2									4+14		12		
SUMME 1. - 3. FS							19-21	22-24	23								66		92		
Grundfachstudium	Pflicht	Baustatik	Baustatik I		Baustatik II	bauIBFP1-BSTAT						2	2					4	sP, 120 min.	5	
			Baustatik II										2	2				4	sP, 120 min.	5	
		Konstruktiver Ingenieurbau	Grundlagen des Stahlbetonbaus I		Grundlagen des Stahlbetonbaus II	bauIBFP2-KSTR.A								2	1		3	sP, 90 min.	4		
			Grundlagen des Stahlbetonbaus II										1	1		2	sP, 60 min.	2			
			Grundlagen des Stahlbaus		Grundlagen des Holzbaus	bauIBFP3-KSTR.B							2	2		4	sP, 120 min.	9			
			Grundlagen des Holzbaus									2	1		3						
		Wasser und Umwelt	Wasserbau und Wasserwirtschaft I		bauIBFP4-WASSER								2	1			3				
			Hydrologie									1	1			2	sP, 150 min.	12			
			Siedlungswasserwirtschaft										1	1			2				
		Mobilität und Infrastruktur	Umwelttechnologien		bauIBFP5-MOBIN											1	1		2		
			Raumplanung und Planungsrecht									2	1					3	sP, 150 min.	12	
			Verkehrswesen										2	1					3	(Vorleistungen: 3 Studienarbeiten)	
	Technologie und Management im Baubetrieb	Bemessungsgrundlagen im Straßenwesen		bauIBFP6-TMB											2	1					
		Baubetriebstechnik									3	1					4	sP, 150 min.	11		
		Baubetriebswirtschaft									2	1					3				
	Geotechnisches Ingenieurwesen	Facility- und Immobilienmanagement		bauIBFP7-GEOING											1	0			1		
		Bodenmechanik I									2	2					4	sP, 150 min.	9		
Grundbau I											2	1			3						
		Bachelor-Arbeit			bauIBSC-THESIS											(7)	(7)	schriftliche Arbeit mit Vortrag, 8 Wochen	11		
SUMME PFLICHT											25	22		6			53		80		
Wahlpflicht		Partielle Differentialgleichungen		bauIBFW1-PDGL							1	1						2	sS, 60 min.	2	
		Einführung in die Kontinuumsmechanik		bauIBFW2-EKM										1	1		2	sS, 60 min.	2		
		Wasserbauliches Versuchswesen		bauIBFW3-WASSVW										1	1		2	test. Versuchsprot.	2		
		Geotechnische Planung		bauIBFW4-GEOPL											1	1		2	test. Stud.arb. mit Kolloq.	2	
		Vermessungskunde		bauIBFW5-VERMK												1	1		2	test. Vermess.übung	2
		Projekt "Planen, Entwerfen, Konstruieren"		bauIBFW6-PPEK												0	2		2	Gruppenübung	2
		Lebenszyklusmanagement		bauIBFW7-LZMAN												1	1		2	sS, 60 min.	2
		Grundlagen Spurföhrte Transportsysteme		bauIBFW8-GSTS										2	0				2	sS, 60 min.	2
		Wasserressourcenmanagement und Ingenieurhydrologie		bauIBFW9-WASSRM												1	1		2	sS	2
SUMME WAHLPFLICHT (mindestens 8 LP sind auszuwählen)											2	2		14			18		8		
SUMME 4. - 6. FS											25-27	22-24	10-14			61		88			
MINDESTSUMME GESAMT 1. - 6. FS							19-21	22-24	23		25	22		14			127		180		
Zusatzstudium	Wahl	noch nicht gewählte Wahlpflichtmodule aus dem Grund- und Grundfachstudium																0-16		0-16	
		5 vorgezogene Module aus dem Masterstudium (max. 30 LP)																0-20		0-30	
MAXIMALSUMME BACHELOR																			147		210

LN = Leistungsnachweis
LP = Leistungspunkt
sP = schriftl. Prüfung
OP = Orientierungsprüfung

1 Structure of the Bachelor Programme in Civil Engineering (B.Sc.)

1 STRUCTURE OF THE BACHELOR PROGRAMME IN CIVIL ENGINEERING (B.Sc.)

2 Useful tips and informative items

Structure of the Programme

The programme exists of several **subjects**, **modules** and **courses**. Every subject (e.g. mathematics or mechanics) is split into modules and every module itself exists of one or more interrelated courses and will be completed by one or more exams. The extent of every module is indicated by credit points (CP), which will be credited after the successful completion of the module.

The programme is structured in **Basic Studies** (semester 1-3) and **Basic Subjects** (consolidation studies, semester 4-6). Most of the modules of the Basic Studies as well as the Basic Subjects are **core modules**. Furthermore, a certain number of modules has to be selected freely from a specified catalogue as (**core elective modules**). In addition, courses on **Key Qualifications** has to be taken from the catalogue of the House of Competence (HoC) in extent of 6 credit points in total. Beyond that, additional accomplishments may be taken voluntarily (see below). This enables the students to customize content and time schedule of the interdisciplinary programme according to personal needs, interest and job perspective.

Module Handbook

The **module handbook** describes the modules belonging to the programme. It goes into:

- the structure of the modules
- the extent of the modules (in CP),
- the dependencies of the modules,
- the learning outcomes,
- the assessment and examinations.

It is the relevant document presenting the structure of the programme as regards content and aids with the orientation during the study.

In addition to the module handbook the **course catalogue** and the individual announcements of the institutes provide important information updated every semester concerning variable course details (e.g. time and location of the course) as well as short-term modifications.

Election and completion of a module

The decision whether a course is elected is made by the student at the time of signing in for the corresponding exam. After attendance of the exam, a module cannot be replaced by another anymore.

The module is **succeeded**, if the module exam has been passed (grade min 4.0). In case that the module exam consists of several partial exams (e.g. Structural Analysis I and II) it holds: the module is succeeded once all partial exams have been passed (grade min 4.0). In order to that the minimum requirement of credits of this module has been met.

General exams and partial exams

Module exams can be taken as a general exam or several partial exams. If the module exam is offered as a **general exam**, the entire content of the module will be reviewed in a single exam. If the module exam consists of **partial exams**, the content of each course will be reviewed in corresponding partial exams over several semesters.

The registration for the examinations takes place online via the self-service function for students. The following functions can be accessed on <https://studium.kit.edu>:

- Sign in and sign off exams
- Retrieve examination results
- Print transcript of records

Repeating exams, deadlines

Principally, a failed exam can be repeated only once within the examination period following the next but one semester of this exam. If the **repeat examination** (including an oral repeat examination) will be failed as well, the **examination claim** is lost. Requests for a second repetition of an exam have to be submitted to the examination committee immediately after losing the examination claim. Requests for a second repetition require the approval of the examination committee. A counseling interview is mandatory.

Orientation Exams are the exams in the module Statics of Rigid Bodies as well as the partial modules Theory of Building Materials and Building Physics. These have to be completed by the end of the exam period of the second subject-related semester. Those who do not succeed the Orientation Exams including possible repeated exams before the end of the exam period of the third subject-related semester will lose the examination claim in Civil Engineering.

Further information is available from the examination regulation of the programme, the examination committee or the "Fachschaft" (student council).

Additional accomplishments, master advance

Additional accomplishments are voluntarily taken exams, whose results are not used for the calculation of the overall grade of the student, which are not mentioned in the certificate but are listed in the transcript of records. It is also mandatory to declare an additional accomplishment as such at the time of registration for an exam. Additional accomplishments may be elected from the entire KIT catalogue and are limited to a maximum of 30 credit points in total.

Up to five modules, 30 credits resp., may be elected as **master advance** from the master study programmes of Civil Engineering, Mobility and Infrastructure or Functional and Construction Engineering, once 120 credits have been completed within the Bachelor' studies. In this way a simpler transition to the consecutive master programme shall be able outside the regular period of study. It has to be mentioned that these modules are not transferred to a master programme automatically. They need to be accredited by the respective examination committee at the beginning of the masters' studies, within the first semester.

Further information

More detailed information about the legal and general conditions of the programme can be found in the examination regulation of the programme (announced at 8.9.2009), and in the statutes for amendment of the examination regulation (announced at 24.3.2011 and 14.1.2014).

Used abbreviations

LP/CP	Credit Points/ECTS	Leistungspunkte/ECTS
LV	course	Lehrveranstaltung
RÜ	computing lab	Rechnerübung
S	summer term	Sommersemester
Sem.	semester/term	Semester
ER/SPO	examination regulations	Studien- und Prüfungsordnung
KS/SQ	key skills	Schlüsselqualifikationen
HpW/SWS	contact hour	Semesterwochenstunde
E/Ü	exercise course	Übung
L/V	lecture	Vorlesung
W	winter term	Wintersemester

3 Actual Changes

Important changes are pointed out in this section in order to provide a better orientation. Although this process was done with great care, other/minor changes may exist.

Due to the statutes for amendment of the examination regulation (ER) announced at 14.1.2014 the following modifications are valid for all students studying according to ER 2011.

Changes in module "Informatics in Civil Engineering" [bauIBGW4-IVBAU]:

Since winter semester 2013/14 the module "Informatics in Civil Engineering" (4 LP) is splitted into the two courses "Introduction to computer programming I" (2 LP, WS) und "Introduction to computer programming II" (2 LP, SS). The Learning Control for the module remains.

Modification for repeating examinations:

Repeating exams can be passed within the examination period of the **next but one** semester, instead of the next semester.

In case of oral repeat examination repeating exams can be passed only with grade "4,0".

Modification for approval to subject exams in Basic Subjects:

An approval to these subject exams is only possible for those who passed the subject exams in Basic Studies according to SPO § 17 except two modules in maximum, instead of all modules.

4 Modules

4.1 Core Modules Basic Studies

Module: Statics of Rigid Bodies [bauIBGP01-TM1]

Coordination: P. Betsch
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 1

ECTS Credits	Cycle	Duration
7	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170101	Statics of Rigid Bodies (p. 88)	3/2/2	W	7	P. Betsch, T. Seelig

Learning Control / Examinations

graded:
 examination Statics of Rigid Bodies, written exam, 100 min., part of orientation exam
 Marking:
 module grade equal to examination grade

Conditions

none

Recommendations

none

Learning Outcomes

The basic concepts of the performance of structures carrying loads is taught using the model of rigid bodies. Relying on a few basic principles of physics, starting from simple bodies, systems of rigid bodies are investigated. Synthetic and analytic approaches and their realization in engineering methods are presented. In connection with principle methodical approaches the investigation of technical systems, especially of civil engineering structures is in the centre of the lecture. In addition, a major goal is the independent learning of the subjects taught, supported by classroom exercises and voluntary supervised group exercises.

Content

- Operations with forces – force systems -Method of sections
- Equilibrium of coplanar/spatial force systems
- Force systems, acting on bodies - resultants
- Force couple - moments
- Reduction of spatial force systems
- Equilibrium of rigid bodies
- Technical tasks – conventions for support and support conditions – statically determined support, equilibrium conditions
- Centroid of an assemblage and of continuous quantities, distributed loads/area loads
- Coplanar systems of rigid bodies – technical systems
- Internal forces and moments
- Ideal truss systems – buildup principle – Ritter's method of sections
- Section forces in beams – distribution of internal forces and moments – differential equation
- The principle of superposition
- Friction stick and slip (static and kinetic) – belt friction
- Work and energy - energy methods
- Kinematics of coplanar motion – the principle of virtual work
- Potential force, potential principles of work and energy
- Stable and unstable equilibrium, stability

Module: Strength of Materials [bauIBGP02-TM2]

Coordination: T. Seelig
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 2

ECTS Credits	Cycle	Duration
9	Every 2nd term, Summer Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170201	Strength of Materials (p. 67)	4/2/2	S	9	P. Betsch, T. Seelig

Learning Control / Examinations

graded:
 examination Strength of Materials, written exam, 100 min.
 Marking:
 module grade equal to examination grade

Conditions

none

Recommendations

It is recommended to attend the module Statics of Rigid Bodies previously.

Learning Outcomes

Analysis of stresses and strains in one-dimensional structural member. Deformations of statically determinate and indeterminate structures can finally be computed. The students should then be able to judge arbitrary stress and strain states in structures concerning yield and fracture. The students should also be able to use energy principles for the solution of standard problems as well as for simple beam buckling problems.

Content

- Tension / compression in bars – stresses/ strains/constitutive equations
- Differential equation for bar
- Statically indeterminate problems
- Deformations – statically determinate truss systems
- Analysis of statically determinate truss systems
- Combined stress state – stress vector/ stress tensor
- Principle stresses – Mohr's circle of stress – transformation of stresses and strains
- Differential equations – plane stress state
- Strain state, relation between stresses and strains – elastic materials
- Yield and fracture criteria
- Beam bending – kinematic assumption and limitations of the theory
- Moments of inertia – principle axes of inertia
- Basic equations of pure bending – symmetrical cross section
- Normal stresses as the result of bending
- Differential equations for beam bending, moment distribution -Single- and multi-field beam structures/superposition law
- Shear stresses – prismatic, thin-walled open cross-sections
- Bending combined with normal force/skew bending unsymmetrical cross sections – temperature loading
- Torsion bar with circular cross section – thin-walled closed cross sections
- Energy methods and deformation energy

- Principle of virtual forces – truss systems, beam bending
- Influence coefficients – Betti-Maxwell principle
- Application of energy methods to statically indeterminate systems
- Stability and buckling of beams

Module: Dynamics [bauIBGP03-TM3]

Coordination: T. Seelig
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 3

ECTS Credits	Cycle	Duration
6	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170301	Dynamics (p. 64)	2/2/2	W	6	T. Seelig, P. Betsch

Learning Control / Examinations

graded:
 examination Dynamics, written exam, 100 min.
 Marking:
 module grade equal to examination grade

Conditions

none

Recommendations

It is recommended to attend the following modules previously:
 Statics of Rigid Bodies, Strength of Materials

Learning Outcomes

The major goal of the course are several selected themes of the classical kinetics that are of particular interest in the field of civil engineering. The basics of vibration theory are taught and provide first insight and understanding of the most important oscillation phenomena in civil engineering structures.

Content

- Kinematics of a single mass point (cartesian, polar and natural coordinates)
- Kinetics of a single mass point: Newton's fundamental law, equations of equilibrium
- Work-energy equation
- Principle of linear momentum (impact law)
- Plane relative motion -Kinematics and kinetics of rigid bodies (moments of inertia, principle of angular momentum)
- Systems of rigid bodies: synthetic and analytic (Lagrangian equations and approaches, constraints, the degree of freedom, potential and non-potential forces)
- Introduction into linear vibration theory: mechanical models, free and forced vibrations of 1 DOF-systems, vibration of 2 DOF-systems

Module: Hydromechanics [bauIBGP04-HYDRO]

Coordination: M. Uhlmann
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 3

ECTS Credits	Cycle	Duration
6	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170304	Hydromechanics (p. 77)	2/2	W	6	N. N.

Learning Control / Examinations

graded:
 examination Hydromechanics, written exam, 100 min.
 Marking:
 module grade equal to examination grade

Conditions

none

Recommendations

It is recommended to attend the following modules previously:
 Analysis and Linear Algebra, Integration and Multivariate Analysis, Statics of Rigid Bodies

Learning Outcomes

Participants are capable of denoting and explaining fundamental concepts and relations in fluid mechanics. They are able to apply these to simple fluid mechanical problems and thus to describe and analyse quantitatively simple application examples.

Content

- physical properties of fluids
- hydrostatics: pressure profile in stagnant fluids, buoyancy
- kinematics: translation, rotation und deformation of fluids
- balance equations: kinematic transport theorem, continuity law, momentum, Navier-Stokes-, energy equation
- ideal fluids: irrotational flows, Bernoulli equation, pressure and energy lines
- viscous flows: laminar and turbulent flows, boundary layers, friction losses, velocity distributions
- flow around solid bodies: drag, pressure and strain distribution, boudary layer separation, friction coefficients
- pipe flows: strain distributions, friction losses, energy losses, flow control, cavitation
- open channel flows: classification, friction losses, local discharge characteristics
- spezific phenomenons: energy transformation, transient flows, measurement methods

Module: Analysis and Linear Algebra [bauIBGP05-HM1]

Coordination: M. Hochbruck, V. Grimm, M. Neher
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 1

ECTS Credits	Cycle	Duration
9	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0131900	Analysis and Linear Algebra (p. 49)	4/2/2	W	9	M. Neher, V. Grimm, M. Hochbruck

Learning Control / Examinations

graded:
 examination Analysis und Linear Algebra, written exam, 90 min.
 Marking:
 module grade equal to examination grade

Conditions

none

Recommendations

none

Learning Outcomes

Content

Module: Integration and Multivariate Analysis [bauIBGP06-HM2]

Coordination: M. Hochbruck, V. Grimm, M. Neher
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 2

ECTS Credits	Cycle	Duration
9	Every 2nd term, Summer Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0181300	Integration and Multivariate Analysis (p. 78)	4/2/2	S	9	V. Grimm, M. Neher, M. Hochbruck

Learning Control / Examinations

graded:
 examination Integration and Multivariate Analysis, written exam, 90 min.
 Marking:
 module grade equal to examination grade

Conditions

none

Recommendations

It is recommended to attend the module pAnalysis and Linear Algebra reviously.

Learning Outcomes

Content

Module: Applied Statistics [bauIBGP07-STATS]

Coordination: J. Ihringer
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 2

ECTS Credits	Cycle	Duration
3	Every 2nd term, Summer Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170204	Applied Statistics (p. 50)	1/1	S	3	J. Ihringer

Learning Control / Examinations

graded:
 examination Applied Statistics, written exam, 60 min.
 Marking:
 module grade equal to examination grade

Conditions

none

Recommendations

none

Learning Outcomes

The Students will get knowledge about the basics for application of statistical Methods in Civil Engineering. With this knowledge they will be able to select and apply statistical Methods for specific problems and will be able to perform and discuss the calculation and results.

Content

- objectives of statistical analysis and terminology
- statistical values and frequency distribution
- change from frequency distribution to likelihood
 random sample and basic population
 probability density function and probability density distribution function
 calculation with probabilities
- discrete random variable
 selected probability density functions
- continuous random variable
 selected probability density functions
 transformation of probability density distributions
- evaluative statistics
 parameter estimation, estimation error, confidence intervals and theory of testing
- regression analysis
 two-dimensional probability density distribution
 linear regression analysis and correlation analysis

Module: Differential Equations [bauIBGP08-HM3]

Coordination: M. Hochbruck, V. Grimm, M. Neher
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 3

ECTS Credits	Cycle	Duration
4	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0132200	Differential Equations (p. 63)	2/1	W	4	V. Grimm, M. Neher, M. Hochbruck

Learning Control / Examinations

graded:
 examination Differential Equations, written exam, 60 min.
 Marking:
 module grade equal to examination grade

Conditions

none

Recommendations

It is recommended to attend the following modules previously:
 knowledge of Analysis and Linear Algebra, Integration and Multivariate Analysis

Learning Outcomes

Content

Module: Building Materials [bauIBGP09-BSTOF]

Coordination: H. Müller
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 2+3

ECTS Credits	Cycle	Duration
12	Every 2nd term, Summer Term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170206	Theory of Building Materials (p. 60)	1/1	S	3	H. Müller
0170306	Building Materials (p. 79)	4/2	W	9	H. Müller

Learning Control / Examinations

graded:

examination part Theory of Building Materials, written exam, 60 min., part of orientation exam

examination part Building Materials, written exam, 120 min.

Marking:

weighting acc. CP

Conditions

none

Recommendations

none

Learning Outcomes

The students get familiarised with the fundamental terms of material science and the specific properties of numerous building materials. They obtain profound knowledge of the physical, chemical and mechanical relations, which result from the material structure and its time- and load-dependent modification. By using the learnt basic knowledge the students gain insight into methods of production, moulding, processing and protection of the durability of building materials. Furthermore, an understanding of the general procedures when selecting applicable materials is given to the students, considering environmental aspects and sustainability. Their understanding for certain building material phenomena is promoted by several examples from building practice.

Content

In this module the fundamental terms and the essential properties of building materials are introduced. Firstly the building materials are classified. Based on this classification, the principal physical and mechanical properties as well as the most important characteristic parameters are specified. Furthermore, the basic knowledge about the atomic structure and its influence on the physical and mechanical properties of the material is given.

For important materials, commonly used in building and construction (e. g. steel, concrete, ceramics, glasses, polymers, timber, bituminous materials), the fundamental terms and essential properties of the materials are supplemented and exemplified. Especially the production and the source materials as well as their influence on the rheological and mechanical properties are in the focus of interest. Damage types and processes in connection with the durability of building materials are another essential part of the module. In addition the legal regulations regarding testing, supervision and certification of building materials are briefly introduced.

Module: Structural Design [bauIBGP10-BKONS]

Coordination: H. Müller, H. Blaß
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 2+3

ECTS Credits	Cycle	Duration
9	Every 2nd term, Summer Term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170208	Building Physics (p. 57)	1/1	S	3	H. Müller
0170308	Structural design (p. 56)	2/2	W	6	H. Blaß

Learning Control / Examinations

graded:

examination part Building Physics, written exam, 60 min., part of orientation exam

examination part Structural Design, written exam, 90 min.

Marking:

weighting acc. CP

Conditions

none

Recommendations

none

Learning Outcomes

Attending the two lectures „Building Physics“ and „Structural Design“ the students gain a basic knowledge on the design of different structures considering the normative requirements regarding the preservation of structures.

By the lecture “Structural Design” the students get to know the basis of design, the safety concept and the process of structural design for buildings. They know the different structural components like roof structures, floor and wall structures as well as foundations. The students get the idea of the load transfer and the distribution of forces in structures. The students are able to determine loads on structures, to persecute the loads to the foundation based on the choice of load elements and to prove simple elements. They know the functionality of load elements and are able to design simple structures.

By the lecture “Building Physics” and the corresponding tutorials the students get a comprehensive understanding of physical problems concerning heat protection, moisture protection, noise control and fire protection. They get to know the normative requirements regarding the preservation of structures and the related methods of calculation. Based on various examples the students also learn about the realization of these requirements in the praxis of construction.

Content

Lecture Building Physics:

- Introduction: Climate, hygiene in housing, security, environment and energy.
- Heat insulation: stationary and non-stationary heat transport, thermal bridges, heat insulation of buildings, energy saving regulation, construction examples.
- Moisture protection: moisture storage and moisture transport, formation of condensate, normative calculation methods, construction examples, development of molds.
- Noise control: acoustic measurements, sound propagation, airborne and structure-borne sound insulation, noise control according to standard, construction examples.
- Fire protection: fire process, behaviour of building materials and construction units in case of fire, calculation of fire resistance, guidelines and regulations.

Lecture Structural Design:

- Basis of design and safety concept: Design concepts, safety standards for structures
- Load bearing systems: Elements, bracings
- Actions on structures: Permanent, live and exceptional loads
- Roof constructions: Steep roofs, flat roofs

- Floor constructions: Reinforced concrete, steel, timber
- Wall constructions: Dimensions, brickwork, timber, design
- Stairs: Standards for stairs, design of stairs
- Foundations: Pad foundations, base failure, tilting, sliding, stresses

Module: Planning Methodology [bauIBGP11-PLANM]

Coordination: P. Vortisch, W. Jung, M. Kagerbauer
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 1

ECTS Credits	Cycle	Duration
2	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170104	Planning Methodology (p. 83)	1/1	W	2	P. Vortisch, W. Jung, M. Kagerbauer

Learning Control / Examinations

attested:

attestation part A, written, 30 min.

attestation part B, written, 30 min.

Marking:

n. a., but both attestation parts have to be passed separately

Conditions

none

Recommendations

none

Learning Outcomes

Learning and understanding of general terms and relationships and general methods and techniques in the field of spatial and infrastructure planning. The module forms an first access into the field of planning (theory, methodologies) at the examples of transport and spatial planning.

Content

Basic concepts and relationships about the methodologies of planning will be mediated, e.g.:

- typologies of planning
- planning systems
- sequences of acting and its coordination
- dealing with scarce resources
- need for forecasts
- uncertainty in planning
- simple forecasting approaches
- evaluation methodologies
- sensitivity analyses (approaches and applications)

Module: Project Management [bauIBGP12-PMANG]

Coordination: S. Haghsheno
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 1

ECTS Credits	Cycle	Duration
2	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170106	Project Management (p. 85)	1/1	W	2	S. Haghsheno, H. Schneider

Learning Control / Examinations

attested:
 attestation Project Management, written, 45 min.
 Marking:
 n. a.

Conditions

none

Recommendations

none

Learning Outcomes

After this module the students have basic knowledge in the subject of project management, particular in the field of project management in civil construction.

Content

This module gives an introduction into the concepts project management. The general organisation of projects (particular in civil engineering) and the description of the different phases of projects were imparted as well as the three main parts of project management, namely time, cost and quality management.

Module: Geology in Civil Engineering [bauIBGP13-GEOL]

Coordination: J. Eckhardt
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 2

ECTS Credits	Cycle	Duration
2	Every 2nd term, Summer Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170210	Geology in Civil Engineering (p. 68)	1/1	S	2	J. Eckhardt, T. Mutschler

Learning Control / Examinations

attested:
 attestation Geology in Civil Engineering, written, 20 min.
 Marking:
 n. a.

Conditions

none

Recommendations

none

Learning Outcomes

Getting to know the common basis for a cooperation of civil engineers and geologists.
 Understanding the system earth, its structure and dynamics
 Recognizing the most important kinds of rock.
 Introduction into geological investigation methods.
 Knowledge of basics in hydrogeology.

Content

- Introduction
- Movement, shape, structure, exogenous and endogenous dynamics of the earth
- Crystals, minerals, rocks and formations
- Magmatic rocks
- Metamorphic rocks
- Sedimentary rocks
- Genesis, classification and addressing of soil and rock formation
- Geology and ground properties
- Basics of tectonics
- Representation of stratification planes and cleaving
- Geological investigation and methodology
- Basics of hydrogeology

4.2 Core Elective Modules Basic Studies

Module: Key Qualifications [bauIBFW0-SQUAL]

Coordination: Studiendekan Bauingenieurwesen
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject:

ECTS Credits	Cycle	Duration
6	Every term	

Learning Control / Examinations

according to elected courses, freely be chosen from the course offerings of HoC (see description on HoC pages)

Marking:

n. a.

(marks can be requested in agreement with lecturer, but do not contribute to overall grade)

Conditions

none

Recommendations

none

Learning Outcomes

Learning outcomes can be divided into three main complementary categories:

1. Contextual Knowledge

- Students are aware of the cultural context of their position and are in a position to consider the views and interests of others (beyond the boundaries of subject, culture, and language).
- They have enhanced their ability to participate properly and appropriately in academic or public discussions.

2. Practical Focus

- Students have gained an insight into the routines of professional life.
- They have further developed their capability to learn.
- They have improved their scope of action by extending their knowledge of foreign languages.
- They are able to relate their field of experience to basic aspects of business administration and law.

3. Basic Competences

- The students autonomously acquire new knowledge in a planned, specific, and methodologically founded manner and use it for solving tasks and problems.
- They can evaluate own work.
- They possess efficient work techniques, can set priorities, take decisions, and assume responsibility.

Content

With the key qualifications, the House of Competence offers a wide selection of courses, which are bundled thematically for better orientation. The contents are explained in detail in the descriptions of the courses on the internet pages (<http://www.hoc.kit.edu/studium>).

Module: Chemistry of Building Materials [bauIBGW1-BCHEM]

Coordination: J. Eckhardt
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core elective semester 1

ECTS Credits	Cycle	Duration
2	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170108	Chemistry of Building Materials (p. 53)	1/1	W	2	J. Eckhardt

Learning Control / Examinations

attested:
 attestation Chemistry of Building Materials, written, 30 min.
 Marking:
 n. a.

Conditions

none

Recommendations

none

Learning Outcomes

The student will be impart topics of general and inorganic chemistry, which are partly handled in the upper school. Particular attention is paid to chemical problems in the building material, which are having more specialized and to some overriding importance for further study in higher semesters.

Content

- Atomic structure and the periodic table of elements
- chemical bonding
- boundary conditions of substances
- Stoichiometry and examples from the construction: chemical reactions, chemical equilibrium (law of mass action)
- electrolytes and non electrolytes
- building material
- redox reaction
- solutions, colloids, dispersions, emulsions
- silicate chemistry, silicates in construction

Module: Environmental Chemistry [bauIBGW2-UCHEM]

Coordination: J. Winter
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core elective semester 1

ECTS Credits	Cycle	Duration
2	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170110	Environmental Chemistry (p. 90)	1/1	W	2	J. Winter

Learning Control / Examinations

attested:
 attestation Environmental Chemistry, written, 30 min.
 Marking:
 n. a.

Conditions

none

Recommendations

none

Learning Outcomes

Basic chemistry for civil engineers

Content

- Introduction into physical and organic chemistry
- Elements, chemical substances, Types of bondages, Solubility
- reaction equilibria, buffer systems, pH, redox reactions
- Corrosion, Chemistry of construction material,
- Environmental chemistry in civil engineering

Module: Environmental Physics/ Energy [bauIBGW3-UPHYS]

Coordination: F. Nestmann
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core elective semester 1

ECTS Credits	Cycle	Duration
2	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170112	Environmental Physics/ Energy (p. 91)	1/1	W	2	F. Nestmann

Learning Control / Examinations

ungraded:
 certificated practice sheets
 Marking:
 n. a.

Conditions

none

Recommendations

none

Learning Outcomes

The students are capable of environmental phenomena. They can describe the use of forces from the natural environment in the sense of energy recovery.

Content

- Definition of energy
- natural resources
- regenerative and non-regenerative kinds of energy
- energy balance
- production of electric energy: water power, wind energy, solar energy, geothermal power plants, conventional power plants
- environmental transport-cycles
- presentation of ongoing research projects at KIT

Module: Informatics in Civil Engineering [bauIBGW4-IVBAU]

Coordination: M. Uhlmann
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core elective semester 1+2

ECTS Credits	Cycle	Duration
4	Every 2nd term, Winter Term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170114	Introduction to computer programming I (p. 54)	1/1	W	2	M. Uhlmann
0170212	Introduction to computer programming II (p. 55)	1/1	S	2	M. Uhlmann

Learning Control / Examinations

attested:
 written attestation
 mandatory programming exercises
 Marking:
 n. a.

Conditions

none

Recommendations

none

Learning Outcomes

Participants receive a fundamental understanding of digital data processing. They are capable of tackling problems of data processing independently, which involves the capacity to learn to use new software tools on their own. Participants will acquire basic programming skills.

Content

1. Fundamentals of digital data processing: Information and coding, data structures, algorithms, computer architectures
2. Introduction to programming: Basic elements of high-level programming languages, structured and object-oriented programming, practical examples
3. Software applications: Operating systems, selected software applications of interest for engineers

Remarks

This course is not designed as a precursor for specific subsequent courses. However, it should be stressed that knowledge of digital data processing is extremely vital for engineers, perhaps comparable to the required background in mathematics.

Module: Technical Illustrations [bauIBGW5-TECDS]

Coordination: R. Roos
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core elective semester 1

ECTS Credits	Cycle	Duration
2	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170116	Technical Illustrations (p. 89)	1/1	W	2	R. Roos

Learning Control / Examinations

attested:
 3 term papers, 1 group exercise with presentation (10 minutes)
 Marking:
 n. a.

Conditions

none

Recommendations

none

Learning Outcomes

Main goal is the gain of basic knowledge in the representation of technical objects and presentation methods

Content

Illustration of the following representation techniques and presentation methods:

- basic principles
- representation techniques
- representation methods (freehand and technical art work)
- presentation methods

Module: Laboratory Course [bauIBGW6-LABOR]

Coordination: J. Winter
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core elective semester 1

ECTS Credits	Cycle	Duration
2	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170118	Laboratory course (p. 80)	0/2	W	2	Mitarbeiter der beteiligten Institute

Learning Control / Examinations

attested:
 participation at 4 chosen experiments in 4 institutes
 Marking:
 n. a.

Conditions

None.

Learning Outcomes

The main goal is to gain basic knowledge in laboratories of different fields
 Experience of practical work of specific institutes

Content

Carrying out practical laboratory training in different fields.

4.3 Core Modules Basic Subjects

Module: Structural Analysis [bauIBFP1-BSTAT]

Coordination: W. Wagner
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 4+5

ECTS Credits	Cycle	Duration
10	Every 2nd term, Summer Term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170401	Structural Analysis I (p. 58)	2/2/1	S	5	W. Wagner
0170501	Structural Analysis II (p. 59)	2/2/1	W	5	W. Wagner

Learning Control / Examinations

graded:
 examination part Structural Analysis I, written, 120 min.
 examination part Structural Analysis II, written, 120 min.
 Marking:
 weighting acc. CP

Conditions

keine

Recommendations

It is recommended to attend the following modules previously:
 Statics of Rigid Bodies, Strength of Materials

Learning Outcomes

Students will learn the essential principles for modeling and calculation of 2D- and 3D-beam structures. This allows the calculation of displacement and stress resultant fields for the design and construction of associated structures.

Content

Calculation of stat. determined and un-determined 2D- and 3D-Beam Structures:

- Idealisation
- load bearing behaviour
- stress resultants
- discrete displacements
- controls
- symmetry
- application of numerical programs
- influence lines, KV, VV
- FEM for 2d truss structures
- prestress

Outlook: Surface structures, FE-modeling, nonlinearities

Module: Basics of Reinforced Concrete [bauIBFP2-KSTR.A]

Coordination: L. Stempniewski
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 5+6

ECTS Credits	Cycle	Duration
6	Every 2nd term, Winter Term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170601	Basics of Reinforced Concrete I (p. 73)	2/1	W	4	L. Stempniewski
0170615	Basics of Reinforced Concrete II (p. 74)	1/1	S	2	L. Stempniewski

Learning Control / Examinations

graded:

examination Basics of Reinforced Concrete I, written, 90 min.

examination Basics of Reinforced Concrete II, written, 60 min.

Marking:

according to contact hours per week

Conditions

Qualifying examinations in the subjects Mechanics, Mathematics, Structural Design, except maximum two modules

Recommendations

It is recommended to attend the following modules previously:

Building Materials, Statics of Structures I+II

Learning Outcomes

Understanding of the Materials and learning how to design simple components + Getting familiar with the safety concept in structural engineering

Content

Characteristics of Reinforced Concrete, Design of Sections and Components, Safety Concept, Design for bending and Transverse forces

Module: Basics in Steel and Timber Structures [bauIBFP3-KSTR.B]

Coordination: H. Blaß, T. Ummenhofer
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 5

ECTS Credits	Cycle	Duration
9	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170504	Basics in steel structures (p. 72)	2/2	W	4,5	T. Ummenhofer
0170507	Timber structures (p. 71)	2/1	W	4,5	H. Blaß

Learning Control / Examinations

graded:
 examination Structural Engineering B, written, 120 min.
 Marking:
 module grade equal to examination grade

Conditions

Qualifying examinations in the core subjects Mechanics, Mathematics, Structural design, except maximum two modules

Recommendations

none

Learning Outcomes

Steel structures:

The Students have knowledge in design, construction and assembly of predominantly static loaded steel constructions made of bar-shaped support links. The students are able to construct and design common steel structures.

Timber structures:

The students get to know timber as construction material and the basic characteristics of timber. They get familiar with grading of timber into strength classes. The students are able to design common timber structures according to DIN 1052 and Eurocode 5. They know the backgrounds of design rules for timber elements and joints. The students get to know different fasteners used in timber structures and the appropriate design theory. They are able to design elements prone to buckling, tapered, curved and pitched cambered beams as wells as bracings.

Content

Steel structures:

- tension bars
- bending stressed bars without compressive forces
- bolted and welded connections
- shear due to shear force - shear center
- flexural buckling
- lateral torsional buckling
- constructional aspects: load transfer, structural types (hall construction, construction with multiple floors), support links (beams, columns, column bases, frame corners)

Timber structures:

- Basics: Timber in construction, wood as building material, solid timber and glued laminated timber – strength classes, limit state design and safety format, volume and stress distribution effects on the strength
- Design of elements: Tension and compression, bending, shear and torsion, columns and buckling lengths, tapered, curved and pitched cambered beams, bracing
- Joints: Mechanical timber joints – general, joints with dowel-type fasteners – theory, nailed joints, bolted and dowelled joints, joints with screws, ring and shear-plate connector joints, toothed-plate connector joints

Module: Water and Environment [bauIBFP4-WASSER]

Coordination: F. Seidel, E. Zehe, S. Fuchs, J. Winter
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 5+6

ECTS Credits	Cycle	Duration
12	Every 2nd term, Winter Term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170509	Hydrological engineering and water management I (p. 95)	2/1	W	4,5	F. Nestmann
0170511	Hydrology (p. 76)	1/1	W	3	E. Zehe
0170603	Siedlungswasserwirtschaft (p. 87)	1/1	S	3	S. Fuchs
0170605	(p. 92)	1/1	S	1,5	J. Winter

Learning Control / Examinations

graded:
 examination Water and Environment, written, 150 min.
 Marking:
 module grade equal to examinatio grade

Conditions

Qualifying examinations in the subjects Mechanics, Mathematics, Structural design, except maximum two modules

Recommendations

It is recommended to attend the module Environmental Physics / Energy previously.

Learning Outcomes

The students will get a basic knowledge about the essential meteorological, hydro-meteorological processes of the water cycle on the land surface. They will get knowledge about the hydrological processes and their simplified reproduction in hydrological models so that the students will be capable to calculate rainfall-runoff relations. They will learn to dimension and calculate measures for water management and hydraulic engineering and to quantify the possible failure of such measures. In addition, the knowledge of how the human impact influences hydrological processes will be discussed. They have extensive knowledge about the basic requirements of water management tasks. They know the operation conditions, the functions and the technical design of water management systems.

Content

Hydraulic Engineering and Water Ressources Management I:

- basics and applications of open channel hydraulics
- Aims of water management in europe and germany
- classification of tasks in the field of water management
- float protection: concepts, measures and models
- Constructions for discharge controlling: function and hydraulic dimensioning
- river engineering: navigation and restauration

Hydrology:

- introduction to the cycles of energy, water and air
- hydrological processes in a catchment and water balances
- measurement, evaluation and statistical interpretation of hydrological data
- introduction to runoff generation and concentration, including relevant model concepts
- methods for regionalising hydrological parameters and model parameters
- evaluation of flooding with the help of rainfall-runoff models
- planning, dimensioning and operation of flood preventien measures
- dimensioning the working capacity for dams

- security concepts for dams and embankments after DIN 19700
- impact of changing border conditions (e.g. landuse-change, climate change) on the runoff of catchments

Urban water resources:

- methods to evaluate the water quality
- water supply
- water treatment
- dewatering of urban areas
- waste water treatment
- prevention of water pollution: methods and models

Environmental Technologies

- for off-gas treatment: Filtration, Biofiltration, Air washers
- for soil: insitu soil sanitation 'l-chemical oxidation, biological treatment exsitu soil sanitation: pump and treat, excavation and thermal treatment
- for groundwater: funnel and gate, natural sanitation, enhanced natural sanitation
- for water/waste water: mechanical treatment chemical treatment: oxidation, precipitation biological treatment: aerobic/anaerobic C-mN-,P-Elimination
- for solid wastes: sorting and material recycling, energetic recycling Biological treatment: Composting, Digestion Mechanical/biological treatment Thermic treatment: pyrolysis, incineration/combustion Residue treatment and utilization

Module: Mobility and Infrastructure [bauIBFP5-MOBIN]

Coordination: R. Roos
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 4

ECTS Credits	Cycle	Duration
12	Every 2nd term, Summer Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170404	Regional Planning and Planning Law (p. 86)	2/1	S	4	W. Jung
0170405	Transportation (p. 93)	2/1	S	4	P. Vortisch
0170407	Design Basics in Highway Engineering (p. 61)	2/1	S	4	R. Roos

Learning Control / Examinations

graded:

examination Mobility and Infrastructure, written, 150 min.

prerequisite for examination: attestation of three term papers (one per lecture)

Marking:

module grade equal to examination grade

Conditions

none

Recommendations

none

Learning Outcomes

Learning the fundamental terminology and methodology of spatial and transportation planning, traffic engineering as well as highway engineering

Content

Regional Planning and Planning Law: basic tasks and contents of different planning levels, for example

- Land use and conflicts
- provision of services and infrastructure as well as their costs, planning on local, regional, national and European level

Transportation:

- Fundamentals of transportation planning (convention for analyses, surveys of travel behaviour)
- fundamentals of traffic engineering

Design Basics in Highway Engineering:

- Road network layout
- driving dynamics
- principles of highway design
- earthworks
- pavements and their dimensioning.

Module: Technology and Management in Construction Operation [bauIBFP6-TMB]

Coordination: S. Haghsheno
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 4

ECTS Credits	Cycle	Duration
11	Every 2nd term, Summer Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170409	Construction Technology (p. 51)	3/1	S	5,5	S. Haghsheno, S. Gentes
0170411	Economics in Construction Operation (p. 52)	2/1	S	4	K. Lennerts
0170513	Facility- and Real Estate Management (p. 66)	1/0	S	1,5	K. Lennerts

Learning Control / Examinations

graded:
 examination Technology and Management in Construction Operation, written, 150 min.
 Marking:
 module grade equal to examination grade

Conditions

none

Recommendations

none

Learning Outcomes

The students have basic knowledge about all essential sectors of construction management. They know the most important construction methods and are able to make simple calculations in construction operation. Beside construction technology they have basic knowledge in engineering economics like accounting cost and results or cost-benefit analysis. Furthermore they have basic knowledge in facility and real estate management.

Content

This module contains an basic introduction into all sectors of construction operation and management. This includes site management techniques as well as construction methods and construction equipment planning.

A further main part of the module is an introduction in the methods of engineering economics or business management, such as cost and results accounting or cost-benefit analysis.

Other subjects are the organization of construction companies, forms of contracts, taxes, etc.

At least the module includes an introduction in the subject of facility management.

Module: Geotechnical Engineering [bauIBFP7-GEOING]

Coordination: T. Triantafyllidis
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 4+5

ECTS Credits	Cycle	Duration
9	Every 2nd term, Summer Term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170412	Soil Mechanics I (p. 62)	2/2	S	4,5	T. Triantafyllidis
0170514	Foundation Engineering I (p. 70)	2/1	W	4,5	T. Triantafyllidis

Learning Control / Examinations

graded:
 examination Geotechnical Engineering, written, 150 min.
 Marking:
 module grade equal to examination grade

Conditions

Qualifying examinations in Mechanics, Mathematics, Structural Design, except maximum two modules

Recommendations

It is recommended to have passed the qualifying examinations in the module Geology in Civil Engineering previously

Learning Outcomes

Understanding and Description of the mechanical behaviour of the building material "soil", based on fundamental physics, in particular mechanics and hydraulics.

Self-dependent proofs of ultimate limit state and serviceability limit state of natural slopes and geotechnical constructions.

Knowledge and understanding of the most important geotechnical construction methods, based on soil mechanics and physics: see content.

Self-dependent selection, design and dimensioning of usual geotechnical construction methods for standard applications, such as building foundations, retaining structures and walls.

Content

- Standards and codes, definitions, soil classification
- soil properties and soil parameters, subsoil investigation
- permeability and seepage
- compression behaviour, stress distributions
- settlement calculation, consolidation
- shear resistance of soils
- earth pressure and earth resistance
- stability of slopes (slope failure) and foundations (base failure)
- safety concepts in foundation engineering
- dewatering
- spread foundations
- retaining structures
- retaining walls for excavations
- pile foundations, deep foundations and caisson foundations in open water
- soil improvement
- tunneling

4.4 Module Bachelor Thesis

Module: Bachelor Thesis [bauIBSC-THESIS]

Coordination: Studiendekan Bauingenieurwesen
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core semester 6

ECTS Credits	Cycle	Duration
11	Every term	1

Learning Control / Examinations

thesis with a duration of 8 weeks and final presentation

Marking:

The mark results from the grading of the Bachelor Thesis and the concluding presentation.

Conditions

attestation of acknowledged practical work acc. § 12 of SPO

Passed examinations in all modules acc. § 17 no. 2 of SPO ('Grundstudium', sem. 1-3)

Recommendations

none

Learning Outcomes

The student learns, how to investigate a complex problem within a particular field of his choice in limited time, following scientific methods. He searches autonomously for literature, finds own approaches, evaluates his results and compares them with the state of the art. He clearly represents the essential matter and results in his bachelor thesis.

Content

The Bachelor Thesis is a first major written report and comprises the theoretical or experimental treatise of a complex problem within a particular field of civil engineering with scientific methods. The student chooses a particular field and can make proposals for the theme.

4.5 Core Elective Modules Basic Subjects

Module: Partial Differential Equations [bauIBFW1-PDGL]

Coordination: M. Hochbruck, V. Grimm, M. Neher
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core elective semester 4

ECTS Credits	Cycle	Duration
2	Every 2nd term, Summer Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0181600	Partial Differential Equations (p. 82)	1/1	S	2	V. Grimm, M. Neher, M. Hochbruck

Learning Control / Examinations

attested:
 attestation Partial Differential Equations, written, 60 min.
 Marking:
 n. a.

Conditions

none

Recommendations

It is recommended to attend the module Differential Equations previously.

Learning Outcomes

Content

Module: Introduction to Continuum Mechanics [bauiBFW2-EKM]

Coordination: T. Seelig
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core elective semester 6

ECTS Credits	Cycle	Duration
2	Every 2nd term, Summer Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170607	Introduction to Continuum Mechanics (p. 65)	1/1	S	2	T. Seelig, P. Betsch

Learning Control / Examinations

attested:

attestation Introduction to Continuum Mechanics, written (under examination-like conditions), 60 min.

Marking:

n. a.

Conditions

none

Recommendations

It is recommended to have passed the following subjects and modules previously:
 Mechanics, Mathematics, Partial Differential Equations

Learning Outcomes

Fundamentals for the analysis of multiaxial loading states and deformation in elastic solids are presented.

This includes the formulation of engineering problems in terms of boundary value problems as well as the interpretation of solutions, e.g. with respect to stress concentrations.

Besides analytical solution techniques in 2D (plane) problems, special emphasis is put on variational (energy) methods which form the basis of numerical methods such as the finite element method.

Content

- vectors, tensors, index notation
- stress and equilibrium
- displacement and strain
- linear elastic material law
- boundary value problems of elasticity theory
- plane problems
- Airy's stress function
- local stress concentrations
- work and energy principles of elasticity theory
- approximate solution methods

Module: Physical Modelling in River Engineering [bauIBFW3-WASSVW]

Coordination: F. Seidel
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core elective semester 6

ECTS Credits	Cycle	Duration
2	Every 2nd term, Summer Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170609	Physical Modelling in River Engineering (p. 96)	1/1	S	2	F. Seidel, C. Lang

Learning Control / Examinations

attested:
 certificated experiment report
 Marking:
 n. a.

Conditions

none

Recommendations

It is recommended to attend the following modules and lectures previously:
 Water and Environment, Hydraulic Engineering and Ressources Management I, Hydromechanics

Learning Outcomes

The students have the competence, the apply the possibilities and limitations of hydraulic tests on situational water problems. They can design, construct an operation a hydraulic model and they can evaluate the develloped results/solutions.

Content

The course gives an detailed overview about the application of hydraulic models for the optimization of hhydrodynamic processes.
 Content:

- Definition of a hydraulic model
- affinity between hydraulic model an nature
- provisions of working with hydraulic models
- planning and construction of a hydraulic model
- hydrometric methods
- Exercize in the laboratory
- Exemples from the practice
- excursion to the waterlabs in Karlsruhe

Module: Geotechnical Design [bauIBFW4-GEOPL]

Coordination: T. Triantafyllidis
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core elective semester 6

ECTS Credits	Cycle	Duration
2	Every 2nd term, Summer Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170611	Geotechnical Design (p. 69)	1/1	S	2	T. Triantafyllidis

Learning Control / Examinations

attested:
term paper with passed colloquium
Marking:
n. a.

Conditions

none

Recommendations

It is recommended to attend the module Geotechnical Engineering previously.

Learning Outcomes

Gaining of confidence and detailed knowledge in the selection and design of geotechnical constructions for standard applications.

Knowledge and trained application of the relevant standards and recommendations.

Extended training in geotechnical proofs and calculations, eventually by application of Geotechnical Software Tools.

Ability to consider aspects of site management and budgeting during the comparison of alternative solutions for geotechnical standard applications.

Content

Specialized exercises based on project studies:

- soil investigation, classification and material properties,
- consolidation under ballast loads,
- settlement analysis of structures,
- shear strength,
- slope stability analysis,
- anchored sheetpile retaining wall,
- dewatering of construction pits,
- spread foundations under multiaxial load,
- design of pile foundations

Module: Surveying [bauIBFW5-VERMK]

Coordination: N. Rösch
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core elective semester 6

ECTS Credits	Cycle	Duration
2	Every 2nd term, Summer Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
20714	Surveying (p. 94)	1/1	S	2	N. Rösch

Learning Control / Examinations

attested:
 attested surveying exercise
 Marking:
 n. a.

Conditions

none

Recommendations

none

Learning Outcomes

It is the main objective of this course to make the students familiar with surveying. Thus the application of typical surveying instruments is presented. Further the basic methods and procedures are explained.

Content

The following items are covered:

- The surveying authorities in Germany
- Reference frames (local and international)
- Coordinate systems (e.g. UTM, Gauß-Krüger)
- Height determination
- 2D point determination
- Basic surveying computations (e. g. polar method, intersection, resection)
- Computation of areas based on different readings
- Computation of volumes

Module: Project “Plan, Design, Engineering” [bauiBFW6-PPEK]

Coordination: R. Roos
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core elective semester 6

ECTS Credits	Cycle	Duration
2	Every 2nd term, Summer Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170516	Project “Plan, Design, Engineering” (p. 84)	0/2	S	2	R. Roos, P. Vortisch, B. Brester, E. Hohnacker

Learning Control / Examinations

attested:
 group exercise with intermediate and final presentation
 Marking:
 n. a.

Conditions

none

Recommendations

It is recommended to attend the module Planning Methodology previously

Learning Outcomes

Main goal is the gain of competences in planning tasks by balancing multidisciplinary objectives and competing tasks. A secondary goal is the learning of basic competences in the different fields and the understanding of relationships between them.

Content

A typical practical task in the field of spatial and infrastructure planning has to be elaborated. The students have to take charge of certain planning tasks and to gain the relevant competences. Mentors will deliver the relevant background information in terms of functional or engineering skills. During this gaming simulation solutions will be elaborated in different scales of detailing.

Module: Life Cycle Management [bauIBFW7-LZMAN]

Coordination: K. Lennerts, H. Müller
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core elective semester 6

ECTS Credits	Cycle	Duration
2	Every 2nd term, Summer Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170613	Life Cycle Management (p. 81)	1/1	S	2	K. Lennerts, H. Müller, E. Kotan, M. Vogel

Learning Control / Examinations

ungraded:
 attestation Life Cycle Management, written, 60 min.
 Marking:
 n. a.

Conditions

none

Recommendations

It is recommended to attend the following modules previously:
 Building Materials, Applied Statistics, Economics in Construction Operation, Facility- and Real Estate Management

Learning Outcomes

After this module the students have basic knowledge about the subject of life cycle management (LCM). They know the characteristics of the life cycle of buildings as well as their influence on the environment. The students are able to explain the life cycle phases of buildings and their specific characteristics. They are able to describe the influencing parameters with impact on the life time of construction elements. They know suitable calculation methods as well as the required input parameters and are able to conduct simple calculations of life cycle costs. The students have knowledge about the methods of durability design of concrete structures as well as about the maintenance (service, inspection, repair and improvement) of constructions.

Content

This module contains an introduction into the concepts of life cycle management. Particularly the different methods of calculation and optimisation of life cycle costs are presented. A further main part of the module is an introduction in the methods of registration and modelling of damages in order to assess the degree of damage and to perform a service life prediction of concrete structures in a proper manner. The assessment of the durability of concrete structures is managed with the help of reliability considerations. Therefore, it is necessary to get a basic overview in the reliability theory. Through this it is possible to arrange a service life design of structures, which are under environmental stress (frost attack, salt, carbon dioxide). Anymore, this course also contains an introduction into the methods of maintenance planning and maintenance realisation for concrete structures, which are damaged by different environmental attacks.

Module: Basics of Track Guided Transport Systems [bauIBFW8-GSTS]

Coordination: E. Hohnacker
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core elective semester 5

ECTS Credits	Cycle	Duration
2	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170517	Basics of Track Guided Transport Systems (p. 75)	2	W	2	E. Hohnacker

Learning Control / Examinations

attested:
 attestation Basics of Track Guided Transport Systems, written, 60 min.
 Marking:
 n. a.

Conditions

none

Recommendations

none

Learning Outcomes

to know the basics of track guided systems

Content

definitions and classifications; basics of rail vehicles, track guided operation and railway alignment

Module: Water Resources Management and Engineering Hydrology [bauIBFW9-WASSRM]

Coordination: J. Ihringer
Degree programme: Bauingenieurwesen SPO 2011 (B.Sc.)
Subject: core elective semester 6

ECTS Credits	Cycle	Duration
2	Every 2nd term, Summer Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
0170617	(p. 97)	1/1	S	2	J. Ihringer

Learning Control / Examinations

attested:
 attestation Water Resources Management and Engineering Hydrology, written
 Marking:
 n. a.

Conditions

compulsory:
 lecture Hydrology

Recommendations

Environmental Physics/Energy/Soil Science

Learning Outcomes

Content

5 Courses

all Courses, in alphabetic order

Course: Analysis and Linear Algebra [0131900]

Coordinators: M. Neher, V. Grimm, M. Hochbruck

Part of the modules: Analysis and Linear Algebra (p. [14](#))[bauiBGP05-HM1]

ECTS Credits	Hours per week	Term	Instruction language
9	4/2/2	Winter term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Literature

T. Arens et al.: Mathematik. Spektrum-Verlag, 2008.

T. Westermann: Mathematik für Ingenieure. Springer, 5. Aufl. 2008.

Course: Applied Statistics [0170204]**Coordinators:** J. Ihringer**Part of the modules:** Applied Statistics (p. [16](#))[bauIBGP07-STATS]

ECTS Credits	Hours per week	Term	Instruction language
3	1/1	Summer term	de

Learning Control / Examinations**Conditions**

None.

Learning Outcomes**Content****Literature**

Kreyszig, E.: Statistische Methoden und ihre Anwendung; Verlag Vandenhoeck und Ruprecht

Plate, E. (1993): Statistik und angewandte Wahrscheinlichkeitslehre für Bauingenieure, Verlag Ernst und Sohn, Berlin

Sachs, L. (1969): Statistische Auswertemethoden; Springer-Verlag

Course: Construction Technology [0170409]

Coordinators: S. Haghsheno, S. Gentes

Part of the modules: Technology and Management in Construction Operation (p. [37](#))[bauIBFP6-TMB]

ECTS Credits	Hours per week	Term	Instruction language
5,5	3/1	Summer term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Course: Economics in Construction Operation [0170411]

Coordinators: K. Lennerts

Part of the modules: Technology and Management in Construction Operation (p. [37](#))[bauIBFP6-TMB]

ECTS Credits	Hours per week	Term	Instruction language
4	2/1	Summer term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Literature

Vorlesungsskripte / weitere Literatur wird in der Lehrveranstaltung vorgestellt.

Course: Chemistry of Building Materials [0170108]**Coordinators:** J. Eckhardt**Part of the modules:** Chemistry of Building Materials (p. [25](#))[bauibGW1-BCHEM]

ECTS Credits	Hours per week	Term	Instruction language
2	1/1	Winter term	de

Learning Control / Examinations**Conditions**

None.

Learning Outcomes**Content****Literature**

Erwin Riedel: Allgemeine und Anorganische Chemie, Gruyter Verlag

Course: Introduction to computer programming I [0170114]

Coordinators: M. Uhlmann

Part of the modules: Informatics in Civil Engineering (p. [28](#))[bauiBGW4-IVBAU]

ECTS Credits	Hours per week	Term	Instruction language
2	1/1	Winter term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Course: Introduction to computer programming II [0170212]

Coordinators: M. Uhlmann

Part of the modules: Informatics in Civil Engineering (p. [28](#))[bauiBGW4-IVBAU]

ECTS Credits	Hours per week	Term	Instruction language
2	1/1	Summer term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Course: Structural design [0170308]**Coordinators:** H. Blaß**Part of the modules:** Structural Design (p. [19](#))[bauIBGP10-BKONS]

ECTS Credits	Hours per week	Term	Instruction language
6	2/2	Winter term	de

Learning Control / Examinations**Conditions**

None.

Learning Outcomes**Content****Literature**

Skript "Baukonstruktionslehre"

Lehrbuch der Hochbaukonstruktionen (Hrsg.: Cziesielski, Erich)

Baukonstruktion im Planungsprozess (Hrsg.: Franke, Lutz)

Porenbetonhandbuch

Informationsdienst Holz, Holzbau Handbuch, Reihe 2, Teil 3 - Dachbauteile, Folge 1 - Berechnungsgrundlagen

Informationsdienst Holz, Holzbau Handbuch, Reihe 2, Teil 3 - Dachbauteile, Folge 2 - Hausdächer

Course: Building Physics [0170208]**Coordinators:** H. Müller**Part of the modules:** Structural Design (p. [19](#))[bauIBGP10-BKONS]

ECTS Credits	Hours per week	Term	Instruction language
3	1/1	Summer term	de

Learning Control / Examinations**Conditions**

None.

Learning Outcomes**Content****Literature**

Skript "Bauphysik"

Lutz, Jenisch, Klopfer et. al: Lehrbuch der Bauphysik. Schall, Wärme, Feuchte, Licht, Brand, Klima. Teubner Verlag

Hohmann, Setzer, Wehling: Bauphysikalische Formeln und Tabellen. Wärmeschutz, Feuchteschutz, Schallschutz. Werner Verlag

Gösele, Schüle, Künzel: Schall, Wärme, Feuchte. Grundlagen, neue Erkenntnisse und Ausführungshinweise für den Hochbau. Bauverlag

Course: Structural Analysis I [0170401]**Coordinators:** W. Wagner**Part of the modules:** Structural Analysis (p. [31](#))[bauiBFP1-BSTAT]

ECTS Credits	Hours per week	Term	Instruction language
5	2/2/1	Summer term	de

Learning Control / Examinations**Conditions**

None.

Learning Outcomes**Content****Literature**

- Vorlesungsmanuskript Baustatik I
- Krätzig, W.B., Harte, R., Meskouris, K., Wittek, U. (1999): Tragwerke 1 - Theorie und Berechnungsmethoden statisch bestimmter Stabtragwerke, Springer.
- Krätzig, W.B., Harte, R., Meskouris, K., Wittek, U. (2005): Tragwerke 2 - Theorie und Berechnungsmethoden statisch unbestimmter Stabtragwerke, Springer.
- Wunderlich, W., Kiener, G. (2004): Statik der Stabtragwerke, Teubner.

Course: Structural Analysis II [0170501]**Coordinators:** W. Wagner**Part of the modules:** Structural Analysis (p. [31](#))[bauIBFP1-BSTAT]

ECTS Credits	Hours per week	Term	Instruction language
5	2/2/1	Winter term	de

Learning Control / Examinations**Conditions**

None.

Learning Outcomes**Content****Literature**

- Vorlesungsmanuskript Baustatik II
- Krätzig, W.B., Harte, R., Meskouris, K., Wittek, U. (1999): Tragwerke 1 - Theorie und Berechnungsmethoden statisch bestimmter Stabtragwerke, Springer.
- Krätzig, W.B., Harte, R., Meskouris, K., Wittek, U. (2005): Tragwerke 2 - Theorie und Berechnungsmethoden statisch unbestimmter Stabtragwerke, Springer.
- Wunderlich, W., Kiener, G. (2004): Statik der Stabtragwerke, Teubner.

Course: Theory of Building Materials [0170206]

Coordinators: H. Müller

Part of the modules: Building Materials (p. 18)[bauIBGP09-BSTOF]

ECTS Credits	Hours per week	Term	Instruction language
3	1/1	Summer term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Literature

script "Baustoffkunde und Konstruktionsbaustoffe";
further references are given in the script

Course: Design Basics in Highway Engineering [0170407]

Coordinators: R. Roos

Part of the modules: Mobility and Infrastructure (p. [36](#))[bauIBFP5-MOBIN]

ECTS Credits	Hours per week	Term	Instruction language
4	2/1	Summer term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Course: Soil Mechanics I [0170412]

Coordinators: T. Triantafyllidis

Part of the modules: Geotechnical Engineering (p. 38)[bauIBFP7-GEOING]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/2	Summer term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Course: Differential Equations [0132200]

Coordinators: V. Grimm, M. Neher, M. Hochbruck
Part of the modules: Differential Equations (p. [17](#))[bauiBGP08-HM3]

ECTS Credits	Hours per week	Term	Instruction language
4	2/1	Winter term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes**Content****Literature**

T. Arens et al.: Mathematik. Spektrum-Verlag, 2008.
T. Westermann: Mathematik für Ingenieure. Springer, 5. Aufl. 2008.

Course: Dynamics [0170301]

Coordinators: T. Seelig, P. Betsch

Part of the modules: Dynamics (p. [12](#))[bauiBGP03-TM3]

ECTS Credits	Hours per week	Term	Instruction language
6	2/2/2	Winter term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Literature

[1] Vielsack - Skriptum "Dynamik"

[2] Gross / Hauger / Schröder Wall - Technische Mechanik 3

Course: Introduction to Continuum Mechanics [0170607]**Coordinators:** T. Seelig, P. Betsch**Part of the modules:** Introduction to Continuum Mechanics (p. [41](#))[bauIBFW2-EKM]

ECTS Credits	Hours per week	Term	Instruction language
2	1/1	Summer term	de

Learning Control / Examinations**Conditions**

None.

Learning Outcomes**Content****Literature**

- Doghri, I. (2000): Mechanics of Deformable Solids. Springer,
- Fung, Y.C. (1965): Foundations of Solid Mechanics. Prentice Hall,
- Gross, D., Hauger, W., Wriggers, P. (2007): Technische Mechanik IV, Springer,
- Gould, P.L. (1983): Introduction to Linear Elasticity. Springer,
- Szabo, I. (2001): Höhere Technische Mechanik. Springer,
- Vielsack, P.: Einführung in die Kontinuumsmechanik, Skript zur Vorlesung (nur noch teilweise)

Course: Facility- and Real Estate Management [0170513]

Coordinators: K. Lennerts

Part of the modules: Technology and Management in Construction Operation (p. [37](#))[bauIBFP6-TMB]

ECTS Credits	Hours per week	Term	Instruction language
1,5	1/0	Summer term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Course: Strength of Materials [0170201]

Coordinators: P. Betsch, T. Seelig

Part of the modules: Strength of Materials (p. 10)[bauIBGP02-TM2]

ECTS Credits	Hours per week	Term	Instruction language
9	4/2/2	Summer term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Literature

[1] Gross / Hauger / Schröder Wall - Technische Mechanik 2

Course: Geology in Civil Engineering [0170210]

Coordinators: J. Eckhardt, T. Mutschler

Part of the modules: Geology in Civil Engineering (p. [23](#))[bauIBGP13-GEOL]

ECTS Credits	Hours per week	Term	Instruction language
2	1/1	Summer term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Literature

Press, F. & Siever, R. (2003): Allgemeine Geologie, 3. Aufl., Spektrum
Fecker, E. & Reik, G. (1996): Baugeologie, 2. Aufl., F. Enke

Course: Geotechnical Design [0170611]**Coordinators:** T. Triantafyllidis**Part of the modules:** Geotechnical Design (p. [43](#))[bauIBFW4-GEOPL]

ECTS Credits	Hours per week	Term	Instruction language
2	1/1	Summer term	de

Learning Control / Examinations**Conditions**

None.

Learning Outcomes**Content****Literature**

- Triantafyllidis, Th. (2011): Arbeitsblätter und Übungsblätter Bodenmechanik
- Triantafyllidis, Th. (2011): Arbeitsblätter und Übungsblätter Grundbau
- Gudehus, G (1981): Bodenmechanik, F. Enke
- Grundwissen „Der Ingenieurbau“ (1995) Bd. 2: Hydrotechnik – Geotechnik, Ernst u. Sohn

Course: Foundation Engineering I [0170514]

Coordinators: T. Triantafyllidis

Part of the modules: Geotechnical Engineering (p. 38)[bauIBFP7-GEOING]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Course: Timber structures [0170507]**Coordinators:** H. Blaß**Part of the modules:** Basics in Steel and Timber Structures (p. [33](#))[bauiBFP3-KSTR.B]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	de

Learning Control / Examinations**Conditions**

None.

Learning Outcomes**Content****Literature**

Blaß, H.J.; Görlacher, R.; Steck, G. (Herausgeber) Holzbauwerke STEP 1 – Bemessung und Baustoffe. Fachverlag Holz, Düsseldorf, 1995 (ISSN-Nr. 04462114)

Course: Basics in steel structures [0170504]**Coordinators:** T. Ummenhofer**Part of the modules:** Basics in Steel and Timber Structures (p. [33](#))[bauIBFP3-KSTR.B]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/2	Winter term	de

Learning Control / Examinations**Conditions**

None.

Learning Outcomes**Content****Literature**

- Skript "Grundlagen des Stahlbaus", Lehrstuhl für Stahl- und Leichtmetallbau, Universität Karlsruhe (TH)
- DIN 18800-1: Stahlbauten - Teil 1: Bemessung und Konstruktion
- DIN 18800-2: Stahlbauten - Teil 2: Stabilitätsfälle-Knicken von Stäben
- DIN 18800-3: Stahlbauten - Teil 3: Plattenbeulen
- DIN 18800-4: Stahlbauten - Teil 4: Schalenbeulen

Course: Basics of Reinforced Concrete I [0170601]

Coordinators: L. Stempniewski

Part of the modules: Basics of Reinforced Concrete (p. [32](#))[bauIBFP2-KSTR.A]

ECTS Credits	Hours per week	Term	Instruction language
4	2/1	Winter term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Course: Basics of Reinforced Concrete II [0170615]

Coordinators: L. Stempniewski

Part of the modules: Basics of Reinforced Concrete (p. [32](#))[bauiBFP2-KSTR.A]

ECTS Credits	Hours per week	Term	Instruction language
2	1/1	Summer term	

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Course: Basics of Track Guided Transport Systems [0170517]**Coordinators:** E. Hohnacker**Part of the modules:** Basics of Track Guided Transport Systems (p. [47](#))[bauiBFW8-GSTS]

ECTS Credits	Hours per week	Term	Instruction language
2	2	Winter term	de

Learning Control / Examinations

See module description.

Conditions

See module description.

Learning Outcomes

See German version.

Content

Definitions and classifications, basics of railway vehicles, track guided operation, railway alignment and operation

Literature

Zilch, Diederichs, Katzenbach, Beckmann (Hrsg): Handbuch für Bauingenieure, Springer-Verlag 2012

Remarks

See German version.

Course: Hydrology [0170511]

Coordinators: E. Zehe

Part of the modules: Water and Environment (p. [34](#))[bauIBFP4-WASSER]

ECTS Credits	Hours per week	Term	Instruction language
3	1/1	Winter term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Course: Hydromechanics [0170304]**Coordinators:** N. N.**Part of the modules:** Hydromechanics (p. 13)[bauIBGP04-HYDRO]

ECTS Credits	Hours per week	Term	Instruction language
6	2/2	Winter term	de

Learning Control / Examinations**Conditions**

None.

Learning Outcomes**Content****Literature**

Jirka, Gerhard H. (2007). Einführung in die Hydromechanik, Universitätsverlag Karlsruhe, Karlsruhe. <http://digbib.ubka.uni-karlsruhe.de/volltexte/1000007165>

Herbert Oertel; Martin Böhle; Ulrich Dohrmann (2006). Strömungsmechanik, 4. überarb. u. erw. Aufl., Vieweg, Wiesbaden.

Herbert Oertel; Martin Böhle; Ulrich Dohrmann (2006). Übungsbuch Strömungsmechanik, 5., überarb. und erw. Aufl., Vieweg, Wiesbaden.

Course: Integration and Multivariate Analysis [0181300]**Coordinators:** V. Grimm, M. Neher, M. Hochbruck**Part of the modules:** Integration and Multivariate Analysis (p. [15](#))[bauiBGP06-HM2]

ECTS Credits	Hours per week	Term	Instruction language
9	4/2/2	Summer term	de

Learning Control / Examinations**Conditions**

None.

Learning Outcomes**Content****Literature**

T. Arens et al.: Mathematik. Spektrum-Verlag, 2008.

T. Westermann: Mathematik für Ingenieure. Springer, 5. Aufl. 2008.

Course: Building Materials [0170306]

Coordinators: H. Müller

Part of the modules: Building Materials (p. 18)[bauIBGP09-BSTOF]

ECTS Credits	Hours per week	Term	Instruction language
9	4/2	Winter term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Literature

script "Baustoffkunde und Konstruktionsbaustoffe";
further references are given in the script

Course: Laboratory course [0170118]

Coordinators: Mitarbeiter der beteiligten Institute
Part of the modules: Laboratory Course (p. [30](#))[bauibGW6-LABOR]

ECTS Credits	Hours per week	Term	Instruction language
2	0/2	Winter term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Life Cycle Management [0170613]

Coordinators: K. Lennerts, H. Müller, E. Kotan, M. Vogel

Part of the modules: Life Cycle Management (p. [46](#))[bauiBFW7-LZMAN]

ECTS Credits	Hours per week	Term	Instruction language
2	1/1	Summer term	

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Literature

Vorlesungsskript / entsprechende Literatur wird in der Lehrveranstaltung vorgestellt.

Course: Partial Differential Equations [0181600]

Coordinators: V. Grimm, M. Neher, M. Hochbruck

Part of the modules: Partial Differential Equations (p. [40](#))[bauIBFW1-PDGL]

ECTS Credits	Hours per week	Term	Instruction language
2	1/1	Summer term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Course: Planning Methodology [0170104]

Coordinators: P. Vortisch, W. Jung, M. Kagerbauer

Part of the modules: Planning Methodology (p. [21](#))[bauIBGP11-PLANM]

ECTS Credits	Hours per week	Term	Instruction language
2	1/1	Winter term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Literature

Skriptum

Fürst, D.; Scholles, F. (Hrsg.) 2008: Handbuch Theorien und Methoden der Raum- und Umweltplanung; Detmold: Dorothea Rohn

Course: Project “Plan, Design, Engineering” [0170516]**Coordinators:** R. Roos, P. Vortisch, B. Brester, E. Hohnacker**Part of the modules:** Project “Plan, Design, Engineering” (p. [45](#))[bauIBFW6-PPEK]

ECTS Credits	Hours per week	Term	Instruction language
2	0/2	Summer term	de

Learning Control / Examinations**Conditions**

None.

Learning Outcomes**Content**

Course: Project Management [0170106]**Coordinators:** S. Haghsheno, H. Schneider**Part of the modules:** Project Management (p. [22](#))[bauIBGP12-PMANG]

ECTS Credits	Hours per week	Term	Instruction language
2	1/1	Winter term	de

Learning Control / Examinations**Conditions**

None.

Learning Outcomes**Content****Literature**

DIETHELM, G.: Projektmanagement, Band 1: Grundlagen, Verlag Neue Wirtschafts-Briefe, Herne, 2000

HAHN, R.: Projektmanagement für Ingenieure, Wiley-VCH Verlag, Weinheim, 2002

KERZNER, H.: Project Management – A Systems Approach to Planning, Scheduling and Controlling, Wiley & Sons, 2006

KOCHENDÖRFER, B., LIEBCHEN, J.: Bau-Projekt-Management, Verlag B. G. Teubner, Stuttgart, 2001

Course: Regional Planning and Planning Law [0170404]

Coordinators: W. Jung

Part of the modules: Mobility and Infrastructure (p. [36](#))[bauIBFP5-MOBIN]

ECTS Credits	Hours per week	Term	Instruction language
4	2/1	Summer term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Course: Siedlungswasserwirtschaft [0170603]

Coordinators: S. Fuchs

Part of the modules: Water and Environment (p. [34](#))[bauIBFP4-WASSER]

ECTS Credits	Hours per week	Term	Instruction language
3	1/1	Summer term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Course: Statics of Rigid Bodies [0170101]

Coordinators: P. Betsch, T. Seelig

Part of the modules: Statics of Rigid Bodies (p. [9](#))[bauIBGP01-TM1]

ECTS Credits	Hours per week	Term	Instruction language
7	3/2/2	Winter term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Literature

[1] Gross / Hauger / Schröder Wall - Technische Mechanik 1

Course: Technical Illustrations [0170116]

Coordinators: R. Roos

Part of the modules: Technical Illustrations (p. [29](#))[bauiBGW5-TECDS]

ECTS Credits	Hours per week	Term	Instruction language
2	1/1	Winter term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Course: Environmental Chemistry [0170110]

Coordinators: J. Winter

Part of the modules: Environmental Chemistry (p. [26](#))[bauIBGW2-UCHEM]

ECTS Credits	Hours per week	Term	Instruction language
2	1/1	Winter term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Course: Environmental Physics/ Energy [0170112]

Coordinators: F. Nestmann

Part of the modules: Environmental Physics/ Energy (p. [27](#))[bauiBGW3-UPHYS]

ECTS Credits	Hours per week	Term	Instruction language
2	1/1	Winter term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Course: [0170605]

Coordinators: J. Winter

Part of the modules: Water and Environment (p. [34](#))[bauiBFP4-WASSER]

ECTS Credits	Hours per week	Term	Instruction language
1,5	1/1	Summer term	

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Course: Transportation [0170405]

Coordinators: P. Vortisch

Part of the modules: Mobility and Infrastructure (p. 36)[bauIBFP5-MOBIN]

ECTS Credits	Hours per week	Term	Instruction language
4	2/1	Summer term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Course: Surveying [20714]

Coordinators: N. Rösch

Part of the modules: Surveying (p. [44](#))[bauiBFW5-VERMK]

ECTS Credits	Hours per week	Term	Instruction language
2	1/1	Summer term	de

Learning Control / Examinations

Conditions

None.

Learning Outcomes

Content

Literature

Script

Course: Hydrological engineering and water management I [0170509]**Coordinators:** F. Nestmann**Part of the modules:** Water and Environment (p. [34](#))[bauIBFP4-WASSER]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	de

Learning Control / Examinations**Conditions**

None.

Learning Outcomes**Content**

- Motivation and visit to the Theodor-Rehbock-Water engineering laboratory
- Fundamentals of Hydrology
- Hydraulic calculations in stream water systems
- Numeric flow simulation
- Floodwater and measurement of flood protection structures
- Constructions in water management; their sizing and handling

Course: Physical Modelling in River Engineering [0170609]**Coordinators:** F. Seidel, C. Lang**Part of the modules:** Physical Modelling in River Engineering (p. [42](#))[bauIBFW3-WASSVW]

ECTS Credits	Hours per week	Term	Instruction language
2	1/1	Summer term	de

Learning Control / Examinations**Conditions**

None.

Learning Outcomes**Content**

Course: [0170617]

Coordinators: J. Ihringer

Part of the modules: Water Resources Management and Engineering Hydrology (p. 48)[bauIBFW9-WASSRM]

ECTS Credits	Hours per week	Term	Instruction language
2	1/1	Summer term	

Learning Control / Examinations

Conditions

None.

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