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Semester	Modulcode	Description of Module	Responsible	CP	Examination (PL) or/and Project achievement (SL)	Content

General Modules

Semester	Modulcode	Description of Module	Responsible	CP	Examination (PL) or/and Project achievement (SL)	Content
Winter	GEO - 3	Selected chapters of Geotechnical Engineering	Prof. Quarg-Voncheidt	5	PL	• Deep excavations and earth retention systems • slurry wall and Diaphragm wall design • Analysis of Soil nailings • Pile foundation design
Winter	FEMG	Finite Element Methods	Prof. Bogacki	5	PL	• Development of governing differential equations (groundwater flow) • Numerical solution by weighed residuals & finite element approach • Practical application with FEFLOW
Summer	GEOS	Geotechnical Engineering in road construction	Prof. Quarg-Vonscheidt	5	SL and PL	• soil reinforcement methods • mechanical Behavior of Geosynthetics for soil reinforcements • Tunnelling and Underground Construction • Tunnel equipment for traffic
Winter	GEOW	Geotechnical Engineering in water construction	Prof. Quarg-Vonscheidt	5	SL and PL	• principles of Groundwater Flow • embankment stabilization and slope stability • numerical Modelling of Soils and Structures • evaluating Soil Liquefaction Potential
Winter	MATH 3	Higher mathematics	Prof. Bogacki	5	PL	• Linear algebra • Partial differentiation • Differential equations
Winter	MATH 4	Statistical Methods	Prof. Bogacki	5	PL	• Sample analysis

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						• Selected distribution functions • Comparative statistics • Application of R statistical language
Summer	MATH 5	Numerical methods	Prof. Bogacki	5	PL	• Numerical differentiation • Numerical integration • Linear equation solver • Programming with R
	MWIP 1*	Scientific research project		5	PL	• Workload: 150 SWS
	MWIP 2*	Scientific research project		10	PL	• Workload: 300 SWS
	MWIP 3*	Scientific research project		15	PL	• Workload: 450 SWS

Focus on construction operation

Semester	Modulcode	Description of Module	Responsible	CP	Examination (PL) or/and Project achievement (SL)	Content
Winter	BBET-4	Construction operation 4: Price finding	Prof. Engler	5	PL	• financial accounting at construction firms • cost and performance accounting at construction firms • calculation methods and calculation of construction prices • partial costs, full costs • computerised calculation
Summer	BBET-5	Construction operation 5: Project management	Prof. Engler	5	PL	• project organization • project course • quality assurance • time scheduling • cost controlls • documentation

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Summer	BBET 6	Construction operation 6: Claim Management	Prof. Engler	5	PL	• additional quantity , under quantity and contract price adjustments • variation order and contract price adjustments • obstruction, delay, calculation of extensions of time • contract termination and remuneration • acceleration of construction progresses and remuneration • documentation of modifications • resolution of conflicts
Winter	BBET 7	Construction operation 7: Tender Procedure and law	Prof. Krudewig	5	PL	• Awarding of building contracts and building law • Concept of contracting authority • Bidder legal protection • Legal bases of land use planning • Building permit process
Winter	PROM 1	Project Management 1 : Management structures in building companies	Prof. Krudewig	5	SL and PL	• Legal forms of enterprises • Organization of companies • Corporate governance • Controlling • Human resources development • Marketing • Team formation, work assignments, scheduling • Monitoring and supervision of projects
Summer	PROM 2	Project Management 2: Site Management	Prof. Krudewig	5	SL and PL	• Work preparation • Scheduling • Construction phase

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						• Invoice verification • Settlement statement and performance evaluation • ARRIBA ® build-billing after REB 23.003 • Claims • Construction documentation • Construction site outcome, completion of the construction project • Performance study
Summer	PROM 3	Project Management 3: Principles of leadership	Prof. Krudewig	2,5	SL	• Fundamentals of decision theory • Decision problems and processes • Decision algorithms • Methods of operations research: decision trees/flow-charts
		Decision making techniques	Prof. Bogacki	2,5	SL	• Cost-Benefit-analysis, Utility analysis, Analytic Hierarchy Process, Outranking methods • Decision making project
Winter	IMMO 1	Real Estate Management	Prof. Krudewig	5	PL	• Principles of Real Estate Management: development, tasks and functions • Project development: from the initial idea to the decision • Determining procedures • Real estate investment and property financing as a

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						precondition to realize a project •
Winter	IMMO 2	Real Estate Management	Prof. Krudewig	5	PL	• Real estate marketing to avoid vacancy • Historical development of the facility management • Facility management • Assessment procedures of real estate investments • Building redevelopment taking account also historic buildings • Regeneration of brownfield sites

Focus on façade /energy

Semester	Modulcode	Description of Module	Responsible	CP	Examination (PL) or/and Project achievement (SL)	Content
Winter	EPLA	Sustainable Construction and energy-efficient building design	Prof. Schuchardt	5	PL	• Reprocessing the basics of stationary heat convection and humidity flow • Detection methods for current standardization • Computer Exercises with transient calculation programs for heat and humidity • Computer Exercises with current programs for lighting design • Computer Exercises with current programs for the heat retention • Basics of modeling calculation • Process parameter of the modeling calculation • Computer Exercises with modeling programs

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						• Building physicals basics: lighting (astronomical data and meteorological factors • Daylight factor
Summer	FASA	Façade	Prof. Schuchardt	5	PL	• Construction specifications and applied building physical and statical calculation methods of • Cold façade, warm façade, cold/warm façade and membrane façade a) Mullion-transom system and construction methods derived from these; unitised-,box , modular system façade, double moulding, pit and corridor fronts b) Surface structure and curtain wall – thin-walled façade panel, thin-walled front elements and membranes c) Glass construction d) Material combination for constructions with load bearing function – sandwich-plates – prefabricated steel elements- and alum sandwich elements

Focus on Structural Engineering

Semester	Modulcode	Description of Module	Responsible	CP	Examination (PL) or/and Project achievement (SL)	Content
Winter	BRAND	Structural Fire Protection	N.N.	5	SL	• Basics of Planning of Fire Protection in buildings according to Model Building Regulations • Fire Prevention Planning • Methods for predicting time to incapacitation and death

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						• of fires for use in fire safety engineering calculations • Physiology and toxicology of fire effluent component, • Residual load capacity after extinguish fire, structural components to fire exposure
Summer	BTEC 2	Advanced Study of Concrete Technology	Prof. Breitbach	5	PL	• advanced knowledge of concrete • special concretes and cement based materials • dealing with monitoring classes ÜK 2 and 3 (DIN 1045-3ÜK) • lightweight concrete • heavy concrete • high performance concrete • mortar and grout applications • exposed concrete
Winter	BFBA	Concrete Construction	Prof. Breitbach	5	PL	• advanced knowledge of concrete • special concretes and cement based materials • dealing with monitoring classes ÜK 2 and 3 (DIN 1045-3ÜK) • lightweight concrete • heavy concrete • high performance concrete • grout • exposed concrete
Summer/ Winter	BSIB-3	Protection and Maintenance of Concrete Building Parts	Prof. Breitbach	5	SL and PL	• advanced concrete technology skills • damage mechanisms • concrete and steel corrosion

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						- causes of cracks and methods of rehabilitation - construction stage analysis - chemical and physical test methods - forecasting methods - repair concept - repair methods - materials and repair systems - special solutions - regulations, state of the art, trends
Winter	BRÜB	Structural Design of Bridges	Prof. Ibach	5	SL and PL	- Structures for bridges, and the static modelling - Loads on footbridges and road bridges (Eurocodes) - Construction methods
Winter	FEMP	Finite Element Method – Application	Prof. Zeitler	5	SL	- introduction to the finite element method - basics for the application in structural design - linear and nonlinear analyses - modelling of 2D- and 3D- structures
Winter	HOLZ 2	Structural Design of Timber Constructions 2	Prof. Göckel	5	SL and PL	- Halls, footbridges and towers in timber construction - Rigid and soft connections in frame structures 2nd order and lateral torsional buckling of timber elements - Strengthening of timber elements with glued-in rods and screws
	HOLZ 3	Structural Design of Timber Constructions 3	Prof. Göckel	5	SL and PL	- Timber framework and solid timber constructions - Design of plate elements, shear walls and shell structures in timber construction

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						• Timber concrete composite elements • Vibrations of timber beams and slabs
Summer	NABA	Sustainable Building 1	Prof. Breitbach	5	PL	• planning principles for sustainable building • energy-optimized construction • in ecological building • protection and repair • refurbishment • requirements of building materials and construction administration • health, comfort, room quality • energy • evaluation criteria • building certification
Winter	NABA 2	Sustainable Building 2	Prof. Zerwas	5	PL	• basics of sustainable construction • Certification System DGNB • life cycle assessment and life cycle costs • Basics HOAI and other performance books • Design principles of sustainable buildings • Integration of a current design and planning thread • Cooperation with architects
Summer	STAHL 3	Structural Design of Steel 3	Prof. Ibach	5	SL and PL	• Buckling of steel plates • Fatigue design
Winter	STAHL 4	Structural Design of Steel 4	Prof. Ibach	5	SL and PL	• Design of steel towers and shell buckling masts • Design of shell flanges • Foundation of towers

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						• Design of cable structures • Design of hollow profiles
Summer	STBB 4	Structural Design of Reinforced Concrete 4	Prof. Zeitler	5	SL and PL	• serviceability limit states for RC structures • bracing of buildings • strut and tie modelling in RC structures • design of RC flat slabs
Winter	SPAN	Structural Design of Prestressed Concrete	Prof. Zeitler	5	SL and PL	• principle of prestressed concrete • serviceability limit states for prestressed structures • ultimate limit states for prestressed structures • short-term and long-term losses in prestress
Winter	STAT 5	Structural Analysis 5	Prof. Hofmann	5	PL	• basics of elastic foundation for statically undetermined structures • basics of structural dynamics for statically undetermined multi mass systems
Winter	STAT 6	Structural Analysis 6	Prof. Hofmann	5	PL	• geometrically nonlinear structural analysis (linearized theory of second order) • material nonlinear structural analysis (yield hinge theory of first order)
Summer	DYNA	Dynamics	Prof. Laubach	5	PL	• Kinematics and kinetics • Basics of dynamic behaviour of single mass systems • Wind loading for vibrating structures • Earthquake loads
Summer	VERB-1	Structural Design of Steel-Concrete Composite 1	Prof. Ibach	5	SL and PL	• material properties and typical cross sections • plastic behaviour of composite structures • Plates, Columns and Beams

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						• Headed Studs
Winter	VERB-2	Structural Design of Steel-Concrete Composite 2	Prof. Ibach	5	SL and PL	• material properties and typical cross sections • elastic behavior of composite beams • Creep and Shrinkage • Lateral Torsional Buckling
Summer	ENVE	Design and Planning of Bridges and Earth Retaining Structures	Prof. Laubach	5	PL	• Systematic review of road and railway bridges • Systematic review of earth retaining structures • Boundary conditions and details for planning • Homework: planning of a road bridge
Winter	BBHO	Structural Design of Existing Buildings	Prof. Laubach	5	PL	• Review of historical steel, timber and concrete constructions • Introduction in historical building codes • Existing reserves of load bearing capacity • Strengthening of load bearing capacity
Winter	INPL	Integral Planning	Prof. Laubach Prof. Zerwas	5	PL	• Common Planning of a realistic project • Cooperation in a team of architects, structural engineers and building physics • Homework: preliminary structural or building physics design • Joining the VDI (The Association of German Engineers) students competition

Focus on Planning, transport and water

Winter	ASPT	Asphalt technology	Prof. Fischer	5	SL and PL	• Advanced knowledge of asphalt mixtures

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						• General basis of bituminous building materials • Testing methods and requirements of aggregates and filler in asphalt mixtures • Composition and production of bitumen • Production of asphalt, components and functionality of a mixing facility • Recycling of asphalt, asphalt mix and testing methods of asphalt • Practice examples
Summer	EISB-2	Railway construction 2	Prof. Schoonbrood	5	SL and PL	• Basics: rules and regulations • Design, planning and engineering of tracks, railway stations and related facilities • Safety systems, signaling, rail-road crossings • State of the art concerning trains and railway operation
Winter	FLPB	Airport Planning	Prof. Schoonbrood	5	PL	• Basics of airport planning • Organization of airports and airport networks • Specific planning of basic infrastructure and related facilities • Operation of airports
Winter	GIS	Geographical information systems	Prof. Bogacki	5	PL	• Introduction to ArcGIS • Practical GIS project
Summer	GVPL	Freight Traffic Planning and Logistics	Prof. Schonbrood	5	PL	• Basics of freight transport, forecasting • Infrastructure, networks, hubs, main corridors • Modalities, modal shift, intermodal transport • Facilities, basics for planning and designing

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Summer	HYGE	Introduction to Water Hydrology	LB	5	PL	• Water cycle (globally and locally), water infiltration, groundwater recharge • Special importance of hydrology and groundwater as fundamental element of water cycle • Groundwater unearthing, porous medium and aquifer (Pore space, porosity, Karst aquifer, storage density, water and mass transfer • Darcy's law, groundwater flow and equitations • Pump trials and calculation of hydraulic permeability • Well hydraulic • Mass transfer • Groundwater model: for example MODFLOW (3D) finite-difference groundwater model
Winter	ÖPNV	Urban Public Transport	Prof. Schonbrood	5	PL	• Basics of urban public transport • Modes, infrastructure, networks, hubs • Facilities and basics for planning and designing • Operation of UPT
Winter	LÄRM	Emission protection	Prof. Zerwas	5	SL and PL	• Determination of relevant noise sources (calculating and measuring) • Calculation of outdoor noise propagation (manual and computerized calculations) • Design of noise protection and noise-reducing measures • Determination of the relevant exterior noise level • Calculate the minimum sound insulation of buildings
Winter	SIWW 2	Urban Water Management /Waste Water	Prof. Ziegler	5	SL and PL	• Wastewater analytics

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		Management 2				• Wastewater treatment including energy and nutrient aspects • Design of wastewater treatment plants • Alternative sanitation technologies
Summer	STAP	Urban Planning	Prof. Mutschler	5	PL	• Urban Construction History/Created guidelines for urban development Early History/Antiquity Mediaeval Architecture Ideal city in the renaissance and baroque residence city Classicism and industrialization in the 19th century Pre-war period (urban development, fascism) Post-war period (urbanity through density, sustainable planning) • Current tasks: conversion, urban redevelopment, megacities • Planning methodology: review, strength-weaknesses-analysis, history of urban planning, designs • Urban functions: residential construction, industry and retail, infrastructure/common needs
Summer	STEB	Road maintenance and road services	Prof. Fischer	5	SL and PL	• Advanced knowledge of different concepts for the maintenance applied on asphalt roads and concrete roads based on current regulations • Handle and create all kinds of conditions and analysis data throughout the entire process of road condition management • Visual condition assessment

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						Technical conservation measures for asphalt and concrete traffic surfaces
Winter	UMWT	Environmental Engineering	Prof. Kirschbauer	5	SL and PL	- Collection and transport of waste - Waste disposal sites - Waste incineration
Summer	WVER	Hydraulic Modelling Methods	Prof. Kirschbauer	5	PL	- Measuring of water levels and of flow velocities - Determination of flow rates - Estimation of flow-pressure force onto buildings and building parts - Calibration of calculation parameters during flow/pressure of barrage and sluice gates - Flooding of water wheel and the possible impacts for fish - Efficiency rates of water wheels
Summer	WASW 2	Hydraulic Construction /Water Engineering 2	Prof. Ziegler	5	SL and PL	- Flood management - Design of retention dams - Hydrograph and runoff - Hydropower: power, turbines
Winter	NAM	Precipitation Runoff Modeling	Prof. Wernecke	5	PL	- Hydrologic cycle and its components - Principles, subject and objective of Precipitation Runoff Modeling - Modular-design modeling - Simulation - Analysis (statistical, graphical …) - Application of Precipitation Runoff Modelling
Summer	WMDC	Water Management in	Prof. Ziegler	5	PL	International water problems

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		developing countries				- Project planning in development cooperation - Access to drinking water and sanitation - Water utility management - Integrated water resource management - Water information systems - Water and Climate Change - Transboundary water management
Summer	FREI	Urban space - latitude	Prof. Kirchner	5	PL	- History of place, inner city location, environing construction and structure typologies - Spatial structures and spatial sequence - Use of public open space and its sides - Leisure options, social control - Fittings and design - Open space design

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