HTWK
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program Structural Engineering

Module B100
SEM 1000

Team of Lecturers
responsible

Compulsory module B100
Numerical Methods and Simulation Technology in Mechanics
Prof. Dr.-Ing. Lenzen

Regular semesters	WS	SS	1. Semester
ECTS points *)	3		
Teaching language	English		
Content of teaching	- Matrix method - Differential equations - Discretization methods - Linear algebra and solution methods - Least Squares, subspace method and singular value decomposition - Numeric integration and exp(At) / display of state spatial - Digital computer (MATLAB): introduction and application		
Learning targets	After successful completion of the module, students are able to apply selected numeric methods. This supports the critical analysis and validation of calculation results. They are able to apply numerical methods particularly to the issues of mechanics (using MATLAB).		
Conditions for attendance	Basic Qualification in Mechanics and Mathematics.		
Group size	1 SWS lecture ≤ 40 students, 1 SWS seminar ≤ 40 students		
Workload	**90 hours**, of which 14 hrs lecture 14 hrs seminar-like lecture 30,5 hrs self-study 30 hrs pre-examination 1,5 hrs examination		
Pre-examination requirements	PVH = term paper (30 hrs)		

Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 1000**	**1**	**1**		**PK (90 min)**	**3**

Media modes	Presentations via projector and panel, computer lab (MATLAB)
Additional Literature	H. Waller, A. Lenzen, Mechanical Vibrations and Structural Dynamics Analytical-, Numerical- and Experimental Methods, Springer 2011 G. Golub, J. M. Ortega, Scientific Computing, Johns Hopkins G. Golub, C. F. van Loan, Matrix Computations, Johns Hopkins Recommended readings named by the lecturers at the beginning of semester
Usability	Compulsory Module for the International Master Program Structural Engineering

+) SWS = semester week lessons; V =lecture; S = Seminar; P/Ü = internship/training

*) 1 ECTS point = 30 hours of study

HTWK
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program
Structural Engineering

Module B110
SEM 1100

Team of Lecturers
responsible

Compulsory module B110
Experimental Mechanics
Prof. Dr.-Ing. Slowik

Regular semesters	WS	SS	3rd semester
ECTS points *)	3		
Teaching language	English		
Content of teaching	**Lectures on Experimental Mechanics** Generation of test loads Introduction to measurement technology Small-scale tests and photoelasticity In situ load tests Non-destructive testing of structures Long-term monitoring of structures **Practical Training in Experimental Mechanics** Exercise 1: Determination of mechanical material properties Exercise 2: Plane stress problem Exercise 3: Photoelasticity Exercise 4: Bending test of a reinforced concrete beam Exercise 5: Stresses in a frame corner Exercise 6: Elastic curve determined by means of inclination sensors		
Learning targets	Students are able to assess the applicability of experimental methods for solving specific technical problems, especially in the field of building condition assessment.		
Conditions for attendance	None		
Group size	**1** SWS ≤ 40 students **1** SWS practical training, groups consisting of approx. 4 students		
Workload	**90 hours**, of which 14 hrs lecture / seminar-like lecture 14 hrs practical training 30 hrs self-study 30 hrs examination as term paper (test protocols) with completion period = 3 weeks 2 hrs examination as colloquium		
Pre-examination requirements	None		

Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 1100**	**1**		**1**	**PH (3 weeks)** **PM (120 min)**	**3**

Media modes	Computer presentations, demonstration tests
Additional Literature	A. S. Khan, Xinwei Wang, Strain Measurements and Stress Analysis, Addison Wesley 2000 Recommended readings named by the lecturers at the beginning of semester
Usability	Compulsory Module for the International Master Program *Structural Engineering*

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*) 1 ECTS point = 30 hours of study

HTWK Leipzig
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program Structural Engineering

Module B120
SEM 1200

Team of Lecturers
responsible

Compulsory module B120
Reinforced Concrete Structures
Prof. Dr.-Ing. Holschemacher

Regular semesters	WS	SS	3. Semester
ECTS points *)	6		
Teaching language	English		
Content of teaching	1 Foundations (spread foundations, stepped foundations, combined foundations, mat foundations, strip foundations) 2 biaxial slab systems 3 biaxial (punching) shear in slabs 4 Ceiling binding girders 5 Walls and shear walls 6 Stairways 7 Strut-and-tie models 8 Frames, frame-like supporting structures 9 Slender columns (biaxial bending with axial load, influence of cross-section's geometry)		
Learning targets	After successful completion of the module, students are able to estimate the bearing behaviour of complex reinforced concrete structures often found in construction practice. They provide calculated evidence by themselves for foundation elements, different forms of structural slabs, walls, columns and other compression members made of reinforced concrete. The students are able to design these elements and to decide on useful selection and definition of design models and building materials.		
Conditions for attendance	Basic qualification in reinforced concrete engineering		
Group size	4 SWS lecture with integrated training ≤ 40 students		
Workload	**180 hours**, of which 56 hrs lecture with integrated exercise 92 hrs self-study 30 hrs pre-examination 2 hrs examination		
Pre-examination requirements	PVH = term paper (30 hrs)		

Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 1200**	**4**			**PK (120 min)**	**6**

Media modes	PowerPoint presentations, accompanying course script, transparencies, panel
Additional Literature	American Concrete Institute: Manual of Concrete Practice 2010. Kamara, Novak, Rabbat: Notes on ACI 318-08. PCI Association, 10th Edition 2008. Mc Gregor, Wright: Reinforced Concrete. Mechanics and Design. Prentice Hall, 4th Edition, 2005. Recommended readings named by the lecturers at the beginning of semester
Usability	Compulsory Module for the International Master Program Structural Engineering

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*) 1 ECTS point = 30 hours of study

HTWK
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program Structural Engineering

Module B130
SEM 1300

Team of Lecturers
responsible

Compulsory module B130
Steel Construction
Prof. Dr.-Ing. Fiebig

Regular semesters	WS	SS	3. Semester
ECTS points *)	3		
Teaching language	English		
Content of teaching	Steel construction - Introduction to steel construction - Security concept and load assumption according to Eurocode - The material steel - Structural analysis according to Eurocode 3 - Ultimate limit states: tension, compression, bending moment according to Eurocode 3 - Bolt and weld joints according to Eurocode 3 Glass construction - Introduction to glass construction - Fundamentals of construction design - Processed glasses – prestressing and lamination		
Learning targets	After successfully completing the module, the students are able to dimension and construct components and connections in steel construction and glass construction in accordance with European standards. Students can work independently on simple engineering tasks in the field of steel construction and glass construction.		
Conditions for attendance	Competences in building mechanics and building materials theory		
Group size	2 SWS ≤ 40 students		
Workload	**90 hrs**, of which 28 hrs lecture 60,5 hrs self-study 1,5 hrs examination		
Pre-examination requirements	None		

Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 1300**	**2**			**PK (90 min)**	**3**

Media modes	Powerpoint presentation, blackboard, OPAL
Additional Literature	EN 1990,Eurocode: Basis of structural design EN 1993-1-1, Eurocode 3: Design of steel structures – Part 1-1: General rules for buildings EN 1993-1-8, Eurocode 3: Design of steel structures – Part 1-8: Design of joints Recommended readings named by the lecturers at the beginning of semester
Usability	Compulsory Module for the International Master Program Structural Engineering

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*) 1 ECTS point = 30 hours of study

HTWK Leipzig
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program
Structural Engineering

Module F140
SEM 1400

Team of Lecturers
responsible

Compulsory module 1400
Foreign language: Academic English
HSK FI, Dr. phil. Tober

Regular semesters	WS	SS	1st, 2nd, 3rd semester
ECTS points *)	6	3	
Teaching language	English		
Course content	**1st semester**: the main focus is on reading for academic purposes along subject-related topics such as e.g. prestressed concrete construction, (spread) foundations etc. **2nd semester**: the main focus is on listening skills and speaking for academic purposes along subject-related topics such as e.g. bridge design, composite structures, structural dynamics etc. **3rd semester**: as this semesters prepares the students for their Master's thesis, the main focus is on giving a presentation and writing for academic purposes along topics such as e.g. finite element method (FEM), structural mechanics, experimental mechanics, reinforced concrete structures, fire protection in Structural Engineering etc.		
Learning outcomes	After successful completion of the module, students will be able to understand subject-related academic texts of different types, mainly in written English, and to apply the main standards of written and spoken academic English to issues concerning the academic field and their individual research focus.		
Individual course requirements	Oral aptitude test		
Group size	2 SWS seminar ≤ 20 students		
Workload	**270 hours** (90 hrs per semester), of which per semester 28 hrs seminar and training 30,5 hrs self-study (31,5 hrs in the 2nd semester) 20 hrs project work 10 hrs feedback on the project work: (1st semester: reading consultation, 2nd semester: presentation, 3rd semester: written assignment review) 1,5 hrs examination (0,5 hrs in the 2nd semester)		
Pre-examination requirements	The examination at the end of each semester must be passed in order to be admitted to the next semester		

Lesson plan Teaching methods +) Exams ECTS points *)	Lesson plan	SWS +) V	SWS +) S	SWS +) P/Ü	Examinations	ECTS points *)	
	SEM 1400, 1st semester		**2**		**PK (90 min)**	**3/9**	**9**
	SEM 1400, 2nd semester		**2**		**PP (30 min)**	**3/9**	
	SEM 1400, 3rd semester		**2**		**PK (90 min)**	**3/9**	
					PK:PP:PK = 1:1:1		

Media used	PowerPoint presentations, script, transparencies, blackboard
Additional Literature	An updated list of recommended reading will be provided by the lecturer at the beginning of the semester. Additional material such as language software, textbooks and journals can be found at the language centre's multimedia language lab.

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*) 1 ECTS point = 30 hours of study

Usability	Compulsory module for the International Master Program Structural Engineering

HTWK
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program
Structural Engineering

Module B150
SEM 1500

Team of Lecturers
responsible

Compulsory module B150
Master Thesis
N.N.

Regular semesters	WS	SS	4. Semester
ECTS points *)		30	
Teaching language	English		
Content of teaching	**SEM 1501: Master Thesis** The master thesis is an essential part of the Master's examination and is included in the final grade in accordance with the LP. It is to be written in English. **SEM 1502: Defence** The master thesis is finalized by a defence. This comprises a scientific presentation and subsequent discussion of the thesis's issue.		
Learning targets	By the master thesis, the student is supposed to prove the ability to elaborate a technical problem self-reliantly within a certain period of time by the application of scientific methods. The processing time is four months. The master thesis is considered as passed, if at least one "sufficient" appraisal is achieved. The examinee is not limited to a certain topic within the area of studies as long as he/she has all the makings for the task and a personal interest in the particular subject. Group work is permitted only if individual contributions are assignable in all objectivity.		
Conditions for attendance	Successful completion of all except 3 module tests of the first 3 regular semesters. The master thesis must be appraised with 4,0 at least.		
Group size	See learning targets		
Workload	**900 hours**, of which 675 hrs term paper (Master Thesis) with completion period = 4 months 225 hrs presentation + oral expert dicussion (Defence)		
Pre-examination requirements	None		

Lesson plan Teaching methods +) Exams ECTS points *)	Lesson plan	SWS +)			Examinations	ECTS points *)	
		V	S	P/Ü			
	SEM 1501				**PH (4 months)**	**22,5/30**	**30**
	SEM 1502				**PP (30 min)** **PM (60 min)**	**7,5/30**	
					PH:PP+PM = 3:1 (PH and PP+PM may not compensate each other)		

Media modes	Standards in accordance with rules of documentation and presentation techniques
Additional Literature	Completed upon issuance of the master thesis
Usability	Compulsory Module for the International Master Program Structural Engineering

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*) 1 ECTS point = 30 hours of study

HTWK Leipzig University of Applied Sciences	Faculty of Civil Engineering International Master Program Structural Engineering				**Module B160** SEM 1600	
	Team of Lecturers responsible		Elective module B160 **Modern and Historical Building Materials** Prof. Dr.-Ing. Jahn			
Regular semesters	WS	SS	1. or 2. Semester			
ECTS points *)	3					
Teaching language	English					
Content of teaching	- Microstructure analysis of building materials and effects on selected properties - Effect of fibres on building materials - Design examples from fibre concrete to textile concrete, strengthening of reinforced concrete elements with CFRP lamellas - Old constructions and their importance					
Learning targets	After successful completion of the module, students are able to consider the links between the porosity of building materials and their properties and the changes of the tension-deformation-ratio especially for older constructions. They apply methods, which: - influence the properties of porous building materials (e.g. brick, natural stone) positively or negatively by using e.g. waterproofing agents - influence modulus of elasticity, technology and processability using fibres in building materials (concrete, synthetic resins)					
Conditions for attendance	Basic qualification in building materials, building construction, steel and reinforced concrete engineering, brick construction					
Group size	2 SWS lecture ≤ 40 students					
Workload	**90 hours**, of which 28 hrs lecture with integrated training 60,5 hrs self-study 1,5 hrs examination					
Pre-examination requirements	None					
Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 1600**	**2**			**PK (90 min)**	**3**
Media modes	PowerPoint presentations, script accompanying the course, transparencies, panel					
Additional Literature	Ultra High Performance Concrete (UHPC): Proceedings of the Second International Symposium on Ultra High Performance Concrete Kassel. Ekkehard Fehling (pub.), Michael Schmidt (pub.), Simone Stürwald (pub.) Publisher: Kassel University Press; 1st edition (February 22, 2008) High-Performance Hybrid-Fibre Concrete I. Markovic Publisher: Ios Pr (April 24, 2006) Fibre Reinforced Concrete: Performance of Fibre Reinforced Concrete Incorporating Locally Available Natural Fibres. Dr. Raja Rizwan Hussain, Engr. Syed Mazharul Islam Publisher: VDM Verlag Dr. Müller (June 8, 2010)					

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*) 1 ECTS point = 30 hours of study

	Fibre Reinforced Cementitious Composites (Modern Concrete Technology) Arnon Bentur Publisher: Routledge Chapman & Hall; 2nd edition (January 30, 2007) Advances in Construction Materials 2007 Christian U. Grosse Publisher: Springer, Berlin (July 20, 2007) Adobe and Rammed Earth Buildings: Design and Construction. Paul Graham McHenry Publisher: University of Arizona Pr; 3rd edition (October 31, 1989) Recommended readings named by the lecturers at the beginning of semester
Usability	Elective Module for the International Master Program Structural Engineering

HTWK Leipzig University of Applied Sciences	Faculty of Civil Engineering International Master Program Structural Engineering				**Module B170** SEM 1700	
	Team of Lecturers responsible				Elective module B170 **Construction Materials and Environment** Prof. Dr. rer. nat. Stich	

Regular semesters	WS	SS	1. or 2. Semester			
ECTS points *)	3					
Teaching language	English					
Content of teaching	**Principles of environmental chemistry** Air: structure and importance of the atmosphere, air quality, climate and greenhouse effect; chemical reactions in the atmosphere, ozone, photo or summer smog, ozone in the stratosphere, ozone hole, chlorofluorocarbons and substitutes Emission of air pollutants: sulphur dioxide, acid smog, nitric oxides, volatile organic compounds (VOC); pollutant effects and measures to prevent them; acid rain, new kinds of damages to forests, flue gas desulphurization, FGD plaster, car exhaust catalysis, Water – water contamination **Environmental compatibility of construction materials** - Interaction of water and building materials - Environmental compatibility and leeching of cement-related materials - Radioactivity and construction materials - Contamination of air inside buildings: Sick Building Syndrome (SBS), air substances inside buildings, formaldehyde issues - Mineral fibres: natural mineral fibres; Asbestos: terms, properties, representatives - Synthetic materials and binding agents in civil engineering - Polyvinylchloride (PVC): original substances and additives and their environmental relevance, problem of softeners, combustion and dioxin issues - Chemical character and environmental behaviour of selected binding agents - Wood preservatives					
Learning targets	After successful completion of the module, students are able to assess phenomena of environmental and ecological chemistry and their impact on buildings. They evaluate the composition of modern building materials and their influence on the environment.					
Conditions for attendance	Basic knowledge of Chemistry					
Group size	2 SWS lecture ≤ 40 students					
Workload	**90 hours**, of which 28 hrs lecture 30,5 hrs self-study 30 hrs pre-examination 1,5 hrs examination					
Pre-examination requirements	PVH = term paper (30 hrs)					

Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 1700**	**2**			**PK (90 min)**	**3**

Media modes	Transparencies, panel, data in network

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Additional Literature	Recommended readings named by the lecturers at the beginning of semester
Usability	Elective Module for the International Master Program Structural Engineering

HTWK
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program
Structural Engineering

Module B180
SEM 1800

Team of Lecturers
responsible

Elective module B180
Energetic Planning of Building
Prof. Dr. (I) Arch. Rossi

Regular semesters	WS	SS	1. or 2. Semester
ECTS points *)	3		
Teaching language	English		
Content of teaching	- Introduction to the building planning - Historical summary - Concepts for the development of residential constructions - Exercises to the planning of buildings - Energy-efficient construction of new buildings - Enercetic reconstruction of old buildings - Examples for the environmentally compatible structural design - Insulating materials made of renewable raw materials - Comparison of conventional / environmentally compatible ways of construction - Building concepts for passive houses - Blower Door procedure / air tightness of buildings - Infrared thermography and the mold problem - Preparation of an energy pass for residential buildings - Excursion		
Learning targets	After successful completion of the module, students are able to evaluate conventional constructions, to develop new solutions for an energy- and environment-oriented building and to apply a range of alternative techniques for all ways of construction and all types of buildings commonly used in present-day civil engineering.		
Conditions for attendance	Basic qualification in building materials, building physics and building construction		
Group size	1 SWS lecture ≤ 40 students, 1 SWS seminar ≤ 40 students		
Workload	**90 hours**, of which 14 hrs lecture 14 hrs seminar-like lecture 31,5 hrs self-study 30 hrs term paper with notice period = 6 weeks 0,5 hrs examination		
Pre-examination requirements	None		

Lesson plan Teaching methods +) Exams ECTS points *)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
	SEM 1800	**1**	**1**		**PH (6 weeks) PP (30 min)**	**3**
					PH:PP= 1:1	

Media modes	PowerPoint presentations, transparencies, panel, lecture notes
Additional Literature	Hegger, Fuchs, Stark, Zeumer, Energy Manual – Sustainable Architecture, (Birkhaeuser Basel-Boston-Berlin, Edition Detail Munich, 2008) ISBN 987654321 Banham, Reyner, The Architecture of the Well-Tempered Environment, (London: Architectural Press, 1969, 73).

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*) 1 ECTS point = 30 hours of study

	Ching, Francis D.K., with Cassandra Adams, A Dictionary of Building Construction, Second Edition (New York: Van Nostrand Reinhold, 1991) Daniels Klaus, Technology of Ecological Building (Birkhäuser Basel; 1 edition, July 2001), ISBN-10: 3764354615, ISBN-13: 978-3764354619 Daniels Klaus, Advanced Building Systems: A Technical Guide for Architects and Engineers, (Birkhäuser Basel; 1 edition, July 2003), ISBN-10: 3764367237, ISBN-13: 978-3764367237 Miller, Kenneth E., Building Control Systems, (New York: John Wiley & Sons, 1985) Olgyay, Victor, Design With Climate, (Princeton, New Jersey: Princeton Press, 1963) Otis Elevator Company Pamphlets: Tell Me About Elevators, Escalators, Odyssey: The New Paradigm. Rice, Peter, An Engineer Imagines, (London, Zurich, Munich: Artemis, 1993) Watson, Donald, Energy Conservation Through Building Design (New York: McGraw Hill, 1979) Wilson, F., Structure: The Essence of Architecture (New York: Van Nostrand Reinhold, 1972) Recommended readings named by the lecturers at the beginning of semester
Usability	Elective Module for the International Master Program Structural Engineering

HTWK
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program
Structural Engineering

Module B190
SEM 1900

Team of Lecturers
responsible

Elective module B190
Glass and Plastic Material Construction
Prof. Dr.-Ing. Jahn

Regular semesters	WS	SS	1. or 2. Semester
ECTS points *)	3		
Teaching language	English		
Content of teaching	Glass construction - production, glass as material, types of glass, properties - sound, heat, fire protection - bearing glass constructions - types of bearing - safety concept, design of glass construction elements Plastics construction - fibre reinforced plastics elements – production, properties, application, basics of calculation, dimensioning		
Learning targets	After successful completion of the module, students are able to calculate and dimension simple construction elements made of glass or plastics taking into consideration relevant construction requirements.		
Conditions for attendance	Basic qualification in structural statics and building construction		
Group size	2 SWS lecture/seminar ≤ 40 students		
Workload	**90 hours**, of which 28 hrs lecture / seminar-like lecture 45,5 hrs self-study 15 hrs term paper 1,5 hrs examination		
Pre-examination requirements	None		

Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 1900**	**2**			**PK (90 min)**	**3**

Media modes	PowerPoint presentations, accompanying lecture notes, transparencies, panel
Additional Literature	Glass Structures: Design and Construction Jan Wurm Publisher: Birkhäuser Architektur; 1st edition (July 4, 2007) Glass Construction Manual Christian Schittich, Gerald Staib, Dieter Balkow Publisher: Birkhäuser Architektur; 2nd edition, (September 3, 2007) Plastics: in Architecture and Construction Stephan Engelsmann, Valerie Spalding, Stefan Peters

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*) 1 ECTS point = 30 hours of study

	Publisher: Birkhäuser; 1st edition (June 2010) Recommended readings named by the lecturers at the beginning of semester
Usability	Elective Module for the International Master Program Structural Engineering

HTWK
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program
Structural Engineering

Module B200
SEM 2000

Team of Lecturers
responsible

Compulsory module B200
Finite Element Method / Surface Structures I
Prof. Dr.-Ing. Slowik

Regular semesters	WS	SS	1. Semester
ECTS points *)	6		
Teaching language	English		

Content of teaching

SEM 2001: Finite Elements Method
Basic principle and historical development
Matrix stiffness method for framework structures
Energy methods for deriving element stiffness matrices
Plane elements
Plate elements
Convergence behaviour and discretisation error
Notes on the practical application of the finite elements method
Non-linear finite element analyses

SEM 2002: Planar Surface Structures
Terms, assumptions and preconditions
Internal forces in planar surface structures
Kirchhoff theory of plates
Derivation of the plate differential equation in Cartesian coordinates and selected solutions
Plate differential equation in cylindrical coordinates
Plate on elastic foundation
Orthotropic plate
Approximation methods, variational principles
Stress function and differential equation for plane problems
Selected solutions of plane problems
Notes on the design of wall structures

Learning targets	The students have a command of calculating stresses in planar surface structures, especially in plates, with different analysis methods. They are also able to apply the finite element method to solve problems in structural engineering.
Conditions for attendance	Completed training in Strength of Materials
Group size	**LE 2001:** 2 SWS lecture ≤ 40 students **LE 2002:** 2 SWS lecture ≤ 40 students
Workload	**180 hours**, of which 56 hrs lecture 121 hrs self-study 3 hrs examination
Pre-examination requirements	None

Lesson plan
Teaching methods +)

Exams ECTS points *)

Lesson plan	SWS +)			Examinations	ECTS points *)	
	V	S	P/Ü			
SEM 2001	**2**			**PK (90 min)**	**3/6**	**6**
SEM 2002	**2**			**PK (90 min)**	**3/6**	

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*) 1 ECTS point = 30 hours of study

					PK:PK = 1:1		
Media modes	Computer presentations, partially with animations						
Additional Literature	W. McGuire, R.H. Gallagher, R.D. Ziemian, Matrix Structural Analysis, John Wiley & Sons 1999 K.-J. Bathe, Finite Element Procedures, Prentice Hall 1995 Recommended readings named by the lecturers at the beginning of semester						
Usability	Compulsory Module for the International Master Program Structural Engineering						

HTWK Leipzig University of Applied Sciences	Faculty of Civil Engineering International Master Program Structural Engineering		**Module B210** SEM 2100
	Team of Lecturers responsible		Elective module B210 **Selected Topics in Steel Structures** Prof. Dr.-Ing. Hebestreit N.N.

Regular semesters	WS	SS	1. or 2. Semester
ECTS points *)	6		
Teaching language	English		
Content of teaching	Hollow section constructions - Introduction, Overview - Dimensioning - Construction with examples Shock absorption in steel construction - Introduction - Tower-like constructions - Absorption technology / Tilger technology - Footbridges and their vibration behaviour Lightweight construction - Aluminium and other non-ferrous metals - Construction - Joining methods - Fatigue Reconstruction of steel structures - Materials - Methods and construction based on examples Welding technology - Welding process - Brittle fracture problems - Adhesive technology - Welding of aluminium - Practical demonstration of welding methods Selected topics of Eurocode 3 - Overview Eurocode 3 - Comparison EC 3 – DIN 18800 - Plate buckling – Class 4 cross-section - Connections (bolted and welded connections, component method, moment resisting joints with and without stiffeners)		
Learning targets	After successful completion of the module, students are able to design complex steel structures using theoretical engineering principles.		
Conditions for attendance	Basic qualification in steel construction		
Group size	4 SWS lecture/seminar ≤ 40 students		
Workload	**180 hours**, of which 56 hrs lecture / seminar-like lecture 92 hrs self-study 30 hrs term paper 2 hrs examination		
Pre-examination requirements	None		

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*) 1 ECTS point = 30 hours of study

Lesson plan Teaching methods [+] Exams ECTS points *)	Lesson plan	SWS [+])			Examinations	ECTS points *)
		V	S	P/Ü		
	SEM 210	**4**			**PK (120 min)**	**6**
Media modes	PowerPoint presentations, transparencies, panel					
Additional Literature	Recommended readings named by the lecturers at the beginning of semester					
Usability	Elective Module for the International Master Program Structural Engineering					

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*) 1 ECTS point = 30 hours of study

HTWK
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program
Structural Engineering

Module B220
SEM 2200

Team of Lecturers
responsible

Elective module B220
Selected Topics in Reinforced Concrete
Prof. Dr.-Ing. Holschemacher

Regular semesters	WS	SS	1. or 2. Semester			
ECTS points *)	6					
Teaching language	English					
Content of teaching	1 Steel fibre reinforced concrete 2 High performance concrete 3 Lightweight aggregate concrete 4 Self-compacting concrete 5 Construction elements of watertight concrete 6 Revaluation and strengthening of concrete elements 7 Composite constructions					
Learning targets	After successful completion of the module, students are able to dimension and design innovative cement-related materials as well as elements of building material such as steel fibre reinforced concrete, lightweight aggregate concrete etc. taking into consideration fresh and hardened concrete properties. The Students design construction elements of watertight concrete, composite constructions and deal with revaluation and strengthening of existing concrete structures.					
Conditions for attendance	Basic qualification in reinforced concrete engineering					
Group size	4 SWS lecture ≤ 40 students					
Workload	**180 hours**, of which 56 hrs lecture 92,5 hrs self-study 30 hrs pre-examination 1,5 hrs examination					
Pre-examination requirements	PVH = term paper (30 hrs)					
Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 2200**	**4**			**PK (90 min)**	**6**
Media modes	PowerPoint presentations, accompanying script for course, transparencies, panel					
Additional Literature	American Concrete Institute: Manual of Concrete Practice 2010. Mc Gregor, Wright: Reinforced Concrete. Mechanics and Design. Prentice Hall, 4th Edition, 2005. Recommended readings named by the lecturers at the beginning of semester					
Usability	Elective Module for the International Master Program Structural Engineering					

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*) 1 ECTS point = 30 hours of study

HTWK
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program Structural Engineering

Module B230
SEM 2300

Team of Lecturers
responsible

Elective module B230
Three Dimensional Concrete Structures
Prof. Dr.-Ing. Jahn

Regular semesters	WS	SS	1. or 2. Semester
ECTS points *)	6		
Teaching language	English		
Content of teaching	1 Tanks 2 Silos 3 Shells 4 Tiled slabs 5 Towers		
Learning targets	After successful completion of the module, students are able to provide calculated evidence for complex spatial load-bearing structures made of reinforced concrete, to design these elements, and to determinate suitable supporting structures and building materials. Students use approximation methods for the calculation of cutting sizes which encourage comprehensive numerical calculations with regards to the plausibility of the results.		
Conditions for attendance	Basic qualification in reinforced concrete engineering		
Group size	4 SWS lecture ≤ 40 students		
Workload	**180 hours**, of which 56 hrs lecture 92,5 hrs self-study 30 hrs pre-examination 1,5 hrs examination		
Pre-examination requirements	PVH = term paper (30 hrs)		

Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 2300**	**4**			**PK (90 min)**	**6**

Media modes	PowerPoint presentations, accompanying script for course, transparencies, panel
Additional Literature	Theory and Design of Concrete Shells; Binoy K. Chatterjee; Hodder & Stoughton Educational (February 1972) Reinforced Concrete Slabs; Robert Park, William L. Gamble; John Wiley & Sons; 2nd edition (January 26, 2000) Analysis of Shells and Plates; Philip L. Gould; Prentice Hall; 2nd edition (October 9, 1998) Theory and Analysis of Elastic Plates and Shells; Junuthula N. Reddy; CRC Press; 2nd edition (November 20, 2006) Recommended readings named by the lecturers at the beginning of semester
Usability	Elective Module for the International Master Program Structural Engineering

+) SWS = semester week lessons; V =lecture; S = Seminar; P/Ü = internship/training

*) 1 ECTS point = 30 hours of study

HTWK Leipzig
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program Structural Engineering

Module B240
SEM 2400

Team of Lecturers
responsible

Elective module B240
Precast Concrete Structures
Prof. Dr.-Ing. Jahn

Regular semesters	WS	SS	1. or 2. Semester
ECTS points *)	6		
Teaching language	English		
Content of teaching	1 Methods and requirements of production 2 Planning process of precast concrete structures 3 Load bearing systems and reinforcement potential 4 Typical construction elements of precast reinforced concrete structures 5 Quality assurance		
Learning targets	After successful completion of the module, students are able to plan and calculate precast reinforced concrete structures while taking subsequent production and quality assurance into consideration.		
Conditions for attendance	Basic qualification in reinforced concrete engineering		
Group size	4 SWS lecture with integrated training ≤ 40 students		
Workload	**180 hours**, of which 56 hrs lecture with integrated exercises 92,5 hrs self-study 30 hrs pre-examination 1,5 hrs examination		
Pre-examination requirements	PVH = term paper (30 hrs)		

Lesson plan Teaching methods +) Exams ECTS points *)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
	SEM 2400	**4**			**PK (90 min)**	**6**

Media modes	Powerpoint presentations, accompanying script for course, transparencies, panel
Additional Literature	Precast Concrete Structures; Kim Elliott; Butterworth-Heinemann; 1st edition (May 14, 2002) Construction of Prestressed Concrete Structures; Ben C. Gerwick Jr.; Wiley-Interscience, 2nd edition (February 13, 1997) Design of Prestressed Concrete Structures; Ned H. Burns, Bruce W. Russell; John Wiley & Sons Inc; edition: 4th revised edition (March 15, 2005) Recommended readings named by the lecturers at the beginning of semester
Usability	Elective Module for the International Master Program Structural Engineering

+) SWS = semester week lessons; V =lecture; S = Seminar; P/Ü = internship/training

*) 1 ECTS point = 30 hours of study

HTWK
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program Structural Engineering

Module U250
SEM 2500

Team of Lecturers
responsible

Elective module U250
Extracurricular Studies
N.N.

Regular semesters	WS	SS	1. or 2. Semester			
ECTS points *)	3					
Teaching language	English					
Content of teaching	corr. course					
Learning targets	After successful completion of the module, students are able to assess the impact of technical contents and scientific methods of other majors / university courses, which have some bearing on civil engineering ideally. Further, multidisciplinary expertises shall become accessible to the students.					
Conditions for attendance	None					
Group size	corr. course					
Workload	**90 hours**					
Pre-examination requirements	corr. course					
Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 2500**	**corr. course**			**corr. course**	**3**
Media modes	corr. course					
Additional Literature	corr. course					
Usability	Elective Module for the International Master Program Structural Engineering					

+) SWS = semester week lessons; V =lecture; S = Seminar; P/Ü = internship/training

*) 1 ECTS point = 30 hours of study

HTWK
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program Structural Engineering

Module B260
SEM 2600

Team of Lecturers
responsible

Elective module B260
Programming in Building Industries
N.N.

Regular semesters	WS	SS	1. or 2. Semester			
ECTS points *)	3					
Teaching language	English					
Content of teaching	Object-oriented design (OOD) und Object-oriented programming (OOP) - Conception and techniques - OOP as programming paradigma - Principles of OOD - Modelling of information - Code quality					
Learning targets	After successful completion of the module, students are able to write simple object-oriented programs to solve engineering problems with respect to universal programming conventions.					
Conditions for attendance	Basic knowledge of a programming language					
Group size	2 SWS lecture/seminar ≤ 40 students					
Workload	**90 hours**, of which 14 hrs lecture 14 hrs seminar-like lecture 31,5 hrs self-study 30 hrs examination as term paper with completion period = 6 weeks 0,5 hrs examination					
Pre-examination requirements	None					
Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 2600**	**1**	**1**		**PH (6 weeks) PK (30 min)**	**3**
					PH:PK= 1:1	
Media modes	PowerPoint and panel presentations, script					
Additional Literature	Recommended readings named by the lecturers at the beginning of semester					
Usability	Elective Module for the International Master Program Structural Engineering					

+) SWS = semester week lessons; V =lecture; S = Seminar; P/Ü = internship/training

*) 1 ECTS point = 30 hours of study

HTWK
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program
Structural Engineering

Module B270
SEM 2700

Team of Lecturers
responsible

Elective module B270
High-rise Buildings
N.N.

Regular semesters	WS	SS	1. or 2. Semester			
ECTS points *)	3					
Teaching language	English					
Content of teaching	- Historical development - Impacts, in particular horizontal loads (wind, earthquakes) - Bearing systems - Building services / technical equipment - Construction methods					
Learning targets	After successful completion of the module, students are able to draft the bearing structure of a high building and to assess the essential bearing behavior of existing structures like high-rise buildings and towers.					
Conditions for attendance	None					
Group size	2 SWS lecture/seminar ≤ 40 students					
Workload	**90 hours**, of which 28 hrs lecture / seminar-like lecture 60,5 hrs self-study 1,5 hrs examination					
Pre-examination requirements	None					
Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 2700**	**2**			**PK (90 min)**	**3**
Media modes	PowerPoint and panel presentations, script					
Additional Literature	Recommended readings named by the lecturers at the beginning of semester					
Usability	Elective Module for the International Master Program Structural Engineering					

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*) 1 ECTS point = 30 hours of study

HTWK Leipzig University of Applied Sciences	Faculty of Civil Engineering International Master Program Structural Engineering				**Module B281** SEM 2800	
	Team of Lecturers responsible		Elective module B281 **Reconstruction and Demolition of Buildings** N.N.			

Regular semesters	WS	SS	1. or 2. Semester			
ECTS points *)	3					
Teaching language	English					
Content of teaching	- Life cycle of buildings - Economic, cultural, and ecological aspects - Methods of building management - Sustainability in the building industries - Demolition and recycling of buildings					
Learning targets	After successful completion of the module, students are able to develop concepts for the reutilization and renaturation of existing buildings. They are able to project strategies for a sustainable utilization of new buildings.					
Conditions for attendance	None					
Group size	2 SWS lecture/seminar ≤ 40 students					
Workload	**90 hours**, of which 28 hrs lecture 60,5 hrs self-study 1,5 hrs examination					
Pre-examination requirements	None					
Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 2800**	**2**			**PK (90 min)**	**3**
Media modes	PowerPoint and panel presentations, script					
Additional Literature	Recommended readings named by the lecturers at the beginning of semester					
Usability	Elective Module for the International Master Program Structural Engineering					

+) SWS = semester week lessons; V =lecture; S = Seminar; P/Ü = internship/training

*) 1 ECTS point = 30 hours of study

HTWK Leipzig
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program Structural Engineering

Module B290
SEM 2900

Team of Lecturers
responsible

Elective module B290
Seismic Design of Buildings
N.N.

Regular semesters	WS	SS	1. or 2. Semester			
ECTS points *)	3					
Teaching language	English					
Content of teaching	- Characterization of earthquakes - Design of buildings for dynamic loads - Earthquake-resistant constructions - Risk assessment					
Learning targets	After successful completion of the module, students are able to assess the threat of earthquakes to buildings. In the context of a risk evaluation, they are able to propose practical measures to secure buildings against earthquakes.					
Conditions for attendance	None					
Group size	2 SWS lecture/seminar ≤ 40 students					
Workload	**90 hours**, of which 28 hrs lecture / seminar-like lecture 60,5 hrs self-study 1,5 hrs examination					
Pre-examination requirements	None					
Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 2900**	**2**			**PK (90 min)**	**3**
Media modes	PowerPoint and panel presentations, script					
Additional Literature	Recommended readings named by the lecturers at the beginning of semester					
Usability	Elective Module for the International Master Program Structural Engineering					

+) SWS = semester week lessons; V =lecture; S = Seminar; P/Ü = internship/training

*) 1 ECTS point = 30 hours of study

HTWK
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program
Structural Engineering

Module B300
SEM 3000

Team of Lecturers
responsible

Compulsory module B300
Prestressed Concrete Construction
Prof. Dr.-Ing. Reuschel

Regular semesters	WS	SS	1. Semester
ECTS points *)	6		
Teaching language	English		
Content of teaching	- Introduction - Building materials - Tendon profile - Technology of prestressing - Prestressing force - Path of stressing force - Calculation of cutting forces due to prestressing - Creeping and contraction of concrete - Preliminary calculation - Verification at the limit state of serviceability - Verification at the limit state of strength - General construction rules - Complex example		
Learning targets	After successful completion of the module, students are able to calculate the bearing and deformation behaviour of prestressed concrete elements. They choose an appropriate type of prestressing and determine the tendon profile corresponding to different conditions of service. The students design prestressed concrete elements with statically determinated and hyperstatic support.		
Conditions for attendance	Basic qualification in reinforced concrete engineering		
Group size	4 SWS lecture with integrated training ≤ 40 students		
Workload	**180 hours**, of which 56 hrs lecture with integrated exercises 62,5 hrs self-study 60 hrs pre-examination 1,5 hrs examination		
Pre-examination requirements	PVH = term paper (60 hrs)		

Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 3000**	**4**			**PK (90 min)**	**6**

Media modes	PowerPoint presentations, accompanying lecture notes, transparencies, panel, practical training seminar, building site excursion
Additional Literature	Recommended readings named by the lecturers at the beginning of semester
Usability	Compulsory Module for the International Master Program Structural Engineering

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*) 1 ECTS point = 30 hours of study

HTWK Leipzig
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program Structural Engineering

Module B310
SEM 3100

Team of Lecturers
responsible

Elective module B310
Building Services
N.N.

Regular semesters	WS	SS	1. or 2. Semester			
ECTS points *)	3					
Teaching language	English					
Content of teaching	- Principles of the buildings services (heating, ventilation / air conditioning, plumbing) - Electrical installations (wiring, computer systems, lightning protection, elevators, intruder and fire alarm systems, electroacoustic installations, video control, renewable energies)					
Learning targets	After successful completion of the module, students are able to draft the technical equipment of a building. In the frame of an interdisciplinary cooperation, they develop practical plans for new and existing buildings.					
Conditions for attendance	None					
Group size	2 SWS lecture/seminar ≤ 40 students					
Workload	**90 hours**, of which 28 hrs lecture / seminar-like lecture 60,5 hrs self-study 1,5 hrs examination					
Pre-examination requirements	None					
Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 3100**	**2**			**PK (90 min)**	**3**
Media modes	PowerPoint and panel presentations, script					
Additional Literature	Recommended readings named by the lecturers at the beginning of semester					
Usability	Elective Module for the International Master Program Structural Engineering					

+) SWS = semester week lessons; V =lecture; S = Seminar; P/Ü = internship/training

*) 1 ECTS point = 30 hours of study

HTWK Leipzig
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program
Structural Engineering

Module B320
SEM 3200

Team of Lecturers
responsible

Elective module B320
Construction Management
N.N.

Regular semesters	WS	SS	1. or 2. Semester			
ECTS points *)	3					
Teaching language	English					
Content of teaching	- Concerned parties of a project - Phases of a building project and project organization - Control of deadlines and costs - Contract management					
Learning targets	After successful completion of the module, students are able to prepare and to control small to medium size building projects using the methods of project management - from the development of the project to the facility management.					
Conditions for attendance	None					
Group size	2 SWS lecture/seminar ≤ 40 students					
Workload	**90 hours**, of which 28 hrs lecture / seminar-like lecture 60,5 hrs self-study 1,5 hrs examination					
Pre-examination requirements	None					
Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 3200**	**2**			**PK (90 min)**	**3**
Media modes	PowerPoint and panel presentations, script					
Additional Literature	Recommended readings named by the lecturers at the beginning of semester					
Usability	Elective Module for the International Master Program Structural Engineering					

+) SWS = semester week lessons; V =lecture; S = Seminar; P/Ü = internship/training

*) 1 ECTS point = 30 hours of study

HTWK
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program
Structural Engineering

Module B330
SEM 3300

Team of Lecturers
responsible

Elective module B330
Design Project
N.N.

Regular semesters	WS	SS	1. or 2. Semester				
ECTS points *)	3						
Teaching language	English						
Content of teaching	Processing of a practical building project in the field of structural engineering - Estimation of the basics (assessment, building history, inspection of the building, structural analysis, damage survey, exploration of the building ground) - Planning and Construction (utilization concept, requirements of the building physics, basic engineering and detailed design) - Construction management (costing, announcement, placing)						
Learning targets	After successful completion of the module, students are able to plan a building project with practical relevance on their own. In addition, the development of an interdisciplinary thinking and a gain of the student's soft skills is encouraged.						
Conditions for attendance	None						
Group size	2 SWS lecture/seminar ≤ 40 students						
Workload	**90 hours**, of which 14 hrs seminar-like lecture 14 hrs practical training / exercise 31,5 hrs project work in groups 30 hrs term paper with completion period = 6 weeks 0,5 hrs examination						
Pre-examination requirements	None						
Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)	
		V	S	P/Ü			
Exams ECTS points *)	**SEM 3300**		**1**	**1**	**PH (6 weeks) PP (30 min)**	**3**	
					PH:PP= 1:1		
Media modes	PowerPoint and panel presentations, script						
Additional Literature	Recommended readings named by the lecturers at the beginning of semester						
Usability	Elective Module for the International Master Program Structural Engineering						

+) SWS = semester week lessons; V =lecture; S = Seminar; P/Ü = internship/training

*) 1 ECTS point = 30 hours of study

I-HTWK Leipzig University of Applied Sciences	Faculty of Civil Engineering International Master Program Structural Engineering	**Module B341** SEM 3400	
	Team of Lecturers responsible	Compulsory module B341 **Construction Technology** Prof. Dr.-Ing. Yaarob Al Ghanem	

Regular semesters	WS	SS	3. Semester
ECTS points *)	3		
Teaching language	English		
Content of teaching	1 Formwork systems Traditional wooden formwork Frame formwork and girder formwork Formwork for ceilings, beams, walls, columns and foundations 2 Concrete pressure on vertical and inclined formwork Determination of the formwork pressure Determination of the acting anchor forces Calculation of the anchor elongation 3 Fresh Concrete Batching, Mixing, Transporting and Handling Concrete Determining the performance of the concrete mixing plant Determining the transport performance of the concrete mixing plant Production processes of fresh concrete Transport processes of fresh concrete Determination of the necessary pressure of the concrete pump according to the nomograms 4 Watertight concrete constructions Design principles of waterproof concrete constructions Sealing of joints, openings and ties Instructions for avoiding execution errors		
Learning targets	Upon successful completion of the module, students will be able to understand, execute, control and manage building processes. This enables them to effectively support a building project with increased quality of construction. The students will be enabled to choose and apply appropriate construction methods, construction machinery taking into account material, constructive, economic and ecological aspects as well as occupational safety. The acquired subject-specific knowledge is fixed by conducting seminars with smaller working groups..		
Conditions for attendance	Basic information in concrete and formwork construction		
Size of group	2 SWS lecture with integrated training ≤ 40 students		
Workload	**90 hours**, of which 28 hrs lecture / seminar-like lecture 45 hrs self-study 15,5 hrs term paper 1,5 hrs examination		
Pre-examination requirements	none		

Lesson plan Teaching methods [+])	Lesson plan	SWS [+])			Examinations	ECTS points *)
		V	S	P/Ü		

[+]) SWS = semester week lessons; V =lecture; S = Seminar; P/Ü = internship/training

*) 1 ECTS point = 30 hours of study

Exams ECTS points *)	**SEM 3400**	**2**			**PK (90 min)**	**3**
Media modes	PowerPoint presentations, accompanying course script, transparencies, panel					
Addidional Literature	Joint Sealing in Water-Resistant Concrete Structure Rainer Hohmann, Fraunhofer IRB Verlag, 2011, ISBN 978-3-8167-8019-9 Standard DIN 7865-1, 2008-02: Elastomeric waterstops for sealing of joint in Concrete-Part 1: Shape and dimension Standard DIN 7865-2, 2008-02: Elastomeric waterstops for sealing of joint in Concrete-Part 2: Material specifications and testing Standard DIN 18197,2011-04: Sealing of joints in concrete with waterstops American Concrete Institute: Guide to Formwork for Concrete ACI 347-04 Formwork for Concrete, M.K.Hurd, . 2005, Edition, Farmington Hills, Michigan, ISBN 0-87031-177-8 Building Code Requirements for Structural Concrete (ACI 318-05) and Commentary (ACI 318R-05, Reported by ACI Committee 318, Structural Building Code Recommended readings named by the lecturers at the beginning of semester					
Usability	Compulsory Module for the International Master Program Structural Engineering					

HTWK
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program
Structural Engineering

Module B350
SEM 3500

Team of Lecturers
responsible

Compulsory module B350
Advanced Building Materials
Prof. Dr.-Ing. Wagner
Prof. Dr.-Ing. Nietner

Regular semesters	WS	SS	3. Semester
ECTS points *)	3		
Teaching language	English		
Content of teaching	- Advanced building material parameters and material testing (wedge-splitting test, uniaxial tensile test, bending tensile test) - Advanced technology and durability assessment of cement based materials - Further knowledge about mineral binder (cement and hydraulic lime) - Simulation of concrete hydration heat evolution and crack risk estimation - Optimization of the durability of concrete by controlling the aftertreatment (thermal and hygric) - Materials for Rehabilitation and reinforcement of structural components made of concrete - Fibre reinforced concrete and strain hardening materials - Textile reinforced concrete (textiles made of glass and carbon) - Steel and selected topics of steel welding problems - Corrosion chemistry and corrosion protection of steel constructions - Anisotropic properties of wood and engineered woods (timber)		
Learning targets	In-depth knowledge in: Mechanical parameters of selected building material, building material testing, concrete technology, special concretes (composite building materials), steel, corrosion protection and wood construction materials. Furthermore, the students get a deeper knowledge about the durability and usability of selected building materials. They are able to identify and assess the risks to the durability and stability of the structure when used improperly.		
Conditions for attendance	Basic knowledge in the selection and use of common building materials recommended.		
Group size	1 SWS ≤ 40 students; practical training ≤ 26 students		
Workload	**90 hours**, of which 14 hrs lecture 14 hrs practical training 32,5 hrs self-study 28 hrs pre-examination 1,5 hrs examination		
Pre-examination requirements	Participation in the seminars; pass of the Opal tests		

Lesson plan Teaching methods +) Exams ECTS points *)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
	SEM 3500	**1**		**1**	**PK (90 min)**	**3**

Media modes	Slides, whiteboard, work instructions in paper form
Additional literature	Materials for Construction and Civil Engineering, M. Clara Gonçalves, Fernanda Margarido, Springer Link (free). Steels, Wei Sha, Springer Link (free)

+) SWS = semester week lessons; V =lecture; S = Seminar; P/Ü = internship/training

*) 1 ECTS point = 30 hours of study

	Problems in Service Life Prediction of Building and Construction Materials, Larry W. Masters, Springer Link. Innovative Materials and Techniques in Concrete Construction, Michael N. Fardis, Springer Link.
Usability	Compulsory Module for the International Master Program Structural Engineering

HTWK Leipzig University of Applied Sciences	Faculty of Civil Engineering International Master Program Structural Engineering		**Module B400** SEM 4000
	Team of Lecturers responsible		Compulsory module B400 **Spread Foundation** Prof. Dr.-Ing. Thiele

Regular semesters	WS	SS	1. Semester
ECTS points *)	3		
Teaching language	English		
Content of teaching	1. Static loaded foundations – individual and strip foundations · execution and structural design · base pressure calculation · foundation formation – mat foundations · formation, joint construction · tension-trapezoid method · bedding modulus method · stiffness modulus method and combined method – membrane foundation – foundation of tower-like constructions – combined pile-slab foundation 2. Dynamic loaded foundations – basic terms of the theory of mechanical vibrations – dynamic properties of soils – dynamic screenings of building grounds – vibrations of foundation constructions – agitation of buildings – earthquakes 3. Estimation of the bearing capacity of existing foundations and their improvement – inspection of existing foundations – securing and redevelopment of existing foundations – examples of the securing of historical buildings 4. Geo-synthetic materials – application – design		
Learning targets	After successful completion of the module, students are able to plan and dimension spread foundations. They calculate dynamic loaded foundations in due consideration of the dynamic properties of the soil. They apply inspection and securing measures for ancient foundation constructions and design geo-synthetic constructions.		
Conditions for attendance	None		
Group size	2 SWS lecture/seminar ≤ 40 students		
Workload	**90 hours**, of which 14 hrs lecture 14 hrs seminar-like lecture 30,5 hrs self-study 30 hrs pre-examination 1,5 hrs examination		
Pre-examination requirements	PVH = term paper (30 hrs)		

+) SWS = semester week lessons; V =lecture; S = Seminar; P/Ü = internship/training

*) 1 ECTS point = 30 hours of study

Lesson plan Teaching methods +) Exams ECTS points *)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
	SEM 4000	**1**	**1**		**PK (90 min)**	**3**
Media modes	PowerPoint presentation, lecture notes, transparencies, panel, film extracts					
Additional Literature	Geotechnical Engineering Handbook; Part 1-3 by U. Smoltczyk Geotechnical Engineering: Soil and Foundation Principles and Practice, 5th Ed. by Richard Handy and Merlin Spangler Principles of Foundation Engineering by Braja M. Das Recommended readings named by the lecturers at the beginning of semester					
Usability	Compulsory Module for the International Master Program Structural Engineering					

HTWK
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program
Structural Engineering

Module B501
SEM 5000

Team of Lecturers
responsible

Compulsory module B501
Bridge Design
Prof. Dr.-Ing. Hebestreit
Prof. Dr.-Ing. Reuschel

Regular semesters	WS	SS	2. Semester
ECTS points *)		6	
Teaching language	English		
Content of teaching	- Introduction (terms, classification, fields of application, business aspects, historical outline, design criteria, norms and regulations, references) - Impact on structures for railway, road and pedestrian bridges - Main bearing systems (slabs, girder bridges, cable-stayed bridges, arched and framed bridges, suspension bridges) - Basics of the analysis of steel superstructures (effective width, orthotropic deck, St. Venant torsion and cross frames, stabilization of compression chords and arches, buckling) - Basics of the calculation of concrete superstructures (slab systems, beam bearing structures, prestressing, CDSR) - Substructures of bridges (abutments, piers and supports) - Bridge bearings, expansion joints, railings, draining and sealing - Monitoring and checking of existing bridge structures (inspection corr. DIN 1076, special examinations) - Costs and efficiency - Construction methods, assembly		
Learning targets	After successful completion of the module, students are able to apply basic knowledge of bridge engineering with regard to the design, calculation, construction and inspection of road, railway and pedestrian/bicycle bridges covering the use of various materials. By processing a project, students are able to elaborate and present simple design tasks in terms of statics and construction on their own.		
Conditions for attendance	Basics of structural mechanics (bar and plate structures), reinforced and prestressed concrete as well as steel structures		
Group size	4 SWS lecture/seminar ≤ 40 students		
Workload	**180 hours**, of which 56 hrs lecture / seminar-like lecture 62,5 hrs self-study and consultation 60 hrs pre-examination 1,5 hrs examination		
Pre-examination requirements	PVH + PVV = term paper + defense (60 hrs)		

Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 5000**	**4**			**PK (90 min)**	**6**

Media modes	PowerPoint presentations, accompanying lecture notes, transparencies, panel, building site excursion
Additional Literature	Recommended readings named by the lecturers at the beginning of semester
Usability	Compulsory Module for the International Master Program Structural Engineering

+) SWS = semester week lessons; V =lecture; S = Seminar; P/Ü = internship/training

*) 1 ECTS point = 30 hours of study

HTWK Leipzig University of Applied Sciences	Faculty of Civil Engineering International Master Program Structural Engineering		**Module B600** SEM 6000
	Team of Lecturers responsible		Compulsory module B600 **Composite Structures** N.N.

Regular semesters	WS	SS	2. Semester
ECTS points *)		6	
Teaching language	English		

Content of teaching

1. Introduction
   - Description of construction methods
   - Terms used in composite construction
   - Development of steel composite structures
2. Basics of design and dimensioning
   - Regulations and concepts of dimensioning
   - Material properties
3. Composite girders
   - Basics and types of constructions
   - Verification at the limit state of strength and at the limit state of serviceability
   - Example
4. Composite columns
   - Basics and types of constructions
   - Simplified calculation procedure
   - Fields of application
   - Concentric pressure; pressure with bending
   - Example
5. Composite slabs
   - Basics and types of constructions
   - Notes on dimensioning
   - Example

Learning targets	After successful completion of the module, students are able to plan steel composite constructions including theoretical engineering principles and the supervision of execution.
Conditions for attendance	Basic qualification in steel construction and reinforced concrete construction
Group size	4 SWS lecture ≤ 40 students
Workload	**180 hours**, of which 56 hrs lecture 92 hrs self-study 30 hrs pre-examination 2 hrs examination
Pre-examination requirements	PVH = term paper (30 hrs)

Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 6000**	**4**			**PK (120 min)**	**6**

Media modes	PowerPoint presentation, panel, transparencies, photos
Additional Literature	DIN V 1880 T5 and EC 4 Recommended readings named by the lecturers at the beginning of semester
Usability	Compulsory Module for the International Master Program Structural Engineering

+) SWS = semester week lessons; V =lecture; S = Seminar; P/Ü = internship/training

*) 1 ECTS point = 30 hours of study

I-HTWK Leipzig University of Applied Sciences	Faculty of Civil Engineering International Master Program Structural Engineering		**Module B700** SEM 7000
	Team of Lecturers responsible		Compulsory module B700 **Structural Dynamics** Prof. Dr.-Ing. Lenzen

Regular semesters	WS	SS	2. Semester
ECTS points *)		3	
Teaching language	English		
Content of teaching	- Motivation of structural dynamics by project examples, vibrations, dynamics of buildings and machines, etc. - Classification of vibration types, definitions according to effects, mathematical / mechanical, deterministic / stochastic, etc. - Oscillators with one degree of freedom (EFS) Equation of motion, free unabsorbed and absorbed oscillations, differential equation, discussion of characteristic parameters like mass, rigidity, inherent frequency, absorption, application / simulation with digital computer - EFS forced oscillations differential equation, solution to the activation and deactivation process, pulse, convolution integral, transfer function harmonic stimulation, enlargement function, resonance study of the oscillation behaviour with reference to EFS / simulation with digital computer - MFS and modal analysis Numerical and experimental, display of the state space, FEM Simulation with digital computer Fourier transformation (FT), image section Analytical and discrete FT, FFT, spectral analysis / signals / systems, solution methods in image domain, frequency response function, simulation with digital computer - Signals / processes and systems / identification / modelling Subspace methods, experiments in lab measurement technology and real time simulation – digital computer - Discussion of the topic Structural dynamics on the basis of project examples, Notes on DIN set of regulations e.g. DIN 4150		
Learning targets	After successfully completion of the module, students are able to analyse and understand selected models of dynamic processes from structural mechanics with the aid of modern calculation methods (e.g. Matlab).		
Conditions for at tendance	Basic Knowledge of Mechanics		
Group size	1 SWS lectures ≤ 40 students, 1 SWS seminar ≤ 20 students, lab ≤ 5 students		
Workload	**90 hours**, of which 14 hrs lecture 14 hrs seminar-like lecture / practical training in the lab 35 hrs self-study and consultation 25 hrs pre-examination 2 hrs examination		
Pre-examination requirements	PVH = term paper (25 hrs)		

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Lesson plan Teaching methods [+] Exams ECTS points *)	Lesson plan	SWS [+])			Examinations	ECTS points *)
		V	S	P/Ü		
	SEM 7000	**1**	**1**		**PK (120 min)**	**3**
Media modes	Presentations with projector and panel					
Additional Literature	H. Waller, A. Lenzen, Mechanical Vibrations and Structural Dynamics Analytical-, Numerical- and Experimental Methods, Springer 2011 Jer-Nan Juang, Applied System Identification, Prentice Hall, 1994 Recommended readings named by the lecturers at the beginning of semester					
Usability	Compulsory Module for the International Master Program Structural Engineering					

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HTWK
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program
Structural Engineering

Module B799
SEM 8000

Team of Lecturers
responsible

Compulsory module B799
Practical Course on Finite Elements
Prof. Dr.-Ing. Slowik

Regular semesters	WS	SS	3rd semester
ECTS points *)	3		
Teaching language	English		
Content of teaching	**Exercises with ANSYS Workbench:** - Tension member with hole, application of plane elements, convergence investigation and parametric study - Frame corner, application of beam, shell, and volume elements - Consideration of plastic material behaviour in static analyses - Buckling analysis - Modal analysis, harmonic analysis, transient structural dynamics - Steady-state thermal analysis and transient thermal analysis, coupled thermo-mechanical analysis		
Learning targets	After successful completion of the module, the students have practical experience in the application of the finite element method for static and dynamic structural analyses as well as in building physics.		
Conditions for attendance	Finite Element Method		
Group size	2 SWS practical training, groups ≤ 20 students, 2 students per computer		
Workload	**90 hours**, of which 28 hrs practical training 32 hrs self-study 30 hrs examination as term paper with completion period = 6 weeks		
Pre-examination requirements	None		

Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)	
		V	S	P/Ü			
Exams ECTS points *)	**SEM 8000**			**2**	**PH (6 weeks)**	**3**	

Media modes	Computer presentations, partly with animation
Additional Literature	D. J. Shiku, ANSYS Workbench tutorial : structural & thermal analysis using the ANSYS Workbench release 13 environment, SDC Publ. 2011 H.-H. Lee, Finite Element simulations with ANSYS Workbench 13: [theory, applications, case studies], SDC Publ. 2011
Usability	Compulsory Module for the International Master Program *Structural Engineering*

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HTWK
Leipzig University of Applied Sciences

Faculty of Civil Engineering
International Master Program
Structural Engineering

Module B905
SEM 9000

Team of Lecturers
responsible

Compulsory module B905
Selected Topics of Structural Mechanics
Prof. Dr. Schubert
Prof. Dr.-Ing. Slowik
Prof. Dr.-Ing. Lenzen

Regular semesters	WS	SS	3. Semester
ECTS points *)	6		
Teaching language	English		
Content of teaching	- Advanced Mechanics of Materials (theory of elasticity, yield/failure criteria, fracture mechanics) - Analysis of beam structures according to the theory of second order (second order bending, analysis of internal forces and displacements) - Theory of plasticity (plastic cross-sectional reserves, plastic internal forces of beams and interaction, plastic reserves of the structural system, plastic hinge method, theory of plastic limit analysis) - Introduction of structural dynamics, single degree of freedom systems, solutions of free and forced vibration, multi degree of freedom systems, modal analysis		
Learning targets	After successful completion of the module, students are able to analyse complex mechanical problems and to develop appropriate solutions.		
Conditions for attendance	Basic qualification in structural mechanics		
Group size	4 SWS lecture/seminar ≤ 40 students		
Workload	**180 hours**, of which 42 hrs lecture 14 hrs seminar-like lecture 71 hrs self-study and consultation 50 hrs pre-examination 3 hrs examination		
Pre-examination requirements	PVH + PVP = term paper + presentation (50 hrs)		

Lesson plan Teaching methods +)	Lesson plan	SWS +)			Examinations	ECTS points *)
		V	S	P/Ü		
Exams ECTS points *)	**SEM 9000**	**3**	**1**		**PK (180 min)**	**6**

Media modes	PowerPoint presentations, lecture notes, transparencies, panel
Additional Literature	Petersen, Ch.: Statik und Stabilität der Baukonstruktionen, Vieweg- Verlag, 1992 Werkle,H.: Finite Elemente in der Baustatik - Statik und Dynamik in der Stab- und Flächentragwerke, Vieweg Verlag, 2008 Wriggers, P.: Nonlinear Finite Element Methods, Springer, 2008 Rubin / Schneider: Theorie I. und II. Ordnung, 2002 Dunne, Petrinic: Introduction to Computational Plasticity S.P. Timoshenko, J.N. Goodier, Theory of Elasticity, McGraw-Hill 1970 D. Gross, Th. Seelig, Fracture Mechanics, Springer 2018 B.L. Karihaloo, Fracture Mechanics & Structural Concrete, Longman Scientific & Technical

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	1995 Recommended readings named by the lecturers at the beginning of semester
Usability	Compulsory Module for the International Master Program Structural Engineering