Mocule Card

Master Civil Engineering
HCU Hamburg

Module Number	Modul Name	Type (C/CE/E)	Semester (proposed)	Module Coordinator
BIW-M-Mod-101	Engineering Mathematics	C	1	Prof. Dr. Thomas Schramm

Subject Area	Duration
Basics	1 Semester

CP (according to ECTS)	Contact Hours/Week (SWS)	Self-study
5 CP (= 150 h Workload)	4 (= 42 h Contact Time)	108 h

Objectives and Contents

Objective of Qualification (competencies)
Students will gain familiarity with and understand the advanced mathematical principles of engineering mathematics used for modeling and data analysis in civil engineering.
Contents
Elements of advanced engineering mathematics: - Complex algebra and its geometric interpretation - Multivariable real-valued functions and their Taylor expansions - Elements of vector analysis (gradient, Jacobian and Hessian matrices) - Fourier transformation, important theorems (fold, cross-correlation) and their application - Types of differential equations, systems of ordinary first-order linear differential equations, interpretation of ma-trix exponentials, simple solution methods - Going further with ordinary differential equations, fundamentals of numerical methods - Mathematical basis of the finite element method - Preview: partial differential equations The first part of the module is identical to Module GEO-M-Mod-101 Engineering Mathematics and is conducted in Eng-lish. Assignments in the form of formative e-assessments may supplement contact hours.
Recommended Literature
Kenneth A. Stroud, Dexter J. Booth, Engineering Mathematics, Palgrave Macmillan Limited, 01.01.2013 - 1155 pages Buchanan, G. R., Schaum's Outline of Fourier Analysis with Applications to Boundary Value Problems, Mcgraw-Hill Professional ,1974 Scheid, F., Schaum's Outline of Numerical Analysis, 2nd Ed., Mcgraw-Hill Professional, 1989 Spiegel, M. R., Schaum's Outline of Finite Element Analysis, Mcgraw-Hill Professional, 1995 Spiegel, M. R., Schaum's Outline of Advanced Mathematics for Engineers and Scientists, Mcgraw-Hill Profes-sional; Auflage: 1, 2009 Thomas Westermann, Mathematik für Ingenieure, 7. Auflage, Springer, Heidelberg,2015 (available as eBook)
Teaching and Learning Methods
Lecture (2 Hours per Week) + Practical Seminar (2 Hours per Week)

Exam(s)

Precondition of Examination	
Type of Examination	**Duration of Examination (if written or oral exam)**
Written Exam / eAssessment	3 h
Composition of Module Mark	
Mark of Exam	

Additional Information

Previous Knowledge / Conditions for Participation (in form and content)

Applicability of Module
Frequency of Offering
every Winter Semester
Course Language
English/German

valid from	valid to	last updated
Winter Semester 15/16		25.09.2018

Mocule Card

Master Civil Engineering
HCU Hamburg

Module Number	Modul Name	Type (C/CE/E)	Semester (proposed)	Module Coordinator
BIW-M-Mod-102	Computer Science in Statics	C	1	Prof. Dr.-Ing. Klaus Liebrecht

Subject Area	Duration
Basics	1 Semester

CP (according to ECTS)	Contact Hours/Week (SWS)	Self-study
5 CP (= 150 h Workload)	4 (= 42 h Contact Time)	108 h

Objectives and Contents

Objective of Qualification (competencies)
The finite element method (FEM) is the most widespread computer-based calculation method in statics. Due to its vivid clarity and excellent flexibility with load-bearing structures, material properties, loading and support conditions, the finite element method is used in calculating rod-shaped components and two-dimensional structures. Beginning with a theoretical introduction to the finite element method, students will be guided in unitizing and designing frameworks and two-dimensional structures on the computer and will then do so independently. Alongside learning the theoretical background and practical application of the finite element method, knowledge of the limits of the method is paramount. With their knowledge of statics, students will learn to perform independent checks on computer-aided calcu-lations and to document them according to standard procedure.
Contents

- Introduction to the theory of the finite element method (FEM)
  - Derivation of basic equations
  - Energy methods and variational principles
  - Approximation method
  - Element types
- Analysis of frameworks and two-dimensional structures
  - Fundamentals
  - Mesh generation
  - Modeling bearings
  - Elastic bedding of base plates (modulus of subgrade reaction method / constrained modulus method)
  - Modeling of effects / combinatorics
  - Definition of singularities / treatment of singularities
  - Calculation of spring stiffness
  - Punching through plates
  - Wall-like beams
- Limits of FEM calculations
- Analysis of errors in FEM calculations
- Checking and documenting computer-aided calculations

Recommended Literature
K.-J. Bathe. Finite-Elemente-Methoden. Springer-Verlag (2001) O.C. Zienkiewicz, R.L. Taylor. The Finite Element Method, Volume 1 and Volume 2. Butterworth-Heinemann (2000) Rombach, Günter: Anwendung der Finite-Elemente-Methode im Betonbau, Ernst & Sohn, Berlin (2000) Katz, Hartmann: Statik mit finiten Elementen, Springer Verlag, (2002) Werkle, Horst: Finite Elemente in der Baustatik, 2. Auflage, Vieweg Verlag (2001)
Teaching and Learning Methods
Lecture (2 Hours per Week) + Practical Seminar (2 Hours per Week)

Exam(s)

Precondition of Examination	
passed Pre-Assignment	
Type of Examination	Duration of Examination (if written or oral exam)
Pre-Assignment: Written Assignment (offered every semester) Examination: Written Exam	Written Exam 1,5 h
Composition of Module Mark	

Mark of Exam

Additional Information

Previous Knowledge / Conditions for Participation (in form and content)
Applicability of Module
Frequency of Offering
every Winter Semester
Course Language
German

valid from	valid to	last updated
Winter Semester 15/16		25.09.2018

Mocule Card

Master Civil Engineering
HCU Hamburg

Module Number	Modul Name	Type (C/CE/E)	Semester (proposed)	Module Coordinator
BIW-M-Mod-103	Steel Structures	C	1	Prof. Dr.-Ing. Manuel Krahwinkel

Subject Area	Duration
Basics	1 Semester

CP (according to ECTS)	Contact Hours/Week (SWS)	Self-study
5 CP (= 150 h Workload)	4 (= 42 h Contact Time)	108 h

Objectives and Contents

Objective of Qualification (competencies)
Students will gain in-depth knowledge of steel and composite construction.
Contents
- Composite construction: Multistorey composite steel and concrete buildings, composite beam design, composite flooring and supports, fire protection and fire safety design in composite structures - Steel construction: Fire protection and fire safety in steel structures, plate buckling, fatigue analysis
Recommended Literature
Krahwinkel, M.; Kindmann, R.: Stahl- und Verbundkonstruktionen, 3. Auflage, Springer Vieweg, 2016
Teaching and Learning Methods
Lecture + Practical Seminar (4 Hours per Week)

Exam(s)

Precondition of Examination	
Type of Examination	**Duration of Examination (if written or oral exam)**
Written Assignment	
Composition of Module Mark	
Mark of Written Assignment	

Additional Information

Previous Knowledge / Conditions for Participation (in form and content)
Applicability of Module
Frequency of Offering
every Winter Semester
Course Language
German

valid from	valid to	last updated
Winter Semester 15/16		25.09.2018

Mocule Card

Master Civil Engineering
HCU Hamburg

Module Number	Modul Name	Type (C/CE/E)	Semester (proposed)	Module Coordinator
BIW-M-Mod-104	Concrete Strucutres	C	1	Prof. Dr.-Ing. Klaus Liebrecht

Subject Area	Duration
Basics	1 Semester

CP (according to ECTS)	Contact Hours/Week (SWS)	Self-study
5 CP (= 150 h Workload)	4 (= 42 h Contact Time)	108 h

Objectives and Contents

Objective of Qualification (competencies)
Students will gain in-depth knowledge of the calculation rules and design methods for concrete structures, which will enable them to work independently on structures of an above average level of difficulty (HOAI). The key rules for de-sign will be derived paradigmatically to clarify the scientific procedure in developing design rules and equations.
Contents
- Bending stress: Stress redistribution (design oriented toward the compression zone) - Design for shear force and torsion: Special case: indirect supports / rules for single loads near supports / influence of changeable component height / joining secondary beams / connection of compression and tension flanges / designing for pure torsion / designing for shear force and torsion / structural details - Wall design: Shear walls / segmented shear walls / diaphragms / construction - Bracing: Analysis of sufficient lateral and torsional rigidity in braced structures / distribution of horizontal loads on bracing components / design of bracing components - Single compression members: Consideration of creep effects / compression members with biaxial eccentricity / construction - Special reinforced concrete components (discontinuity regions): Frame design / designing brackets, half joints, etc. - Subarea surface pressure and tensile splitting: Design and construction / bearing construction
Recommended Literature
Goris, Alfons: Stahlbetonbau-Praxis nach Eurocode 2, Band I u. II, ab 5. Auflage, Beuth-Verlag, Berlin – Wien - Zürich (2013) Avak, Conchon, Aldejohann: Stahlbetonbau in Beispielen Teil 1, ab 7. Auflage, Bundesanzeiger Verlag, Köln (2016) Wommelsdorff: Stahlbetonbau – Bemessung und Konstruktion Teil 1, ab 8. Aufl., Wolters Kluwer Verlag (2005) Quast, Ulrich: Nichtlineare Statik im Stahlbetonbau, Bauwerk Verlag Berlin (2007) Schneider: Bautabellen für Ingenieure, ab 20. Auflage, Köln, Werner Verlag
Teaching and Learning Methods
Lecture + Practical Seminar (4 Hours per Week)

Exam(s)

Precondition of Examination	
Type of Examination	**Duration of Examination (if written or oral exam)**
Written Exam Note: Optional homework assignments will be given.	3 h
Composition of Module Mark	
Mark of Exam	

Additional Information

Previous Knowledge / Conditions for Participation (in form and content)
Applicability of Module
Compulsory Elective Special Constructions: Prestressed Concrete (recommended)

Frequency of Offering
every Winter Semester
Course Language
German

valid from	valid to	last updated
Winter Semester 16/17		28.09.2018

Mocule Card

Master Civil Engineering
HCU Hamburg

Module Number	Modul Name	Type (C/CE/E)	Semester (proposed)	Module Coordinator
BIW-M-Mod-105	Facade Structures I	C	1	Prof. Dr.-Ing. Frank Wellershoff

Subject Area	Duration
Architectural Engineering	1 Semester

CP (according to ECTS)	Contact Hours/Week (SWS)	Self-study
5 CP (= 150 h Workload)	4 (= 42 h Contact Time)	108 h

Objectives and Contents

Objective of Qualification (competencies)
- Design planning: - Pre-selection of location and suitable façade structures specific to the building - Design planning of façade structures under conditions of static loading and building physics
Contents
- Design planning: - Historical development of façade construction in various cultures and regions - Building users' comfort requirements specific to activity (temperature, fresh air, humidity, sound level, lighting) - Aspects of power efficiency (nighttime cooling, shading, solar energy, wind energy) - Aspects of economic efficiency (low-maintenance planning, double-skin facades with forced ventilation, sur-face coatings) - Environment – and sustainability certification systems (BREEM, LEED, DGNB) - Typology of façade structures (punctuated facades, post and beam facades, double-skin, cable truss facades, lattice shell) - Identifying geometry (flat surfaces, developable surfaces, non-developable surfaces, freeform surfaces) - System decision criteria, assessment criteria - Building materials and products and their joining and anchoring principles (natural stone, clay stone, concrete, wood, plastic, metal, glass: basic materials, production and finishing processes - Interaction among building concept, building technology and façade system - Planning load-bearing systems (overall structural system, subsystem, elements) - Serviceability / deformation (interaction among structural deformities and façade deformities) - Serviceability / watertightness (definition of requirements, overview of test methods) - Manufacturing method and tolerances - Production quality management (dimensional accuracy, coat thickness, surface quality, welds) - Mounting method and tolerances
Recommended Literature
Herzog et. al.: Fassaden Atlas, Birkhäuser Verlag Schittich; Glasbau Atlas, Birkhäuser Verlag Weller et. al.: Konstruktiver Glasbau, Edition Detail Schittich: Gebäudehüllen, Birkhäuser Verlag Watts: Moderne Baukonstruktion, Fassaden, Springer Verlag
Teaching and Learning Methods
Lecture + Practical Seminar (4 Hours per Week) Excursion (optional)

Exam(s)

Precondition of Examination	
Type of Examination	**Duration of Examination (if written or oral exam)**
Term Paper The Term Paper consists of subtasks worked on throughout the semester. The examination is given once a year.	
Composition of Module Mark	
Mark of mark term paper	

Additional Information

Previous Knowledge / Conditions for Participation (in form and content)
This module uses knowledge of statics, building construction and construction physics (recommended).
Applicability of Module
Façade Structures I is the prerequisite for enrolling in Façade Structures II (mandatory)
Frequency of Offering
every Winter Semester
Course Language
German

valid from	valid to	last updated
Summer Semester 2017		30.10.2018

Mocule Card

Master Civil Engineering
HCU Hamburg

Module Number	Modul Name	Type (C/CE/E)	Semester (proposed)	Module Coordinator
BIW-M-Mod-201	Structures of Underground Engineering	C	2	Prof. Dr.-Ing. habil. Kerstin Lesny

Subject Area	Duration
Basics	1 Semester

CP (according to ECTS)	Contact Hours/Week (SWS)	Self-study
5 CP (= 150 h Workload)	4 (= 42 h Contact Time)	108 h

Objectives and Contents

Objective of Qualification (competencies)
Students will gain familiarity with more complex geotechnical constructions and selected methods of underground engineering and will be able to assess their mode of operation and suitability for various applications. Students will be familiar with pertinent design methods and will be able to assess their suitability on a case-by-case basis. They will be fluent in a practical engineering software program suitable for addressing selected problems in this field.
Contents
- Foundations (laterally loaded piles, pile groups, combined pile raft foundations) - Low-grade deformation excavation sheeting, deep excavations, excavations in water, supporting/retaining structures - Earth and landfill construction procedures; measures for improving excavations - Introduction to the GGU software suite and computing selected geotechnical structures
Recommended Literature
for example: Kolymbas, D. (2011): Geotechnik : Bodenmechanik, Grundbau und Tunnelbau, Springer Verlag, Berlin Möller, G. (2012): Geotechnik: Grundbau, 2. Auflage, Verlag Ernst & Sohn, Berlin Witt, K. J., Hrsg. (2009): Grundbau-Taschenbuch, Bd. 1-3, Verlag Ernst & Sohn
Teaching and Learning Methods
Lecture + Practical Seminar (2 Hours per Week) Excursion (optional)

Exam(s)

Precondition of Examination	
Type of Examination	**Duration of Examination (if written or oral exam)**
Written Assignment and Presentation The examination is offered only in summer semester.	
Composition of Module Mark	
mark of Written Assignment	

Additional Information

Previous Knowledge / Conditions for Participation (in form and content)
Applicability of Module
Frequency of Offering
every Summer Semester
Course Language
German

valid from	valid to	last updated
Summer Semester 2017		30.10.2018

Mocule Card

Master Civil Engineering
HCU Hamburg

Module Number	Modul Name	Type (C/CE/E)	Semester (proposed)	Module Coordinator
BIW-M-Mod-202	Maintenance and Restoration of Buildings	C	2	Prof. Dr.-Ing. Gesa Kapteina

Subject Area	Duration
Basics	1 Semester

CP (according to ECTS)	Contact Hours/Week (SWS)	Self-study
5 CP (= 150 h Workload)	4 (= 42 h Contact Time)	108 h

Objectives and Contents

Objective of Qualification (competencies)
- Knowledge gained about building materials and their interaction with the environment will enable students to identify critical aspects of a structure with regards to durability. - Given a problem based in practice, students will be able to select an appropriate diagnostic method and will have the knowledge required analyze and apply it. - Selection of restoration concepts depending on cause of damage, as well as knowledge of the use and processing of restoration materials.
Contents
- In-depth knowledge of building materials (i.e. concrete, glass, plastic, wood) and their mechanisms of damage - Properties of and processing restoration materials - Recognizing damage and damage diagnostics of structures and assessment procedures - Maintenance (comparison of actual and nominal conditions, remaining service life, restoration concepts) - Restoration planning using selected examples
Recommended Literature
Stark, J.; Wicht, B.: Dauerhaftigkeit von Beton, Springer Vieweg, 2013, ISBN 978-3-642-35278-2 Raupach, M.; Orlowsky, J.: Erhaltung von Betonbauwerken. Vieweg +Teubner, 2008, ISBN 978-3-8351-0120-3 Grunau, E.: Lebenserwartung von Baustoffen, Funktionsdauer von Baustoffen u. Bauteilen; Wirtschaftlichkeit durch langlebige Baustoffe. Vieweg, 1980; ISBN-13:978-3-528-08847-7
Teaching and Learning Methods
Lecture + Practical Seminar (4 Hours per Week) Excursion (optional)

Exam(s)

Precondition of Examination	
Type of Examination	**Duration of Examination (if written or oral exam)**
Written Exam	2 h
Composition of Module Mark	
Mark of Exam	

Additional Information

Previous Knowledge / Conditions for Participation (in form and content)
Applicability of Module
Frequency of Offering

every Summer Semester
Course Language
German

valid from	valid to	last updated
Summer Semester 2017		30.10.2018

Mocule Card

Master Civil Engineering
HCU Hamburg

Module Number	Modul Name	Type (C/CE/E)	Semester (proposed)	Module Coordinator
BIW-M-Mod-203	Construction Physics	C	2	Prof. Dr.-Ing. Frank Wellershoff

Subject Area	Duration
Architectural Engineering	1 Semester

CP (according to ECTS)	Contact Hours/Week (SWS)	Self-study
5 CP (= 150 h Workload)	4 (= 42 h Contact Time)	108 h

Objectives and Contents

Objective of Qualification (competencies)
Planning a space with optimal user comfort (air, light, sound)
Contents
- Heat and energy: Comfort criteria, thermal comfort; heat transmission, resistance, thermal bridges, U-value; unsteady-state heat transfer: cooling and heating processes, periodic temperature fluctuations; summer thermal insulation, excess temperature and time; fundamentals of numerical solution methods, thermal simulation programs, energy ba-lancing rooms; ventilation, physiological and biophysical features, air change rate, heat recovery - Soundproofing in building construction: Loudness, annoyance, noise effects; sound insulation for the building envelope; flanking transmission (lon-gitudinal sound insulation), ISO 12354 calculation methods; impact sound insulation (parameters, slabs and coverings); structure-borne sound insulation (waterborne sound / noise from sanitary and building equipment and appliances) - Light planning: Physical and physiological fundamentals of light sources, light propagation and reflection; numerical calculati-on methods (radiosity), natural light use, directional light, practical optimization, quantification of daylight autonomy
Recommended Literature
Hausladen et. al.: Climate Design, Birkhäuser Verlag Hausladen et. al.: Climate Skin, Callwey Verlag Broban; Handbuch der Bauphysik, Rudolf Müller Verlag
Teaching and Learning Methods
Lecture + Practical Seminar (4 Hours per Week) Excursion (optional)

Exam(s)

Precondition of Examination	
Type of Examination	**Duration of Examination (if written or oral exam)**
Term Paper The Term Paper consists of subtasks worked on throughout the semester. The exam is given once a year.	
Composition of Module Mark	
The highest mark for the term paper is 100 points. It determines students' overall mark.	

Additional Information

Previous Knowledge / Conditions for Participation (in form and content)
Applicability of Module
Material covered in this module is a prerequisite for Energy-related Building Technology (3rd semester).
Frequency of Offering
every Summer Semester
Course Language

German

valid from	valid to	last updated
Winter Semester 15/16		30.10.2018

Mocule Card

Master Civil Engineering
HCU Hamburg

Module Number	Modul Name	Type (C/CE/E)	Semester (proposed)	Module Coordinator
BIW-M-Mod-204	Shell and Spatial Structures	C	2	Prof. Dr.-Ing. Annette Bögle

Subject Area	Duration
Architectural Engineering	1 Semester

CP (according to ECTS)	Contact Hours/Week (SWS)	Self-study
5 CP (= 150 h Workload)	4 (= 42 h Contact Time)	108 h

Objectives and Contents

Objective of Qualification (competencies)
- Students will gain competence in calculating and designing spatial structures. Further, they will gain the ability to design spatial structures. - Competence will be acquired in understanding the particular relationships between structural form, loads and material.
Contents
- Definitions of spatial structures: Plates, grillages, discs and shells; (Membranes and tensile structures not addressed here) - Shaping spatial structures: Load transfer efficiency, design and function - Structural behavior and calculation of plates and grillages - Structural behavior and calculation of discs - Structural behavior and calculation of annular girders - Structural behavior and calculation of shells - Membrane theory of rotation shells and hyperboloids; bending theory of shells - Project examples
Recommended Literature
Marti, P: Baustatik, Ernst & Sohn, Berlin 2012. Büttner, O.; Hampe, E.: Bauwerk Tragwerk Tragstruktur – Band 2, VEB Verlag für Bauwesen, Berlin, 1984. Engel, H: Tragsysteme Structure Systems, Verlag Gerd Hatje, Ostfildern-Ruit, 1997. Franz, G.; Schäfer, K: Konstruktionslehre des Stahlbetons – Band II: Tragwerke, Springer-Verlag, Berlin, 1988. Flügge, W.: Statik und Dynamik der Schalen, Springer-Verlag, Berlin, 1981. Hake, E; Meskouris, K.: Statik der Flächentragwerke, Springer-Verlag, Berlin, 2007.
Teaching and Learning Methods
Lecture + Practical Seminar (4 Hours per Week) Excursion (optional)

Exam(s)

Precondition of Examination	
Type of Examination	**Duration of Examination (if written or oral exam)**
Written Exam	3 h
Composition of Module Mark	

Additional Information

Previous Knowledge / Conditions for Participation (in form and content)
Applicability of Module

Frequency of Offering
every Summer Semester
Course Language
German

valid from	valid to	last updated
Winter Semester 15/16		01.11.2018

Mocule Card

Master Civil Engineering
HCU Hamburg

Module Number	Modul Name	Type (C/CE/E)	Semester (proposed)	Module Coordinator
BIW-M-Mod-205	Design Project I	C	2	Prof. Dr.-Ing. Manuel Krahwinkel

Subject Area	Duration
Architectural Engineering	1 Semester

CP (according to ECTS)	Contact Hours/Week (SWS)	Self-study
5 CP (= 150 h Workload)	2 (= 21 h Contact Time)	129 h

Objectives and Contents

Objective of Qualification (competencies)
- To learn to carry out a complex design project in planning load-bearing structures - Structuring a planning processes for a complex real-life project in load-bearing structure design throughout various phases (base analysis, variant analysis, design, dimensioning and construction) and working independently in disciplinary planning teams - Discussion of planning content in planning teams as well as presenting planning results - Learning working methods of design and practicing disciplinary project work as a first step in preparation for in-terdisciplinary project work
Contents
Interdisciplinary Project: - Formation of “engineering offices” (work groups). 3 - 4 students create an “engineering office,” which must elaborate all planning phases. - Introductory events/orientation. Explanation of the procedure and organization of the study project, presenta-tion of the task, presentation of key marginal conditions - Presentations on specialist topics: In the initial weeks of the project, introductory talks (“expert input sessions”) will be given on individual specialist topics of particular importance to the working process. - Advisory units: Students periodically give a condensed report on their project status. Questions that arise will be addressed. The advisory units also serve as a performance review (possibly to set a deadline for tasks not completed according to schedule) - Planning meetings. In the course of the project seminar, the "engineering offices" regularly submit interim re-ports (as oral presentations by the students). As part of the oral presentations, problems are identified and so-lutions are presented in general terms. The planning meetings also serve as a performance review. - Independent work. Working out the basics, developing planning content, preparing presentations, compiling the final report (drafts, calculations, drawings, models)
Recommended Literature
Krahwinkel, M.; Kindmann, R.: Stahl- und Verbundkonstruktionen, 3. Auflage, Springer Vieweg, 2016 Staffa, M.: Tragwerkslehre, Beuth, 2014
Teaching and Learning Methods
Project (2 Hours per Week) Excursion (optional)

Exam(s)

Precondition of Examination	
Type of Examination	Duration of Examination (if written or oral exam)
Documentation and Presentation	
Composition of Module Mark	
Mark of Documentation and Presentation	

Additional Information

Previous Knowledge / Conditions for Participation (in form and content)
Applicability of Module
Frequency of Offering
every Summer Semester
Course Language
German

valid from	valid to	last updated
Winter Semester 15/16		01.11.2018

Mocule Card

Master Civil Engineering
HCU Hamburg

Module Number	Modul Name	Type (C/CE/E)	Semester (proposed)	Module Coordinator
BIW-M-Mod-210	Facade Structures II	C	1	Prof. Dr.-Ing. Frank Wellershoff

Subject Area	Duration
Architectural Engineering	1 Semester

CP (according to ECTS)	Contact Hours/Week (SWS)	Self-study
5 CP (= 150 h Workload)	4 (= 42 h Contact Time)	108 h

Objectives and Contents

Objective of Qualification (competencies)
- Final planning: - Final static planning of façade structures (overall bearing structure, elements, connections)
Contents
- Final planning: - Protection requirements for wind, snow, rain, hail, fire, burglary, collision, falls and explosions - Planning structural details (connections, sealing, water flow) - Structural safety (fundamentals of safety concepts and load-bearing capacity in international comparison) - Structural analysis (stability and dynamic strength of framework elements, load-bearing capacity and connec-tion rigidity) - Dynamic analysis (vibration susceptibility to wind load, spectral method, transient calculations, explosion cal-culations)
Recommended Literature
Herzog et. al.: Fassaden Atlas, Birkhäuser Verlag Schittich; Glasbau Atlas, Birkhäuser Verlag Weller et. al.: Konstruktiver Glasbau, Edition Detail Schittich: Gebäudehüllen, Birkhäuser Verlag Watts: Moderne Baukonstruktion, Fassaden, Springer Verlag
Teaching and Learning Methods
Lecture + Practical Seminar (2 Hours per Week) Excursion (optional)

Exam(s)

Precondition of Examination	
Type of Examination	**Duration of Examination (if written or oral exam)**
Term Paper The Term Paper consists of several tasks throughout the semester. The exam is given once a year.	
Composition of Module Mark	
Mark of Term Paper	

Additional Information

Previous Knowledge / Conditions for Participation (in form and content)
Facade Structures I is the prerequisite for enrolling in Facade Structures II (mandatory).
Applicability of Module
Frequency of Offering
every Summer Semester
Course Language
German

valid from	valid to	last updated
Summer Semester 2017		30.10.2018

Mocule Card

Master Civil Engineering
HCU Hamburg

Module Number	Modul Name	Type (C/CE/E)	Semester (proposed)	Module Coordinator
BIW-M-Mod-302	Energy-Related Building Technology	C	3	Prof. Dr.-Ing. Frank Wellershoff

Subject Area	Duration
Architectural Engineering	1 Semester

CP (according to ECTS)	Contact Hours/Week (SWS)	Self-study
5 CP (= 150 h Workload)	4 (= 42 h Contact Time)	108 h

Objectives and Contents

Objective of Qualification (competencies)
- Conceptual energy-optimized planning of a building observing the interaction among site, use, building envelope and building automation and control systems - To recognize the relationships among building shape, façade, resultant user comfort and energy demand in early planning phases - Method of integral planning
Contents
- Energy fundamentals: Energy balances, (primary, final and end-use energy), fossil and non-fossil energy sources, legal and future requirements, outdoor climate, comfort - Passive and active solar components: Heating systems, ventilation and air conditioning, passive house technologies, resource-efficient (i.e. cogene-ration plants, fuel cells, etc.) and innovative energy supply technologies, energy concepts - Planning artificial lighting: DIN 18599 (overview) - Energy Saving Ordinance (EnEV) and accessible software - Interplay of building envelope and technology - Selection criteria of resultant building automation and control systems and optimization of the architectural design
Recommended Literature
Hegger et. al: Energie Atlas, Birkhäuser Verlag Hausladen et. al.: Climate Design, Birkhäuser Verlag Hausladen et. al.: Climate Skin, Callwey Verlag
Teaching and Learning Methods
Lecture + Practical Seminar (2 Hours per Week) Excursion (optional)

Exam(s)

Precondition of Examination	
Type of Examination	**Duration of Examination (if written or oral exam)**
Term Paper The Term Paper consists of several tasks throughout the semester.	
Composition of Module Mark	
The highest score possible on the term paper is 100 points. This determines students' overall mark.	

Additional Information

Previous Knowledge / Conditions for Participation (in form and content)
Knowledge and skills acquired in the master's module, Construction Physics (recommended)
Applicability of Module

Frequency of Offering
every Winter Semester
Course Language
German

valid from	valid to	last updated
Winter Semester 15/16		30.10.2018

Mocule Card

Master Civil Engineering
HCU Hamburg

Module Number	Modul Name	Type (C/CE/E)	Semester (proposed)	Module Coordinator
BIW-M-Mod-303	Stability and Dynamics of Structures	C	3	Prof. Dr.-Ing. Manuel Krahwinkel

Subject Area	Duration
Architectural Engineering	1 Semester

CP (according to ECTS)	Contact Hours/Week (SWS)	Self-study
5 CP (= 150 h Workload)	4 (= 42 h Contact Time)	108 h

Objectives and Contents

Objective of Qualification (competencies)
Students will master the basic principles of structural dynamics and gain depth of knowledge in the practice of stability analysis.
Contents
- Stability of structures: Examples on the subject of stability from building practice - Dynamics of structures: Problems and tasks of structural dynamics, differential equations of motion, modal analysis, direct integration, models of single and multiple degrees of freedom, practical applications (i.e. machine bases, pedestrian bridges, seismic design, impact)
Recommended Literature
Krahwinkel, M.; Kindmann, R.: Stahl- und Verbundkonstruktionen, 3. Auflage, Springer Vieweg, 2016 Petersen, C.: Dynamik der Baukonstruktionen, Springer Vieweg, 2000 Clough, R.-W.; Penzien, J.: Dynamics of Structures, 3. Auflage, Computers & Structures, Inc., 1995
Teaching and Learning Methods
Lecture + Practical Seminar (4 Hours per Week)

Exam(s)

Precondition of Examination	
Type of Examination	Duration of Examination (if written or oral exam)
Written Exam	3h
Composition of Module Mark	
Mark of Exam	

Additional Information

Previous Knowledge / Conditions for Participation (in form and content)
Applicability of Module
Frequency of Offering
every Winter Semester
Course Language
German

valid from	valid to	last updated
Winter Semester 16/17		28.09.2018

Mocule Card

Master Civil Engineering
HCU Hamburg

Module Number	Modul Name	Type (C/CE/E)	Semester (proposed)	Module Coordinator
BIW-M-Mod-304	Computer Aided Engineering CAE	C	3	Prof. Dr.-Ing. Annette Bögle

Subject Area	Duration
Architectural Engineering	1 Semester

CP (according to ECTS)	Contact Hours/Week (SWS)	Self-study
5 CP (= 150 h Workload)	4 (= 42 h Contact Time)	108 h

Objectives and Contents

Objective of Qualification (competencies)
- Students will gain competence in designing narrow spatial frame structures and doubly curved plate structures using efficient computer-aided methods of generation and calculation. - Students will gain skills in using computer-aided form-finding processes and their coupling with digital calculation and realization processes.
Contents
- Introduction to the task of form-finding in engineering: Identification of various form-finding processes and their implementation - Analytic description of the geometry of a form (mathematical principles) - Geometric parameters of form-finding, parameter variation and its effect on form (parametric design with Grasshopper) - Methods of experimental form-finding, relationship between form and load - Digital form-finding on the basis of experimental methods (pneumatic models, soap bubble, suspension models, etc.) with the aid of Kangaroo Physics - Interface numerical FEM calculation (RSTAD, RFEM, Karamba) - Methods of form optimization
Recommended Literature
Pottmann, H. u.a.: Architekturgeometrie, Springer-Verlag, Wien, 2010. Bechthold, M.: Innovative surface structures : technology and applications. Taylor & Francis, Abingdon, 2008. Jabi, W.: Parametric Design for Architecture. Laurence King Publishing, London, 2013. Menges, A.; Ahlquist, S.: Computational Design Thinking. John Wiley & Sons, New York, 2011. Woodbury, R.: Elements of Parametric Design. Routledge, New York, 2010. Tedeschi, A.: AAD Algorithms-aided Design : Parametric Strategies Using Grasshopper. Le Penseur, 2014. Adriaenssens, S. u.a.; Shell Structures for Architecture. Routledge, New York, 2014
Teaching and Learning Methods
Lecture + Practical Seminar (4 Hours per Week)

Exam(s)

Precondition of Examination	
Type of Examination	**Duration of Examination (if written or oral exam)**
Term Paper	
Composition of Module Mark	
The Term Paper consists of various tasks. The precise composition of the overall mark will be announced at the beginning of the semester	

Additional Information

Previous Knowledge / Conditions for Participation (in form and content)
Knowledge of the programs Rhino 3D and Grasshopper (recommended)

Applicability of Module
Frequency of Offering
every Winter Semester
Course Language
German

valid from	valid to	last updated
Summer Semester 2017		26.09.2018

Mocule Card

Master Civil Engineering
HCU Hamburg

Module Number	Modul Name	Type (C/CE/E)	Semester (proposed)	Module Coordinator
BIW-M-Mod-305	Design Project II	C	3	Prof. Dr.-Ing. Annette Bögle

Subject Area	Duration
Architectural Engineering	1 Semester

CP (according to ECTS)	Contact Hours/Week (SWS)	Self-study
10 CP (= 300 h Workload)	4 (= 42 h Contact Time)	258 h

Objectives and Contents

Objective of Qualification (competencies)
- Students will gain competence in executing a complex interdisciplinary design project involving the planning of load-bearing structures - Students will acquire the ability to structure and carry out the planning process for an actual complex structural design project over various phase (base analysis, variant analysis, design, dimensioning and construction) as well as to work independently in disciplinary planning teams - Students will acquire the skill of specialist collaboration and discussion in interdisciplinary teams
Contents
Interdisciplinary Project: - Introduction to the assignment: Presentation of the context of the design task: location and content - Input workshops on specific subjects - Team formation, acquaintance with the assignment - Subjects relevant to the project (i.e. load-bearing structures, functionality, implementing an idea, itemization) - Visualization (plans, models) - Corrective feedback: Students and teachers will meet in voluntary and mandatory feedback sessions distributed throughout the semester. The students' current state of progress and any arising issues will be addressed; problems will be addressed and solutions formulated. - Presentations: Mandatory presentations occur on specific dates throughout the semester. They are an oppor-tunity to convey one's own project to an audience as well as for the teachers to discuss students' individual projects. - Independent interdisciplinary team work
Recommended Literature
Albert, A. (Hrsg.): Schneider Bautabellen für Ingenieure, Bundesanzeiger Verlag GmbH, Köln, 2014. Block, P.; u.a.: Faustformel Tragwerksentwurf, Deutsche Verlags-Anstalt, München, 2013. Kister, J.: Neufert Bauentwurfslehre, Vieweg & Sohn Verlag, Wiesbaden, 2012. Staffa, M.: Tragwerkslehre Grundlagen, Gestaltung, Beispiele, Beuth Verlag GmbH, Berlin Wien Zürich, 2014. Stöffler, J.; Samberg, S.: Tragwerksentwurf für Architekten und Bauingenieure, Bauwerk Verlag GmbH, Berlin, 2002. Wüstenrot Stiftung (Hrsg.): Raumpilot Grundlagen, Karl Kraemer Verlag, Stuttgart und Zürich, 2014.
Teaching and Learning Methods
Lecture + Project (4 Hours per Week) Excursion (optional)

Exam(s)

Precondition of Examination	
Mandatory attendance at (interim) presentations, workshops and excursions	
Type of Examination	Duration of Examination (if written or oral exam)
Documentation and Presentation	
Composition of Module Mark	
Presentation and documentation are marked. The precise composition of the overall mark will be announced at the beginning of the semester.	

Additional Information

Previous Knowledge / Conditions for Participation (in form and content)
Applicability of Module
Frequency of Offering
every Winter Semester
Course Language
German

valid from	valid to	last updated
Winter Semester 15/16		01.11.2018

Mocule Card

Master Civil Engineering
HCU Hamburg

Module Number	Modul Name	Type (C/CE/E)	Semester (proposed)	Module Coordinator
BIW-M-Mod-401/402/403/404	Compulsory Elective	C	4	Prof. Dr.-Ing. Annette Bögle

Subject Area	Duration
Compulsory Elective	1 Semester

CP (according to ECTS)	Contact Hours/Week (SWS)	Self-study
5 CP (= 150 h Workload) or 2 x 2,5 CP (= 2 x 75 h Workload)	4 (= 42 h Contact Time) or 2 x 2 (= 2 x 21 h Contact Time)	108 h or 2 x 54 h

Objectives and Contents

Objective of Qualification (competencies)
- Increasing breadth and depth of particular disciplinary knowledge - Profiling the personal portfolio
Contents
• A course worth 5 CP is to be chosen from the catalog of mandatory electives for the civil engineering program. OR • Two courses worth 2.5 CP each are to be chosen from the catalog of mandatory electives for the civil engineering program.
Recommended Literature
Varies by course
Teaching and Learning Methods
Lecture and Practical Seminar (4 Hours per Week or 2 x 2 Hours per Week) Excursion (optional)

Exam(s)

Precondition of Examination	
Varies by course	
Type of Examination	**Duration of Examination (if written or oral exam)**
Varies by course	
Composition of Module Mark	
Varies by type of Examination	

Additional Information

Previous Knowledge / Conditions for Participation (in form and content)
Applicability of Module
Frequency of Offering
every Semester
Course Language
German or English

valid from	valid to	last updated
Winter Semester 15/16		30.10.2018

Mocule Card

Master Civil Engineering
HCU Hamburg

Module Number	Modul Name	Type (C/CE/E)	Semester (proposed)	Module Coordinator
BIW-M-Mod-403	Thesis (ASPO 2015)	C	4	Prof. Dr.-Ing. Annette Bögle

Subject Area	Duration
Thesis	1 Semester

CP (according to ECTS)	Contact Hours/Week (SWS)	Self-study
20 CP (= 600 h Workload)		600 h

Objectives and Contents

Objective of Qualification (competencies)
The master's thesis is an examination paper. It will demonstrate the candidate's ability to work through a problem in civil engineering independently, according to scientific methods and by a predetermined deadline.
Contents
The exam consists of a problem from the master's curriculum in civil engineering. The first examiner will hand out the topic.
Recommended Literature
Varies by subject
Teaching and Learning Methods
Independent Written Term Paper For further information, see "Informationen zur Bachelor-/Masterthesis" on the homepage

Exam(s)

Precondition of Examination	
Preconditions for the examination paper are stipulated in the general and degree-specific examination regulations of HCU Hamburg.	
Type of Examination	Duration of Examination (if written or oral exam)
Thesis, Presentation, Colloquium 2 copies (each with a hard copy and a digital copy on CD)	
Composition of Module Mark	
Thesis 80%, presentation and colloquium 20% (first and second examiners' marks each comprise one half of the evaluation)	

Additional Information

Previous Knowledge / Conditions for Participation (in form and content)
Applicability of Module
Frequency of Offering
any time
Course Language
German

valid from	valid to	last updated
Winter Semester 15/16		26.09.2018