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Module handbook

Civil Engineering

Master's programme courses
Civil Engineering

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1 Introduction

1.1 Remarks

This Module Handbook is intended as an annotated course catalogue and as a reference document for the accreditation authorities. All content-related and organisational information in the module descriptions is based on information provided by the lecturers. Please note that this information is subject to alteration.

1.2 Modules

Modularisation is the grouping of subject areas into thematically and time-based, self-contained units that can be assessed with credit points. Modules can contain a combination of various teaching and learning methods and cover content from a single semester or an academic year. When all the assessment activities belonging to a module have been completed, credit points are credited to the assessment record and the grade for the module is calculated.

1.3 Credits

The credit points are awarded in accordance with the standard ECTS (European Credit Transfer System). 60 points should be earned per year of study. The credit point system is used to determine the overall performance of the students and to credit examination achievements from other degree programmes.

1.4 Study Workload

Each course is allocated credits according to the workload involved. One credit point corresponds to a study effort of 30 hours of effective study time; this includes attendance hours, preparation and follow-up work as well as exam preparation. The scope of courses and the associated credits for the individual courses are specified in the module descriptions. On successful completion of a module, as many credit points will be awarded as credits have been designated for that module.

1.5 Notes on the module pages

Module 1 covers current topics in Modernisation & Conservation and Renewable Energy & Climate Change as well as English for Civil Engineers. This offers an English programme specially tailored for civil engineers, including Business Communication.

The core of the Master's programme consists of modules 2A or 2B, 3A or 3B. Modules 1, 4, 5, 6 and 7 are compulsory for all students. Modules 2A and 3A must be taken by those opting for a structural engineering direction, modules 2B and 3B must be taken by those taking Environment, Traffic Engineering and Water Disposal and Water Supply. These modules predominantly consist of technical topics. They make up approx. 80% of the total study programme. The focus is on teaching students to acquire knowledge methodically on their own. These modules teach and

practise problem-solving skills. Students will be able to solve new problems systematically on a scientific basis. They will also know how to independently analyse the task at hand and work out the steps required to solve the problem. The examples covered in the modules serve as a guideline for scientific appraisal. The methodical approaches developed in this context are fully transferable and applicable to other problems.

This gives the students excellent practical skills in analysis, preparation of procedural steps and goal-oriented problem solving.

Module 4 is designed as a supporting compact course and is intended to provide students with the knowledge of business management required for leadership tasks, including the use of digital management tools.

In the third semester, students have the opportunity to choose a total of 6 LP from a selection of elective subjects. The selection includes Module 6 as well as all electives offered at the HBC for Master’s degree programmes.

The elective lectures are designed to supplement the student’s knowledge with specially selected special skills.

Module name	**Zukunft Bauen I**
English module name	Future of building
Module number	**BM1-I**
Module level	Master's
Module coordinator	Prof. Dipl.-Ing. Dr. techn. Daniel Rubin
Credits (LP)	5 LP
Requirement for the award of credit points	General admission requirements for the Master's programme
Related courses	LV BM1-I-1 Modernisation, Conservation, Renovation (1 SWS) LV BM1-I-2 English for Civil Engineers (3 SWS)

Course	**BM1-I-1 Modernisation, Conservation, Renovation (WS)**
Semester of study	MB1
Lecturer	Hilmar Quantz, Prof. Dr.-Ing. habil. Jörg Schänzlin
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lectures, seminars
Workload	Classroom study: 15 hrs. E-learning 15 hrs. Independent study: 30 hrs. **Total workload: 60 hrs.**
Credits (LP)	2
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	Addressing current issues in the field of modernisation, conservation and renovation: • Digital recording (e.g. 3D scan) • Evaluation of the condition of the structure • Damage analysis • Safety assessment • Service life forecast • Building inspection • Redevelopment
Module objectives	Learn methods for the assessment of existing structures
Formative assessments	none
Summative assessment	Coursework (graded)
Frequency	Only in winter semester
Media formats	Lecture notes, working materials and worksheets as digital information on the intranet

Literature recommendations	Literature will be specified on the intranet

Course	**BM1-I-2 English for Civil Engineers**
Semester of study	MB1
Lecturer	Dr. Vera Christoph
Teaching language	English
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	The required knowledge is taught in lectures, supplemented by e-learning components that students have to complete independently. Individual lectures, group work, interaction in foreign language, videos
Workload	Attendance: 22.5 hrs. E-learning 22.5 hrs. Independent study: 45.0 hrs. **Total workload: 90.0 hrs.**
Credits (LP)	3
Requirements according to examination regulations	General admission requirements for the Master's programme Basic knowledge of English, oral and written, internet access, telephone connection
Recommended prerequisites	none
Module contents	• Study and analysis of selected topics from the field of civil engineering using original texts. • Deeper reading comprehension. • Expansion of technical vocabulary on various topics. • Improvement of communication skills and ability to give several short presentations in English. • Proficiency in presenting complex civil engineering facts to third parties in a foreign language. • Proficiency with a specific written portfolio in English.
Module objectives	**Specialist skills:** Development of skills and abilities in listening comprehension, reading comprehension, writing and speaking in English **Methodological skills:** Methods for reading comprehension, summarising and recounting. Use of various presentation techniques such as PowerPoint, podcasts, and audio conferences. Social skills: Encourage teamwork, interaction and presentation in English
Formative assessments	None
Summative assessment	Presentation and oral assessment
Frequency	Only in winter semester
Media formats	Lecture notes, working materials and worksheets as digital information on the intranet and internet

Literature recommendations	Sharon Heidenreich: Englisch für Architekten und Bauingenieure – English for Architects and Civil Engineers, 6. Auflage, Springer Vieweg, Wiesbaden, 2019. Further literature will be specified on the intranet before the start of the semester.

Module name	**Zukunft Bauen II**
English module name	Future of building
Module number	**BM1-II**
Module level	Master's
Module coordinator	Prof. Dipl.-Ing. Dr. techn. Daniel Rubin
Credits (LP)	5 LP
Requirement for the award of credit points	General admission requirements for the Master's programme
Related courses	LV BM1-II-1 Renewable Energy, Climate Change, Sustainability (1 SWS) LV BM1-II-2 Business Communication (3 SWS)

Course	**BM1-II-1 Renewable Energy, Climate Change, Sustainability (SS)**
Semester of study	MB2
Lecturer	Michele Velenderić, MSc.
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lectures, seminars
Workload	Classroom study: 15 hrs. E-learning 15 hrs. Independent study: 30 hrs. **Total workload: 60 hrs.**
Credits (LP)	2
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	Current issues around the energy transition: • Sustainability and energy transition • Energy generation from sun, wind, biomass and water • Problems of energy storage • Problems of energy transport • Development prospects • Climate change and natural hazards • Waste heat utilisation
Module objectives	Learn about problems and solutions in managing the energy transition
Formative assessments	none
Summative assessment	Coursework (graded)
Frequency	Only in summer semester
Media formats	Lecture notes, working materials and worksheets as digital information on the intranet
Literature recommendations	Literature will be specified on the intranet

Course	**BM1-II-2 Business Communication**
Semester of study	MB2
Lecturer	Dr. Vera Christoph
Teaching language	English
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	The required knowledge is taught in lectures, supplemented by e-learning components that students have to complete independently. Individual lectures, group work, interaction in foreign language, videos
Workload	Attendance: 22.5 hrs. E-learning 22.5 hrs. Independent study: 45.0 hrs. **Total workload: 90.0 hrs.**
Credits (LP)	3
Requirements according to examination regulations	General admission requirements for the Master's programme Basic knowledge of English, oral and written, internet access, telephone connection
Recommended prerequisites	none
Module contents	• Insights into selected economic topics based on original texts. • Deeper reading comprehension. • Expansion of technical vocabulary on various topics. • Develop the knowledge and skills required for communication in business life (business correspondence, meetings, negotiations, offers etc.) • Improvement of communication skills and ability to give several short presentations in English. • Proficiency with a specific written portfolio in English.
Module objectives	**Specialist skills:** Develop skills and abilities in listening comprehension, reading comprehension, writing and speaking in English; intercultural sensitisation **Methodological skills:** Methods for reading comprehension, summarising and recounting. Use of various presentation techniques such as PowerPoint, podcasts, and audio conferences Social skills: Encourage teamwork, interaction and presentation in English
Formative assessments	none
Summative assessment	Presentation and oral assessment
Frequency	Only in summer semester
Media formats	Lecture notes, working materials and worksheets as digital information on the intranet and internet
Literature recommendations	Sharon Heidenreich: Englisch für Architekten und Bauingenieure – English for Architects and Civil Engineers, 6. Auflage, Springer Vieweg, Wiesbaden, 2019.

	Stephanie Ashford, Tom Smith: Business Proficiency, Wirtschaftsenglisch für Hochschule und Beruf, Ernst Klett Verlag, Stuttgart, 2017. Further literature will be specified online before the start of the semester.

Module name	**Technische und betriebswirtschaftliche Projektanalyse (KIB) I**
English module name	Technical and Economic Project Analysis
Module number	**BM2A-I**
Module level	Master's
Module coordinator	Prof. Dipl.-Ing. Dr. techn. Daniel Rubin
Credits (LP)	10 LP
Requirement for the award of credit points	Credit points are obtained by passing the "BM2A-I-1 BM2A-I-2" (2/4 LP) sub-module assessment and the "BM2A-I-3" (4 LP) sub-module assessment.
Related courses	LV BM2A-I-1 Method. Preparation of Project – Basics and Data I (1 SWS) LV BM2A-I-2 Project Work: Concept, Design, Calculation I (2 SWS) LV BM2A-I-3 Project-related Academic Work I (2 SWS)

Course	**BM2A-I-1 Methodical Preparation of Project – Basics and Data I**
Semester of study	MB1
Lecturer	Prof. Dipl.-Ing. Dr. techn. Daniel Rubin, Prof. Dr.-Ing. habil. Jörg Schänzlin, Prof. Dr.-Ing. Dimitrios Toris
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	The required knowledge and methods are taught in lectures, which are supplemented by an e-learning component that students have to complete independently. Project work in individual and group assignments.
Workload	Classroom study: 15 hrs. E-learning 15 hrs. Independent study: 30 hrs. **Total workload:** 60 **hrs.**
Credits (LP)	2
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	Normative, operational and economic requirements for the construction task are determined for each selected planning task. The interaction and conflicts of the factors influencing the planning are identified and presented. Planning principles are developed in project discussions, teamwork and individual work. Time and project management methods are used to control the development of the planning principles

Module objectives	Students are able to systematically and comprehensively record and present all factors influencing a planning task.
Formative assessments	none
Summative assessment	Coursework (graded) Written and/or oral presentations with supplementary content Oral assessment
Frequency	Only in winter semester
Media formats	Lecture notes, standards, working materials, worksheets and project documents as digital information in ILIAS and on the internet
Literature recommendations	Literature will be specified according to the project on the intranet before the start of the semester.

Course	BM2A-I-2 Project Work: Concept, Design, Calculation I
Semester of study	MB1
Lecturer	Prof. Dipl.-Ing. Dr. techn. Daniel Rubin, Prof. Dr.-Ing. habil. Jörg Schänzlin, Prof. Dr.-Ing. Dimitrios Toris
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	The required knowledge is taught in lectures, which are supplemented by an e-learning component that students have to complete independently. Project work in individual and group assignments.
Workload	Classroom study: 30 hrs. E-learning 30 hrs. Independent study: 60 hrs. **Total workload: 120 hrs.**
Credits (LP)	4
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	None
Module contents	Analysis, preparation and presentation of the requirements for conception, design and calculation of select areas of large-scale projects (e.g. composite bridges) in technical and business terms. Development of own solutions in seminars and independently. Some work is done in groups of 2-3 students to develop the social skills and ability to work in a team, which are important in practice. Evaluation of the technical quality of the individual versions in terms of design, manufacturing and assembly options, building physics requirements. Determination and comparison of the costs for the individual versions. Decision-making and preparation of a detailed design with structural calculation using modern computer-aided methods (e.g. CAD, FEM)

	Error analysis, evaluation and control of the calculation results Presentation of results.
Module objectives	Students are familiar with the multi-layered, interconnected, technical and business management tasks and problems in the construction and operation of a real large-scale project (e.g. composite bridge). They can analyse, evaluate and amend specific sub-areas in terms of concept, design and load-bearing capacity. They are able to think and act independently across all disciplines. Students have consolidated their subject-specific competences in structural engineering (acquired in the Bachelor's degree programme).
Formative assessments	none
Summative assessment	Coursework (graded) Written and/or oral presentations with supplementary content Oral assessment
Frequency	Only in winter semester
Media formats	Lecture notes, standards, working materials, worksheets and project documents as digital information in ILIAS and on the internet
Literature recommendations	Project-specific literature, literature references on the internet (e.g. for composite construction/composite bridges: "Stahlbau-Kalender 2018", Verlag Ernst & Sohn)

Course	**BM2A-I-3 Project-related Academic Work I**
Semester of study	MB1
Lecturer	Prof. Dipl.-Ing. Dr. techn. Daniel Rubin
Language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Teaching form / SWS	The required knowledge is taught in lectures, which are supplemented by an e-learning component that students have to complete independently. Project work in individual and group assignments.
Workload	Classroom study: 30 hrs. E-learning 30 hrs. Independent study: 60 hrs. **Total workload:** 120 **hrs.**
Credits (LP)	4
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	The contents may vary depending on the project. • Mathematical and scientific foundations • Composite construction • Complex tasks in structural analysis and strength of materials (torsion of arch forces, spatial stability, bending torsion buckling) • Application of numerical methods (FEM)

	• Operational strength analysis
Module objectives	Students have additional skills in analysing specific technical issues and developing possible solutions that may arise in the construction of large-scale projects (e.g. composite bridges). These include, for example, particular foundation problems, complex structural mechanics tasks in static and dynamic aspects, material fatigue and operational stability, use of innovative materials, such as high-strength steels, carbon fibre composite materials, load-bearing glass structures, fire protection: Natural fire concepts
Formative assessments	Coursework (Workload for formative assessment is part of independent study)
Summative assessment	Written and/or oral presentations with supplementary content Oral assessment
Frequency	Only in winter semester
Media formats	Lecture notes, academic papers, technical regulations and standards available digitally on the intranet and internet
Literature recommendations	Project-specific literature, literature references on the internet (e.g. Petersen, C., Dynamik der Baukonstruktionen u. Statik und Stabilität der Baukonstruktionen)

Module name	**Technische und betriebswirtschaftliche Projektanalyse (UVW) I**
English module name	Technical and Economic Project Analysis
Module number	**BM2B-I**
Module level	Master's
Module coordinator	Prof. Dr.-Ing. Ulrike Zettl
Credits (LP)	10 LP
Requirement for the award of credit points	Credit points are obtained by passing the "BM2B-I-1 BM2B-I-2" (2/4 LP) sub-module assessment and the "BM3B-I-3" (4 LP) sub-module assessment.
Related courses	LV BM2B-I-1 Method. Method. Preparation of Project – Basics and Data I (1 SWS) LV BM2B-I-2 Project Work: Infrastructure Planning I (2 SWS) LV BM2B-I-3 Project-related Academic Work I (2 SWS)

Course	**BM2B-I-1 Methodical Preparation of Project – Basics and Data I**
Semester of study	MB1
Lecturer	Prof. Dr.-Ing. Ulrike Zettl Prof. Dr.-Ing. Jörg Hauptmann Prof. Dr.-Ing. Gerhard Haimerl
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	The required knowledge and methods are taught in lectures, which are supplemented by an e-learning component that students have to complete independently. Project work in individual and group assignments.
Workload	Classroom study: 15 hrs. E-learning 15 hrs. Independent study: 30 hrs. **Total workload:** 60 **hrs.**
Credits (LP)	2
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	The technical, legal, operational and economic requirements for the implementation of the task are determined for each selected task. The interaction and conflicts of the factors influencing the planning are identified and presented. Time and project management methods are used to control the development of the planning principles.

Module objectives	Methods and methodological concepts are taught that enable students to methodically prepare projects in practice so that the project, from the analysis of the task to the preparation of the submission documents, is systematic, timed and provided with necessary resources. These requirements are then implemented in the additional module BM2B-I-2.
Formative assessments	none
Summative assessment	Coursework (graded) Preparation of written presentations with supplementary content Oral assessment
Frequency	Only in winter semester
Media formats	Working materials, worksheets and project documents as digital information in ILIAS and on the internet
Literature recommendations	Literature will be specified according to the project on the intranet before the start of the semester.

Course	**BM2B-I-2 Project Work: Infrastructure Planning I**
Semester of study	MB1
Lecturer	Prof. Dr.-Ing. Ulrike Zettl Prof. Dr.-Ing. Jörg Hauptmann Prof. Dr.-Ing. Gerhard Haimerl
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	The required knowledge is taught in lectures, which are supplemented by an e-learning component that students have to complete independently. Project work in individual and group assignments.
Workload	Classroom study: 15 hrs. E-learning 45 hrs. Independent study: 60 hrs. **Total workload: 120 hrs.**
Credits (LP)	4
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	Based on a real, current project, lecturers and presentations by those involved in the project will provide the necessary technical and project knowledge. The actual project is worked through in sub-steps: weighing up variants, making a decision and working out the chosen solution. The work is done through project discussions, teamwork and individual work. This module mainly includes the implementation of the specifications of HOAI LPH 1 to LPH 8.

Module objectives	To communicate specialist knowledge on the project topic and to develop the ability to integrate this specialist knowledge during the course of the project in an interdisciplinary manner and in accordance with the self-defined methodology. Students acquire the ability to develop solution variants for an infrastructure measure step by step and to present the solutions in a team. Lectures provide the necessary knowledge about academic work, and the ability to apply this knowledge is developed through the students' own work. All documents and presentations on the project must also comply with the criteria of an academic working method.
Formative assessments	none
Summative assessment	Coursework (graded) Preparation of written presentations with supplementary content Oral assessment
Frequency	Only in winter semester
Media formats	Working materials and worksheets as digital information on the intranet and internet
Literature recommendations	Relevant standards and guidelines. VOB, VOF, HOAI. Further literature will be specified according to the project on the intranet before the start of the semester.

Course	**BM2B-I-3 Project-related Academic Work I**
Semester of study	MB1
Lecturer	Prof. Dr.-Ing. Ulrike Zettl Prof. Dr.-Ing. Jörg Hauptmann Prof. Dr.-Ing. Gerhard Haimerl Adjunct professors
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	The required knowledge is taught in lectures, which are supplemented by an e-learning component that students have to complete independently.
Workload	Classroom study: 60 hrs. E-learning 30 hrs. Independent study: 30 hrs. **Total workload: 120 hrs.**
Credits (LP)	4
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	Bachelor's level knowledge of road construction, urban water management and hydraulic engineering
Module contents	Traffic safety

	Economic efficiency calculations for traffic infrastructure Awarding of public contracts Modernisation of hydraulic structures Approval planning for infrastructure projects
Module objectives	To communicate specialist knowledge on the project topic and to develop the ability to integrate this specialist knowledge during the course of the project in an interdisciplinary manner and in accordance with the self-defined methodology. Students acquire the ability to develop solution variants for an infrastructure measure step by step and to present the solutions in a team.
Formative assessments	Coursework (Workload for formative assessment is part of independent study)
Summative assessment	Presentation Oral assessment
Frequency	Only in winter semester
Media formats	Lecture notes, academic papers, technical regulations and standards available digitally on the intranet and internet
Literature recommendations	Specialist literature in the relevant field, further literature will be specified according to the project on the internet before the start of the semester.

Module name	**Technische und betriebswirtschaftliche Projektanalyse (KIB) II**
English module name	Technical and Economic Project Analysis
Module number	**BM2A-II**
Module level	Master's
Module coordinator	Prof. Dr.-Ing. Heiko Rahm
Credits (LP)	10 LP
Requirement for the award of credit points	Credit points are obtained by passing the "BM2A-II-1 BM2A-II-2" (2/4 LP) sub-module assessment and the "BM2A-II-3" (4 LP) sub-module assessment.
Related courses	LV BM2A-II-1 Method. Preparation of Project – Basics and Data II (1 SWS) LV BM2A-II-2 Project Work: Concept, Design, Calculation II (2 SWS) LV BM2A-II-3 Project-related Academic Work II (2 SWS)

Course	**BM2A-II-1 Methodical Preparation of Project – Basics and Data II**
Semester of study	MB2
Lecturer	Prof. Dr.-Ing. Heiko Rahm, Prof. Dr.-Ing. Patricia Hamm, Adjunct professors
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	The required knowledge and methods are taught in lectures, which are supplemented by an e-learning component that students have to complete independently. Project work in individual and group assignments.
Workload	Classroom study: 15 hrs. E-learning 15 hrs. Independent study: 30 hrs. **Total workload:** 60 **hrs.**
Credits (LP)	2
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	Normative, operational and economic requirements for the construction task are determined for each selected planning task. The interaction and conflicts of the factors influencing the planning are identified and presented. Planning principles are developed in project discussions, teamwork and individual work. Time and project management methods are used to control the development of the planning principles.

Module objectives	Students are able to systematically and comprehensively record and present all factors influencing a planning task.
Formative assessments	none
Summative assessment	Coursework (graded) Written and/or oral presentations with supplementary content Oral assessment
Frequency	Only in summer semester
Media formats	Lecture notes, standards, working materials, worksheets and project documents as digital information on the intranet and internet
Literature recommendations	Literature will be specified according to the project before the start of the semester.

Course	**BM2A-II-2 Project Work: Concept, Design, Calculation II**
Semester of study	MB2
Lecturer	Prof. Dr.-Ing. Heiko Rahm, Prof. Dr.-Ing. Patricia Hamm, Prof. Dipl.-Ing. Dr. techn. Daniel Rubin Adjunct professors
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	The required knowledge is taught in lectures, which are supplemented by an e-learning component that students have to complete independently. Project work in individual and group assignments.
Workload	Classroom study: 30 hrs. E-learning 30 hrs. Independent study: 60 hrs. **Total workload:** 120 **hrs.**
Credits (LP)	4
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	Analysis, preparation and presentation of the requirements for conception, design and calculation of select areas of large-scale projects (e.g. wind energy systems) in technical and business terms. Development of own solutions in seminars and independently. Some work is done in groups of 2-3 students to develop the social skills and ability to work in a team, which are important in practice. Evaluation of the technical quality of the individual versions in terms of design, manufacturing and assembly options, building physics requirements. Determination and comparison of the costs for the individual versions.

	Decision-making and preparation of a detailed design with structural calculation using modern computer-aided methods (e.g. CAD, FEM) Error analysis, evaluation and control of the calculation results Presentation of results.
Module objectives	Students are familiar with the multi-layered, interconnected, technical and business management tasks and problems in the construction and operation of a real large-scale project (e.g. wind energy system). They can analyse, evaluate and amend specific sub-areas in terms of concept, design and load-bearing capacity. They are able to think and act independently across all disciplines. Students have consolidated their subject-specific competences in structural engineering (acquired in the Bachelor's/diploma programme).
Formative assessments	none
Summative assessment	Coursework (graded) Written and/or oral presentations with supplementary content Oral assessment
Frequency	Only in summer semester
Media formats	Lecture notes, standards, working materials, worksheets and project documents as digital information on the intranet and internet
Literature recommendations	Literature will be specified according to the project before the start of the semester (e.g. for hangars: "Stahlbau-Handbuch")

Course	**BM2A-II-3 Project-related Academic Work II**
Semester of study	MB2
Lecturer	Prof. Dr.-Ing. Heiko Rahm, Prof. Dr.-Ing. Patricia Hamm, Adjunct professors
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	The required knowledge is taught in lectures, which are supplemented by an e-learning component that students have to complete independently. Project work in individual and group assignments.
Workload	Classroom study: 30 hrs. E-learning 30 hrs. Independent study: 60 hrs. **Total workload:** 120 **hrs.**
Credits (LP)	4
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	The contents may vary depending on the project. • Dynamic loading of structures (free and forced vibrations, damping, material fatigue)

	• Application of numerical methods (FEM) and control of results for dynamic problems • Use of innovative materials (e.g. CFRP) • Special foundations • Fire safety (natural fire concepts, simulations)
Module objectives	Students have additional skills in analysing specific technical issues and developing possible solutions that may arise in the construction of large-scale projects (e.g. wind energy systems). These include, for example, particular foundation problems, complex structural mechanics tasks in static and dynamic aspects, material fatigue and operational stability, use of innovative materials, such as high-strength steels, carbon fibre composite materials, load-bearing glass structures, fire protection: Natural fire concepts
Formative assessments	Coursework (Workload for formative assessment is part of independent study)
Summative assessment	Written and/or oral presentations with supplementary content Oral assessment
Frequency	Only in summer semester
Media formats	Lecture notes, academic papers, technical regulations and standards available digitally on the intranet and internet
Literature recommendations	Literature will be specified according to the project before the start of the semester (e.g. Chr. Petersen: "Dynamik der Baukonstruktionen" and "Statik und Stabilität der Baukonstruktionen")

Module name	**Technische und betriebswirtschaftliche Projektanalyse (UVW) II**
English module name	Technical and Economic Project Analysis
Module number	**BM2B-II**
Module level	Master's
Module coordinator	Prof. Dr.-Ing. Jörg Hauptmann
Credits (LP)	10 LP
Requirement for the award of credit points	Credit points are obtained by passing the "BM2B-II-1 BM2B-II-2" (2/4 LP) sub-module assessment and the "BM2B-II-3" (4 LP) sub-module assessment.
Related courses	LV BM2B-II-1 Method. Preparation of Project – Basics and Data II (1 SWS) LV BM2B-II-2 Project Work: Infrastructure Planning II (2 SWS) LV BM2B-II-3 Project-related Academic Work II (2 SWS)

Course	**BM2B-II-1 Methodical Preparation of Project – Basics and Data II**
Semester of study	MB2
Lecturer	Prof. Dr.-Ing. Jörg Hauptmann Prof. Dr.-Ing. Gerhard Haimerl Prof. Dr.-Ing. Ulrike Zettl
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	The required knowledge and methods are taught in lectures, which are supplemented by an e-learning component that students have to complete independently. Project work in individual and group assignments.
Workload	Classroom study: 15 hrs. E-learning 15 hrs. Independent study: 30 hrs. **Total workload: 60 hrs.**
Credits (LP)	2
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	The technical, legal, operational and economic requirements for the planning of the task are determined for each selected task. The interaction and conflicts of the factors influencing the implementation are identified and presented. Time and project management methods are used to control the development of the planning principles.
Module objectives	Methods and methodological concepts are taught that enable students to methodically prepare projects in practice so that the project, from the analysis

	of the task to the preparation of the submission documents, is systematic, timed and provided with necessary resources. These requirements are then implemented in the module BM2B-II-2.
Formative assessments	none
Summative assessment	Coursework (graded) Preparation of written presentations with supplementary content Oral assessment
Frequency	Only in summer semester
Media formats	Working materials, worksheets and project documents as digital information in ILIAS and on the internet
Literature recommendations	Literature will be specified according to the project on the internet before the start of the semester.

Course	**BM2B-II-2 Project Work: Infrastructure Planning II**
Semester of study	MB2
Lecturer	Prof. Dr.-Ing. Jörg Hauptmann Prof. Dr.-Ing. Gerhard Haimerl Prof. Dr.-Ing. Ulrike Zettl
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	The required knowledge is taught in lectures, which are supplemented by an e-learning component that students have to complete independently. Project work in individual and group assignments.
Workload	Classroom study: 15 hrs. E-learning 45 hrs. Independent study: 60 hrs. **Total workload:** 120 **hrs.**
Credits (LP)	4
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	Bachelor's level knowledge of hydraulic engineering, hydraulics
Module contents	Based on a real, current project, lecturers and presentations by those involved in the project will provide the necessary technical and project knowledge. The actual project is worked through in sub-steps: weighing up variants, making a decision and working out the chosen solution. The work is done through project discussions, teamwork and individual work. This module contains primarily conceptual planning services that are not included in the HOAI LPH.
Module objectives	To communicate specialist knowledge on the project topic and to develop the ability to integrate this specialist knowledge during the course of the project in

	an interdisciplinary manner and in accordance with the self-defined methodology. Students acquire the ability to develop solution variants for an infrastructure measure step by step and to present the solutions in a team. Students learn how to write academic papers and how to select and evaluate academic methods for specific applications. Students also develop the skills to publish and cite correctly in academic journals.
Formative assessments	none
Summative assessment	Coursework (graded) Preparation of written presentations with supplementary content Oral assessment
Frequency	Only in summer semester
Media formats	Working materials and worksheets as digital information on the intranet and internet
Literature recommendations	Specialist literature in the relevant field, further literature will be specified according to the project on the internet before the start of the semester.

Course	**BM2B-II-3 Project-related Academic Work II**
Semester of study	MB2
Lecturer	Prof. Dr.-Ing Jörg Hauptmann Prof. Dr.-Ing. Ulrike Zettl M. Sc. Dipl.-Ing. (FH) Monika Schad
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	The required knowledge is taught in lectures, which are supplemented by an e-learning component that students have to complete independently.
Workload	Classroom study: 60 hrs. E-learning 30 hrs. Independent study: 30 hrs. **Total workload:** 120 **hrs.**
Credits (LP)	4
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	Bachelor's level knowledge of road construction, urban water management and geotechnics
Module contents	Road construction with regard to climate change Energy optimisation of wastewater treatment plants Foundation concepts for subsoil with low bearing capacity

Module objectives	Students gain additional skills in dealing with particular project-specific issues and detailed problems using in-depth calculation and analysis methods. Design, implement and evaluate investigation programmes.
Formative assessments	Coursework (Workload for formative assessment is part of independent study)
Summative assessment	Presentation Oral assessment
Frequency	Only in summer semester
Media formats	Lecture notes, academic papers, technical regulations and standards available digitally on the intranet and internet
Literature recommendations	Specialist literature in the relevant field, further literature will be specified according to the project on the internet before the start of the semester.

Module name	**Bauinformatik: Spezielle EDV-Anwendungen (KIB) I**
English module name	Computing in Civil and Building Engineering: Specialist IT Applications (SE) I
Module number	**BM3A-I**
Module level	Master's
Module coordinator	Prof. Dipl.-Ing. Dr. techn. Daniel Rubin
Credits (LP)	8 LP
Requirement for the award of credit points	Credit points are obtained by passing the "BM3A-I-1" (4 LP) sub-module assessment and the "BM3A-I-2" (4 LP) sub-module assessment.
Related courses	LV BM3A-I-1 Scientific Fundamentals of Linear and Nonlinear FEM I (2 SWS) LV BM3A-I-2 Application and Control of Spec. FEM Models I (2 SWS)

Course	**BM3A-I-1 Scientific Fundamentals of Linear and Nonlinear FEM I**
Semester of study	MB1
Lecturer	Dr. techn. Christian Schenk
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lecture (approx. 70%) with integrated tutorials (approx. 30%); E-learning portion: Interactive material to accompany the lecture
Workload	Classroom study: 20 hrs. E-learning 40 hrs. Independent study: 60 hrs. **Total workload: 120 hrs.**
Credits (LP)	4
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	• Vectors and matrices, hypermatrices, norms, condition numbers • Linear equation systems: Elimination methods (GAUSS, CHOLESKY), iteration methods, equation system conditioning • Basic equations of linear elasticity theory for beams, discs, plates • Working and extreme principles of linear elastomechanics using examples • Numerical errors, controls
Module objectives	Students are proficient in the basic mathematical and mechanical knowledge required for practical FE analysis.
Formative assessments	None
Summative assessment	Oral assessment
Frequency	Only in winter semester

Media formats	Working materials and worksheets as digital information on the intranet and internet
Literature recommendations	• Dankert, J., Numerische Methoden der Mechanik, Wiesbaden: Springer, 2013 • Werkle, H., Finite Elemente in der Baustatik; Wiesbaden: Vieweg u. Sohn, 2008 • Link, M., Finite Elemente in der Statik und Dynamik; Wiesbaden: Springer Vieweg, 2014 • Meißner/ Maurial, Die Methode der finiten Elemente; Heidelberg: Springer, 2000 • Bathe, K.-J., Finite-Element-Methoden; Wiesbaden: Springer, 2003 • Kindmann/ Kraus, Finite-Elemente-Methoden im Stahlbau, Berlin: Ernst & Sohn 2007 • Barth/ Rustler, Finite Elemente in der Baustatik-Praxis

Course	**BM3A-I-2 Application and Control of Special FEM Models I**
Semester of study	MB1
Lecturer	Dr. techn. Christian Schenk
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lecture (approx. 70%) with integrated tutorials (approx. 30%); E-learning portion: Interactive material to accompany the lecture
Workload	Classroom study: 20 hrs. E-learning 40 hrs. Independent study: 60 hrs. **Total workload: 120 hrs.**
Credits (LP)	4
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	• Overview and application possibilities, approximation character of the FEM • Approximation approaches for the element displacements • Derivation of the linear force vectors and stiffness matrices using differential equations and the principle of the minimum of the total potential, using the example of a beam element • Transformation and assembly of the elements through global equilibrium at the nodes • Solution of linear equation systems and back calculation • Application (and checks) of the method with self-developed VBA software (source code) and with standard FE software for beam and plane area elements • Possible errors, quality assurance, controls

	• Interpretation and documentation of results
Module objectives	Students have theoretical-mechanical background knowledge and are able to use standard finite element software critically and responsibly for dealing with linear load-bearing behaviour of the structure. They can independently recognise errors in using today's unavoidable "black box programmes" and specifically avoid them through controls. They are familiar with several practical programme systems through partnerships with leading German software companies.
Formative assessments	None
Summative assessment	Coursework (graded) (Workload for summative assessment is part of independent study)
Frequency	Only in winter semester
Media formats	Working materials and worksheets as digital information on the intranet and internet
Literature recommendations	• Werkle, H., Finite Elemente in der Baustatik; Wiesbaden: Vieweg u. Sohn, 2008 • Link, M., Finite Elemente in der Statik und Dynamik; Wiesbaden: Springer Vieweg, 2014 • Meißner / Maurial, Die Methode der finiten Elemente; Heidelberg: Springer, 2000 • Bathe, K.-J., Finite-Element-Methoden; Wiesbaden: Springer, 2003 • Kindmann/ Kraus, Finite-Elemente-Methoden im Stahlbau, Berlin: Ernst & Sohn 2007 • Barth/ Rustler, Finite Elemente in der Baustatik-Praxis

Module name	**Bauinformatik: Spezielle EDV-Anwendungen (UVW) I**
English module name	Computing in Civil and Building Engineering: Specialist IT Applications (ETW) I
Module number	**BM3B-I**
Module level	Master's
Module coordinator	Prof. Dr.-Ing. Gerhard Haimerl
Credits (LP)	8 LP
Requirement for the award of credit points	Credit points are obtained by passing the "BM3B-I-1" (4 LP) sub-module assessment and the "BM4B-I-2" (4 LP) sub-module assessment.
Related courses	LV BM3B-I-1 Scientific Foundations of Special EDP Models I (2 SWS) LV BM3B-I-2 Application and Control of Spec. EDP Models I (2 SWS)

Course	**BM3B-I-1 Scientific Foundations of Special EDP Models I**
Semester of study	MB1
Lecturer	Prof. Dr.-Ing. Gerhard Haimerl Dipl.-Ing. Markus Grünzner Additional professors
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lectures (30%); practical tutorials in the computer room (50%); homework with e-learning components (20%) E-learning portion: Independent study on material to accompany the lecture; online advice and progress monitoring
Workload	Classroom study: 30 hrs. E-learning 30 hrs. Independent study: 60 hrs. **Total workload:** 120 **hrs.**
Credits (LP)	4
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	Basic computer skills, basic knowledge of hydromechanics, basic knowledge of scheduling
Module contents	Digital construction scheduling Physical fundamentals of 3-dimensional hydromechanics 3-dimensional numerical modelling of flow processes Model laws of physical models in hydraulic engineering Hybrid modelling
Module objectives	Apply digital scheduling tools

	Become familiar with and apply 3D hydraulic models in fluid mechanics; their special features, their application levels, their data foundation, interpretation of the results, application in the planning process
Formative assessments	None
Summative assessment	Oral assessment
Frequency	Only in winter semester
Media formats	E-learning, digital information on the intranet, internet, work in computer rooms.
Literature recommendations	Manuals, manufacturer's notes Literature will be specified on the intranet

Course	**BM3B-I-2 Application and Control of Spec. EDP Models I**
Semester of study	MB1
Lecturer	Prof. Dr.-Ing. Gerhard Haimerl Dipl.-Ing. Markus Grünzner
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lectures (30%); practical tutorials in the computer room (70%); homework with e-learning components E-learning section: Interactive material to accompany the lecture; online advice and progress monitoring
Workload	Classroom study: 20 hrs. E-learning 40 hrs. Independent study: 60 hrs. **Total workload:** 120 **hrs.**
Credits (LP)	4
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Contents	Work on sub-projects with the knowledge gained in module BM 3B-I-1
Module objectives	Learn to use project-related EDP models
Formative assessments	None
Summative assessment	Coursework (graded) (Workload for summative assessment is part of independent study)
Frequency	Only in winter semester
Media formats	E-learning, workshops, working in computer rooms
Literature recommendations	Further reading will be listed on the intranet

Module name	**Bauinformatik: Spezielle EDV-Anwendungen (KIB) II**
English module name	Computing in Civil and Building Engineering: Specialist IT Applications (SE) II
Module number	**BM3A-II**
Module level	Master's
Module coordinator	Prof. Dipl.-Ing. Dr. techn. Daniel Rubin
Credits (LP)	8 LP
Requirement for the award of credit points	Credit points are obtained by passing the "BM3A-II-1" (4 LP) sub-module assessment and the "BM3A-II-2" (4 LP) sub-module assessment.
Related courses	LV BM3A-II-1 Scientific Fundamentals of Linear and Nonlinear FEM II (2 SWS) LV BM3A-II-2 Application and Control of Spec. FEM models II (2 SWS)

Course	**BM3A-II-1 Scientific Fundamentals of Linear and Nonlinear FEM II**
Semester of study	MB2
Lecturer	Dr. techn. Christian Schenk
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lecture (approx. 70%) with integrated tutorials (approx. 30%); E-learning portion: Interactive material to accompany the lecture
Workload	Classroom study: 20 hrs. E-learning 40 hrs. Independent study: 60 hrs. **Total workload: 120 hrs.**
Credits (LP)	4
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	• Repetition, special course for beginners: Overview of vectors and matrices, linear equation systems • Eigenvalues and eigenmodes of symmetric matrices • Basic equations of linear and non-linear elasticity theory for beams with bending, normal force and shear • Principles of the steady-state value of the total potential of linear and non-linear elastomechanics using the example of beams with bending, normal force and shear • Solving non-linear systems of equations: Newton-Raphson iteration
Module objectives	Students are proficient in the basic mathematical and mechanical knowledge required for practical FE analysis.
Formative assessments	None
Summative assessment	Oral assessment

Frequency	Only in summer semester
Media formats	Working materials and worksheets as digital information on the intranet and internet
Literature recommendations	• Dankert, J., Numerische Methoden der Mechanik, Wiesbaden: Springer, 2013 • Werkle, H., Finite Elemente in der Baustatik; Wiesbaden: Vieweg u. Sohn, 2008 • Link, M., Finite Elemente in der Statik und Dynamik; Wiesbaden: Springer Vieweg, 2014 • Meißner/ Maurial, Die Methode der finiten Elemente; Heidelberg: Springer, 2000 • Bathe, K.-J., Finite-Element-Methoden; Wiesbaden: Springer, 2003 • Kindmann/ Kraus, Finite-Elemente-Methoden im Stahlbau, Berlin: Ernst & Sohn 2007 • Barth/ Rustler, Finite Elemente in der Baustatik-Praxis

Course	**BM3A-II-2 Application and Control of Spec. FEM models II**
Semester of study	MB2
Lecturer	Dr. techn. Christian Schenk
Language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lecture (approx. 70%) with integrated tutorials (approx. 30%); E-learning portion: Interactive material to accompany the lecture
Workload	Classroom study: 20 hrs. E-learning 40 hrs. Independent study: 60 hrs. **Total workload: 120 hrs.**
Credits (LP)	4
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Contents	• Repetition, special course for beginners: Overview and application possibilities, approximation character of the FEM • Initial functions and derivation of the non-linear force vectors and stiffness matrices using the principle of the stationary value of the total potential using the example of a beam element (elastic material behaviour) • Overview/repetition: Transformation, assembly of the elements • Solving the non-linear system of equations according to the Newton-Raphson method • Back calculation • Application (and controls) for simple beam elements with self-developed VBA software (source code)

	• Application (and controls) for more complex structures with standard FE software for beam elements • Investigation and discussion of different accuracy levels of geometrically nonlinear kinematic relations; influence on convergence behaviour and quality of results • Determinant progression of the stiffness matrix, critical load conditions, eigenvalues and eigenfunctions • Influence of geometric substitute imperfections • Possible errors, quality assurance, controls • Interpretation and documentation of results
Module objectives	Students have theoretical-mechanical background knowledge and are able to use standard finite element software critically and responsibly for dealing with non-linear load-bearing behaviour of the structure. They can independently recognise errors in using today's unavoidable "black box programmes" and specifically avoid them through controls. They are familiar with several practical programme systems through partnerships with leading German software companies.
Formative assessments	None
Summative assessment	Coursework (graded) (Workload for summative assessment is part of independent study)
Frequency	Only in summer semester
Media formats	Working materials and worksheets as digital information on the intranet and internet
Literature recommendations	• Link, M., Finite Elemente in der Statik und Dynamik; Wiesbaden: Springer Vieweg, 2014 • Bathe, K.-J., Finite-Element-Methoden; Wiesbaden: Springer, 2003 • Kindmann/ Kraus, Finite-Elemente-Methoden im Stahlbau, Berlin: Ernst & Sohn 2007 • Barth/ Rustler, Finite Elemente in der Baustatik-Praxis • Lumpe, G., Zur Stabilität und Biegetorsion großer Verformungen von räumlichen Stabwerken, Bauingenieur, Heft 3, 2005; • Gensichen/ Lumpe, Zur Leistungsfähigkeit, korrekten Anwendung und Kontrolle räumlicher Stabwerksprogramme, Vortrag Gensichen: Stahlbauseminar Rheine, Mai 2007

Module name	**Bauinformatik: Spezielle EDV-Anwendungen (UVW) II**
English module name	Computing in Civil and Building Engineering: Specialist IT Applications (ETW) II
Module number	**BM3B-II**
Module level	Master's
Module coordinator	Prof. Dr.-Ing. Gerhard Haimerl
Credits (LP)	8 LP
Requirement for the award of credit points	Credit points are obtained by passing the "BM3B-II-1" (4 LP) sub-module assessment and the "BM3B-II-2" (4 LP) sub-module assessment.
Related courses	LV BM3B-II-1 Scientific Foundations of Special EDP Models I (2 SWS) LV BM3B-II-2 Application and Control of Spec. EDP Models II (2 SWS)

Course	**BM3B-II-1 Scientific Foundations of Special EDP Models II**
Semester of study	MB2
Lecturer	Prof. Dr.-Ing. Gerhard Haimerl Adjunct professors
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lectures (30%); practical tutorials in the computer room (50%); homework with e-learning components (20%) E-learning portion: Independent study on material to accompany the lecture; online advice and progress monitoring
Workload	Classroom study: 30 hrs. E-learning 30 hrs. Independent study: 60 hrs. **Total workload:** 120 **hrs.**
Credits (LP)	4
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	Basic computer skills, basic knowledge of hydromechanics
Module contents	Theoretical principles of 2-dimensional hydrodynamic models, terrain models and surface runoff characteristics for the calculation of heavy rain hazard maps
Module objectives	Become familiar with various EDP models in the building industry; their special features, their application levels, their data basis, interpretation of the results, application in the planning process
Formative assessments	None
Summative assessment	Oral assessment
Frequency	Only in winter semester

Media formats	E-learning, digital information on the intranet, internet, work in computer rooms.
Literature recommendations	Manuals, lecture notes

Course	**BM3B-II-2 Application and Control of Spec. EDP Models II**
Semester of study	MB2
Lecturer	Prof. Dr.-Ing. Gerhard Haimerl Adjunct professors
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lectures (30%); practical tutorials in the computer room (70%); homework with e-learning components E-learning section: Interactive material to accompany the lecture; online advice and progress monitoring
Workload	Classroom study: 20 hrs. E-learning 40 hrs. Independent study: 60 hrs. **Total workload:** 120 **hrs.**
Credits (LP)	4
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Contents	Work on sub-projects with the knowledge gained in module BM 3B-I-1
Module objectives	Learn to use project-related EDP models
Formative assessments	None
Summative assessment	Coursework (graded) (Workload for summative assessment is part of independent study)
Frequency	Only in winter semester
Media formats	E-learning, workshops, working in computer rooms
Literature recommendations	Further reading will be listed on the intranet

Module name	**Unternehmensleitung und Digitalisierung I**
English module name	Company Management and Digitalization I
Module number	**BM4-I**
Module level	Master's
Module coordinator	Vertr.-Prof. Dipl.-Ing. Lothar Boenert
Credits (LP)	7 LP
Requirement for the award of credit points	Credit points are obtained by passing the sub-module assessment "BM4-I-1" (4 LP) and the sub-module assessment "BM4-I-2" (3 LP).
Related courses	LV BM4-I-1 Company Management I (2 SWS) LV BM4-I-2 Digital Management Tools (2 SWS)

Course	**BM4-I-1 Company Management I**
Semester of study	MB1
Lecturer	Christian Biegert
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	The required knowledge and methods are taught in lectures, which are supplemented by an e-learning component that students have to complete independently. Project work in individual and group assignments.
Workload	Classroom study: 30 hrs. E-learning 30 hrs. Independent study: 60 hrs. **Total workload: 120 hrs.**
Credits (LP)	4
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	• Normative and Strategic Corporate Management • Planning and Control • Organization and Human Resources • Global Leadership Approaches, Leadership Levels, and Alpha Leadership • Decision Making • Strategic Leadership: Leader as Networker, Change Agent, and Political Antenna • Corporate Finance • Project Finance
Module objectives	Deepening Knowledge, Skills, and Competencies in Strategic Corporate Management. The aim is for students to expand their knowledge of corporate

	management within the module's content areas and to gain a deeper understanding of construction business management and control mechanisms. Particularly during independent study, under guidance, they should improve their research and analytical skills. Students will learn to understand, evaluate, and apply scientific methods in the context of the module's content to practical situations. This will enhance their practical implementation capabilities in corporate management, and personal and social competencies will be fostered through role-playing exercises designed to apply the acquired knowledge.
Formative assessments	none
Summative assessment	Oral assessment
Frequency	Only in winter semester
Media formats	Lecture with board and projector; learning videos; online lecture notes; learning objectives
Literature recommendations	• Ralf Dillerup, Roman Stoi: Unternehmensführung – Management & Leadership – Strategien, Werkzeuge, Praxis, 5. Auflage, München, Verlag Franz Vahlen, 2016 • Martin K. Welge, Andreas Al-Laham, Marc Eulerich: Strategisches Management: Grundlagen – Prozess – Implementierung, 8., überarb. u. erw. Auflage 2024, Wiesbaden, Springer Gabler Verlag, 2024 • Ulrich Ermschel, Christian Möbius, Holger Wengert: Investition und Finanzierung, 4. Auflage, Berlin Heidelberg, Verlag Springer Gabler, 2016 • Klaus von Sicherer, Bilanzierung im Handels- und Steuerrecht, 4. Auflage, Wiesbaden, Springer Fachmedien, 2016 • Rudolf Fiedler: Controlling von Projekten – Mit konkreten Beispielen der Unternehmenspraxis – Alle Aspekte der Projektplanung, Projektsteuerung und Projektkontrolle, 7. Auflage, Wiesbaden, Springer Fachmedien, 2016 • Klaus-Dieter Däumler, Jürgen Grabe: Grundlagen der Investitions- und Wirtschaftlichkeitsrechnung, Herne, NBW Verlag, 2014

Course	**BM4-I-2 Digital Management Tools I**
Semester of study	MB1
Lecturer	Prof. Dr.-Ing. Hannes Schwarzwälder
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	The required knowledge and methods are taught in lectures, which are supplemented by an e-learning component that students have to complete independently. Project work in individual and group assignments.
Workload	Classroom study: 30 hrs. E-learning 15 hrs. Independent study: 45 hrs.

	Total workload: 90 hrs.
Credits (LP)	3
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	• Basics of digitalisation in the construction industry • Advanced knowledge of the Building Information Modelling method • Application of software for creating digital building models • Model-oriented calculation incl. preparation of bills of quantities and VOB/C-compliant quantity determination • Creation of a model-based construction process animation • Creation of a technical visualisation
Module objectives	The module aims to provide students with a practice-oriented view of the status quo of methods through the fundamentals of digitalisation in the construction industry to its application in a specific example. In the course of working on the project, the interdisciplinary processes that have been learned in the course of the degree programme are discussed and digitally implemented. Students are taught the connections between theory and practice.
Formative assessments	none
Summative assessment	Coursework (graded)
Frequency	Only in winter semester
Media formats	Lectures with projector, laboratory tutorials, tutorials, online notes
Literature recommendations	• Sacks, Eastman et.al.: BIM-Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers, 3. Auflage, John Wiley & Sons, Hoboken, New Jersey, 2015 • Bormann, König et.al.: Building Information Modeling: Technologische Grundlagen und industrielle Praxis, 1.Auflage, Springer Vieweg, Wiesbaden 2015 • Krygiel: Green BIM: Successful Sustainable Design with Building Information Modeling, 1. Auflage, Wiley Inc., Indianapolis

Module name	**Unternehmensleitung und Digitalisierung II**
English module name	Company Management and Digitalization II
Module number	**BM4-II**
Module level	Master's
Module coordinator	Vertr.-Prof. Dipl.-Ing. Lothar Boenert
Credits (LP)	7 LP
Requirement for the award of credit points	Credit points are obtained by passing the "BM4-II-1" (4 LP) sub-module assessment and the "BM4-II-2" (3 LP) sub-module assessment.
Related courses	LV BM4-II-1 Company Management I (2 SWS) LV BM4-II-2 Digital Management Tools (2 SWS)

Course	**BM4-II-1 Company Management II**
Semester of study	MB2
Lecturer	Christian Biegert
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	The required knowledge and methods are taught in lectures, which are supplemented by an e-learning component that students have to complete independently. Project work in individual and group assignments.
Workload	Classroom study: 30 hrs. E-learning 30 hrs. Independent study: 60 hrs. **Total workload:** 120 **hrs.**
Credits (LP)	4
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	• Advanced Aspects of Leadership • A World in Motion: Challenges for Corporate Leaders Yesterday and Tomorrow • Current Priorities for Corporate Leaders • From the Perspective of Corporate Leaders: Leadership Principles, Corporate Strategies, and Dealing with Investors • Negotiation Methods
Module objectives	Deepening Knowledge, Skills, and Competencies in Strategic Corporate Management. Students should expand their knowledge of corporate management in the areas covered by the module and gain a deeper understanding of construction business management and control mechanisms. Through guided independent study, they should particularly improve their

	research and analysis skills. Students will learn to understand, evaluate, and apply scientific methods related to the module's content to practical situations. This is designed to enhance their practical implementation abilities in corporate management, while also fostering personal and social competencies through role-playing exercises that apply the acquired knowledge.
Formative assessments	none
Summative assessment	Oral assessment
Frequency	Only in summer semester
Media formats	Lecture with board and projector; learning videos; online lecture notes; learning objectives
Literature recommendations	• Roger Fischer, William Ury, Bruce Patton: Das Havard Konzept, 25. Auflage, Campus Verlag, Frankfurt/New York, 2015 • Laurent Combalbert, Marwan Mery: Negotiator, The Reference for all Negotiation, 1. Auflage, Dunod, 2021 • Uwe Schirmer, Sabine Woydt: Mitarbeiterführung, 3. Auflage, Springer Verlag, Berlin Heidelberg, 2016 • Christian Homburg: Grundlagen des Marketingmanagements – Einführung in Strategie, Instrumente, Umsetzung und Unternehmensführung, 5. Auflage, Springer Gabler, Wiesbaden, 2016 • Heribert Meffert, Christoph Burmann, Manfred Kirchgeorg, Maik Eisenbeiß: Marketing: Grundlagen marktorientierter Unternehmensführung – Konzepte, Instrumente, Praxisbeispiele, Springer Gabler, Wiesbaden, 2018

Course	**BM4-II-2 Digital Management Tools II**
Semester of study	MB2
Lecturer	Prof. Dr.-Ing. Hannes Schwarzwälder
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	The required knowledge and methods are taught in lectures, which are supplemented by an e-learning component that students have to complete independently. Project work in individual and group assignments.
Workload	Classroom study: 30 hrs. E-learning 15 hrs. Independent study: 45 hrs. **Total workload: 90 hrs.**
Credits (LP)	3
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none

Module contents	• Basics of digitalisation in the construction industry • Advanced knowledge of the Building Information Modelling method • Application of software for creating digital building models • Model-oriented calculation incl. preparation of bills of quantities and VOB/C-compliant quantity determination • Creation of a model-based construction process animation • Creation of a technical visualisation
Module objectives	The module aims to provide students with a practice-oriented view of the status quo of methods through the fundamentals of digitalisation in the construction industry to its application in a specific example. In the course of working on the project, the interdisciplinary processes that have been learned in the course of the degree programme are discussed and digitally implemented. Students are taught the connections between theory and practice.
Formative assessments	none
Summative assessment	Coursework (graded)
Frequency	Only in summer semester
Media formats	Lectures with projector, laboratory tutorials, tutorials, online notes
Literature recommendations	• Sacks, Eastman et.al.: BIM-Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers, 3.Auflage, John Wiley & Sons, Hoboken, New Jersey, 2015 • Bormann, König et.al.: Building Information Modeling: Technologische Grundlagen und industrielle Praxis, 1.Auflage, Springer Vieweg, Wiesbaden 2015 • Krygiel: Green BIM: Successful Sustainable Design with Building Information Modeling, 1.Auflage, Wiley Inc., Indianapolis

Module name	**Wahlpflichtfächer (WPF)**
English module name	Compulsory Electives
Module number	**BM5**
Module level	Master's
Module coordinator	Prof. Dipl.-Ing. Dr. techn. Daniel Rubin
Credits (LP)	6 LP
Requirement for the award of credit points	Credit points are obtained by passing the "BM5-1/2/3/4/5/6" (1 LP each) sub-module assessments. Alternatively, credit points can also be earned by completing electives from any other Master's programme at the HBC.
Related courses	LV BM 5-1 Public-Private-Partnership and Other Forms of Cooperation (1 SWS) LV BM 5-2 Business Plans and Start-ups (1 SWS) LV BM 5-3 Selected Elements of SE (1 SWS) LV BM 5-4 Selected Elements of ETW (1 SWS) LV BM 5-5 Selected Elements of Geotechnics/Business Administration/Circular Economy (1 SWS) LV BM 5-6 Organisation and Participation Excursion (1 SWS)

Course	**BM5-1 Public-Private-Partnership and Other Forms of Cooperation**
Semester of study	MB3
Lecturer	Prof. h. c. Dipl.-Ing Alexander Hofmann
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lectures (50%) and seminar (50%) in block format
Workload	Classroom study: 8 hrs. E-learning 0 hrs. Independent study: 22 hrs. **Total workload: 30 hrs.**
Credits (LP)	1
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	• Types of PPP • Mixed-economy enterprises (cooperation model) • Operator model • Management model (concession model) • Operating lease model • BOT model • Risks • Application fields • The "PPP Acceleration Act"
Module objectives	Students learn how to apply forms of cooperation such as public-private partnerships. They are introduced to the legal and economic realities of these forms of cooperation. Examples are used to illustrate the organisation, the contracts and the practical implementation.
Formative assessments	none
Summative assessment	Presentation
Frequency	Every semester
Media formats	Slides, flipchart, board, projector
Literature recommendations	Further literature will be specified on the intranet before the start of the semester.

Course	**BM5-2 Business Plans and Start-Ups**
Semester of study	MB3
Lecturer	Michael Reichert
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lectures (50%) and seminar (50%) in block format
Workload	Classroom study: 8 hrs. E-learning 0 hrs. Independent study: 22 hrs. **Total workload: 30 hrs.**
Credits (LP)	1
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	Business plans • Types • Structure • Scope • Source Start-ups • Start-up assistance • Issues with institutional funding • Start-up competition • Business start-up simulation • Start-up research • Tax incentives for start-ups
Module objectives	Students are taught how to become self-employed. They are taught how to prepare a business plan and, then, how this can be used to obtain approval for external financing. The types of loans that are possible when setting up a business are outlined.
Formative assessments	None
Summative assessment	Presentation
Frequency	Every semester
Media formats	Slides, flipchart, board, projector
Literature recommendations	Further literature will be specified on the intranet before the start of the semester.

Course	**BM5-3 Selected Elements of SE**
Semester of study	MB3
Lecturer	Prof. Dipl.-Ing. Dr. techn. Daniel Rubin
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lectures (40%), seminars (60%) in block format
Workload	Classroom study: 8 hrs. E-learning 0 hrs. Independent study: 22 hrs. **Total workload: 30 hrs.**
Credits (LP)	1
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	• Warping torsion (1st order theory) • Spatial stability • Proof of bending torsional buckling through spatial calculation of shell structures according to second order theory using pre-deformations
Module objectives	Students have additional skills in analysing special technical issues relating to first and second order 3D beam structures and in working out possible solutions.
Formative assessments	None
Summative assessment	Coursework (graded)
Frequency	Every semester
Media formats	Slides, flipchart, board, projector
Literature recommendations	Further literature will be specified on the intranet before the start of the semester.

Course	**BM5-4 Selected Elements of ETW**
Semester of study	MB3
Lecturer	Vertr. Prof. M.Sc. Dipl-Ing. (FH) Monika Schad and Prof. Dr.-Ing. Roland Koenigsdorff
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lectures (50%) and seminar (50%) in block format
Workload	Classroom study: 8 hrs. E-learning 0 hrs. Independent study: 22 hrs. Total workload: 30 hrs.
Credits (LP)	1
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	• Geothermal energy • Geothermal piles
Module objectives	• Students have additional skills in analysing specific civil engineering issues relating to geothermal piles and in developing possible solutions.
Formative assessments	• None
Summative assessment	• Coursework (graded)
Frequency	• Every semester
Media formats	• Slides, flipchart, board, projector
Literature recommendations	• Further literature will be specified on the intranet before the start of the semester.

Course	BM5-5 Selected Elements of Geotechnics/Business Administration/Circular Economy
Semester of study	MB3
Lecturer	Vertr. Prof. M.Sc. Dipl-Ing. (FH) Monika Schad and Prof. Dr.-Ing. Dimitrios Toris
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lectures (50%) in block form and independent study (50%)
Workload	Classroom study: 15 hrs. E-learning 0 hrs. Independent study: 15 hrs. **Total workload: 30 hrs.**
Credits (LP)	1
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	If applicable, Bachelor's courses in the field of bioeconomy and circular economy
Module contents	Creating a circular system for the recycling of building materials requires knowledge about potential uses. What are the potential applications for bricks, windows, timber construction and interior components, formwork or concrete from demolition or old stock? What is the overall potential of the "city as a source of raw materials"? How can new construction be designed so that the building components are easy to recycle as a source of raw materials at the end of their useful life? These questions are discussed in lectures using practical examples and material flow analyses. Current information about the political-regulatory advancement of a circular construction industry is also taught.
Module objectives	Students are introduced to the concept of circular construction. They extend their knowledge of circular building design and of possible uses of existing buildings as a source of raw materials ("urban mining") using current case studies. They learn about the conditions for recycling and concrete application options for building materials from existing stock. They will become familiar with the regulatory framework of circular construction. They gain a basic knowledge of the life cycle assessments of selected building materials – including, for example, to what extent extending the use of building materials improves them.
Formative assessments	None
Summative assessment	Coursework (graded)
Frequency	Every semester
Media formats	Slides, flipchart, board, projector
Literature recommendations	Heisl, Hebel (2021), Urban Mining und kreislaufgerechtes Bauen: die Stadt als Rohstofflager, Fraunhofer IRB.

Course	BM5-6 Organisation and Participation Excursion
Semester of study	MB3
Lecturer	Prof. Dipl.-Ing. Dr. techn. Daniel Rubin
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lectures (50%) and seminar (50%) in block format
Workload	Classroom study: 8 hrs. E-learning 0 hrs. Independent study: 22 hrs. **Total workload:** 30 **hrs.**
Credits (LP)	1
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	Excursions to a variety of destinations
Module objectives	Students are able to organise a subject-related excursion. This includes selecting the excursion destination, the activities carried out there, and the preparation and follow-up of the excursion.
Formative assessments	None
Summative assessment	Coursework (graded)
Frequency	Every semester
Media formats	Slides, flipchart, board, projector, excursion report
Literature recommendations	Further literature will be specified on the intranet before the start of the semester.

Module name	**Schwerpunktbereich**
English module name	
Module number	**BM6**
Module level	Master's
Module coordinator	Prof. Dipl.-Ing. Dr. techn. Daniel Rubin
Credits (LP)	6 LP
Requirement for the award of credit points	Credit points are obtained by passing 1 of the 2 selected "BM7-1/2" (6 LP each) sub-module assessments. Alternatively, the required 6 credit points can also be obtained by completing electives from any other Master's programmes at the HBC.
Related courses	LV BM 7-1 Research and Innovation (2 SWS) LV BM 7-2 International Management Skills (2 SWS)

Course	**BM6-I Research and Innovation**
Semester of study	MB3
Lecturer	Prof. Dr.-Ing. habil. Jörg Schänzlin
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lectures and independent study
Workload	Classroom study: 30 hrs. E-learning 0 hrs. Independent study: 150 hrs. **Total workload: 180 hrs.**
Credits (LP)	6
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	The lecture introduces the development process within the context of research and innovation. On one hand, the methods for transforming an idea into a business model are presented in cooperation with the start-up initiative at Biberach University of Applied Sciences. Following this, a research question is analyzed. The principles of scientific work are explained and applied to a specific project. The university's facilities, such as the building materials testing center and/or the hydraulic engineering laboratory, can be used for the investigation. In the end, solutions to the research questions are presented, and further investigations are recommended.
Module objectives	Students become familiar with the concept of research and innovation in the construction industry. They learn strategies for solving previously unresolved issues. They learn how to apply the methods in specific case studies.
Formative assessments	none

Summative assessment	Coursework (graded), oral assessment 5:1 weighting
Frequency	Every semester
Media formats	Slides, flipchart, board, projector
Literature recommendations	Specialised literature on the respective research focus
Course	**BM6-I International Management Skills**
Semester of study	MB3
Lecturer	N.N.
Teaching language	German and English
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lectures (50%) and seminar (50%) in block format and independent study
Workload	Classroom study: 30 hrs. E-learning 30 hrs. Independent study: 120 hrs. **Total workload:** 180 **hrs.**
Credits (LP)	6
Requirements according to examination regulations	General admission requirements for the Master's programme
Recommended prerequisites	none
Module contents	The special features of construction in an international context are explained and discussed together in seminars using various project examples and case studies. The following topics are covered: • Different organisational and contractual structures • Legal framework and differences in contractual design • Position and special features of FIDIC contracts • Design-and-Build contracts in the international context and their specific considerations • Position and tasks of design management in Design-and-Build contracts • Special features of foreign construction • Special features of calculation, cost controlling and risk management Some of the lectures are given in English.

Module objectives	Introduction to the special features of construction in an international context. Students are familiar with the scope and structure of international construction. They are familiar with the rights and obligations of the parties involved in construction, which are defined differently in Germany and other countries, and they are able to understand and interpret the basic patterns of thought and action of international contracts. They also know about typical foreign-specific features of project control, project management and construction operations and approaches to dealing with them.
Formative assessments	None
Summative assessment	Coursework (graded) Oral assessment
Frequency	Every semester
Media formats	Slides, flipchart, board, projector
Literature recommendations	Further literature will be specified online before the start of the semester.

Module name	**Master-Thesis**
English module name	Master's thesis
Module number	**BM8**
Module level	Master's
Module coordinator	Prof. Dipl.-Ing. Dr. techn. Daniel Rubin
Credits (LP)	18 LP
Requirement for the award of credit points	Credit points will be obtained after successful completion of the Master's thesis. (See also SPO Master's)
Related courses	BM8 Master's thesis

Course	**BM8 Master's thesis**
Semester of study	MB3
Lecturer	All professors and lecturers on the study programme
Teaching language	German
Incorporation in degree programme	Master's degree programme in Civil Engineering
Applicability	Master's degree programme in Civil Engineering
Teaching form / SWS	Lectures, seminars, workshops and e-learning components
Workload	Classroom study: 0 hrs. E-learning 0 hrs. Independent study: 540 hrs. **Total workload: 540 hrs.**
Credits (LP)	18
Requirements according to examination regulations	Successful completion of BM1 and BM2
Recommended prerequisites	Basics of scientific work Structured and focused way of working Time management Confident handling of subject-specific EDP programmes
Module contents	Structure and preparation of an academic paper Academic work with word processing programmes Representative polls, surveys, professional internet research Structured and focused analyses and analysis tools Legal principles
Module objectives	Students will be able to work independently on a demanding, technical task using scientific methods and complete it successfully.
Formative assessments	None
Summative assessment	"Master's Thesis with Oral Exam / Presentation" module assessment
Frequency	Every semester
Media formats	All

Literature recommendations	• Pospiech, Ulrike: Duden-Ratgeber – Wie schreibt man wissenschaftliche Arbeiten? Alles Wichtige von der Planung bis zu fertigen Text, Bibliographisches Institut, 1. Auflage, 2012 Further literature will be specified on the intranet before the start of the semester.