Appendix 3: Module catalogue

Please note: The German version of this document is the legally binding version. The English translation provided here is for information purposes only.

Introduction to the Integrated Project 1								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	1st sem.	Annual	Winter	1 sem.	Compulsory	M.A. M.Eng.
1	Course type		Contact hours	Self-study	Forms of teaching (learning methods)		Planned group size	Language
	Seminar		1 SCH / 15 h					
	Exercises / Projects		2 SCH / 30 h	105 h	Group work		35	German
2	Learning outcomes/competences							
	The module “Introduction to the Integrated Project” involves teaching students the necessary skills to be able to realise a complex planning task as a team. First of all, in preparation for the planning activities in Integral Project 1, the basics of integral planning are analysed in a project, so that an independent differentiation of the already acquired knowledge is possible afterwards. After completing the module, students should be able to evaluate which steps are required at which point in time within a complex task and be able to process them as a team. The individual skills that the students have acquired in the bachelor degree programme are combined in this module. In addition, the gender aspects are addressed here and discussed with the students in relation to their activities.							
3	Contents							
	The interaction of the different planning areas from architecture, project management, civil engineering and infrastructure engineering is taught by means of exercises and a project task. The compilation of the results in a project book forms the basis for the further planning task. The focus of the module is on the development of basic principles that must be taken into account in complex integral planning. The students work on interdisciplinary topics in a project, where the individual focus of the participants corresponds to the specialisation.							
4	Participation requirements							
	Formal: none Content: Knowledge and skills must be equivalent to a bachelor degree in the subject areas of Architecture, Civil Engineering, Project Management Construction or Infrastructure Engineering.							
5	Form of assessment							
	Project work The contribution to the integral project is presented and evaluated in a final colloquium through the documents produced. In each case, the project members present the work done in their area of activity.							
6	Condition for the award of credit points							
	Module examination pass							
7	Application of the module (in the following study programmes)							
	Integral Construction (M.A. and M.Eng.)							
8	Module coordinator							
	Prof. Dr. Matthias Kathmann							
9	Other information							

Integrated Project 1								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	450 h	15	2nd sem.	Annual	Summer	1 sem.	Compulsory	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Seminar	2 SCH/30 h				
	Exercises / Projects	5 SCH/75 h	345 h	Group work	35	German

2 Learning outcomes/competences

Building on the knowledge gained in the module "Introduction to the Integrated Project", students should master the skills of integral planning and project work as a team after completing the module Integrated Project 1. The complex planning is handled by the team members according to their individual areas of study. Building on the understanding of the different focal points of the individual disciplines and the associated links and interdependencies within the framework of integrated planning, students develop strategies for their own planning. The project should be worked on in a practical way, taking into account new innovative approaches, so that the skills can be directly applied after graduation.

3 Contents

The planning task includes the areas of architecture, project management, civil engineering and infrastructure engineering. The combination of all individual findings and the resulting interdependencies are to be taken into account by the students over the entire life cycle of a building, starting with project development and continuing through to building operation and third-party use. The focus of Integral Project 1 is on the conceptual design, development and planning of new buildings. The wide range of tasks is intended to provide students with a comprehensive overview of all sub-steps in the planning of complex projects.

4 Participation requirements

Formal: none
Content: Knowledge and skills taught within the module "Introduction to the Integrated Project" must be available.

5 Form of assessment

Project work
The contribution to the integral project is presented and evaluated in a final colloquium through the documents produced. In each case, the project members present the work done in their area of activity.

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction (M.A. and M.Eng.)

8 Module coordinator

Prof. Dr. Matthias Kathmann

9 Other information

Integrated Project 2								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	300 h	10	3rd sem.	Annual	Winter	1 sem.	Compulsory	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Seminar	2 SCH/30 h				
	Exercises / Projects	3 SCH/45 h	225 h	Group work	35	German

2 Learning outcomes/competences

After completing the module, students should be able to produce an integral planning and project work in structural engineering as a team. They will be able to assess the different requirements that complex projects entail and independently generate the resulting planning steps. The students will learn about the different components of planning, costing, scheduling, sustainability and organisational structures of a project. The existing knowledge from the previous modules is brought together in the project so that the students gain a holistic / integral understanding.

3 Contents

Joint activity within a planning group, taking into account the individual performance of each group member. The differentiation of the individual performance is made according to the different study focuses in the fields of architecture, project management, civil engineering and infrastructure engineering. The integral idea includes the entire area from project development to the operating phase. The focus of Integrated Project 2 is on the analysis, evaluation and development of concepts for existing buildings. The project requirements are worked on in a practical and interactive way in the individual teams.

4 Participation requirements

Formal: none
Content: Knowledge and skills corresponding to the module examination Integrated Project 1 must be present

5 Form of assessment

Project work
The contribution to the integrated project is presented and evaluated in a final colloquium through the documents produced. The project members present the work they have done in their sub-area.

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction (M.A. and M.Eng.)

8 Module coordinator

Prof. Dr. Matthias Kathmann

9 Other information

Master Thesis								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	600 h	20	4th sem.	Bi-annual	Summer	1 sem.	Compulsory	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Project work		600 h			German

2 Learning outcomes/competences

The students acquire the knowledge and skills to explore a task in the subject area they have chosen in the master's programme in terms of content and method within a given period of time. They apply their scientific and/or artistic experience and can independently present their work results according to scientific methods. The students hone their awareness of interdisciplinary cooperation with the other parties involved in planning and building. The content of the master thesis can be chosen for both the Master of Arts (M.A.) and the Master of Engineering (M.Eng.) degree.

3 Contents

The master thesis is a written or design and/or experimental project work. It consists of the conception, implementation and evaluation of a project, usually according to the task, based on the processing of a design task, an object planning, a construction task, a research question or a thesis. This can also take place in institutions that have a professional connection with the objectives and contents of the study programme. It may also include empirical research, conceptual or design tasks or evaluation of existing sources. The length of the master thesis should not exceed 150 text pages.

4 Participation requirements

Formal: Students who have passed the module examinations up to and including the 3rd semester are admitted to the master thesis.

5 Form of assessment

The master thesis is assessed by two persons, one of whom should have supervised the master thesis. The second examiner is appointed by the examination board.

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction (M.A. and M.Eng.)

8 Module coordinator

Prof. Dr. Matthias Kathmann

9 Other information

Master Colloquium								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	4th sem.	Bi-annual	Summer	1 sem.	Compulsory	M.A. M.Eng.
1	Course type		Contact hours	Self-study	Forms of teaching (learning methods)		Planned group size	Language
	Presentation		0	150 h				
2	Learning outcomes/competences The students acquire the competences to verbally present the findings of their master thesis in their chosen subject area in terms of content and methodology.							
3	Contents The summary, presentation and presentation of the master thesis according to scientific methods. The master colloquium complements the master thesis. It determines whether the student has secure knowledge in the field of the master thesis and is able to justify it independently and apply the corresponding knowledge.							
4	Participation requirements Formal: Those who have handed in the master thesis are admitted to the master colloquium							
5	Form of assessment Presentation with a maximum duration of 45 minutes							
6	Condition for the award of credit points Module examination pass							
7	Application of the module (in the following study programmes) Integral Construction (M.A. and M.Eng.)							
8	Module coordinator Prof. Dr. Matthias Kathmann							
9	Other information							

Building with New Materials, Techniques and Methods								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	1st/3rd sem.	Bi-annual	Winter	1 sem.	Compulsory elective	M.A. M.Eng.
1	Course type		Contact hours	Self-study	Forms of teaching (learning methods)		Planned group size	Language
	Sem. lessons		3 SCH/45 h	105 h	Lecture, presentations and discussion		20	German
2	Learning outcomes/competences In the context of this course, students should learn to collect content from sources such as relevant literature or the internet, to critically question it, to reduce it to the essentials and to communicate it with the help of clear hand-outs and presentations. They gain knowledge of selected materials, building products and construction methods.							
3	Contents Legal basis for the use of building materials. Building with selected building materials and construction methods from solid construction, steel construction, timber and masonry construction, glass construction, ecological construction methods, membrane construction, building with constructive anchoring, building products for sound and heat insulation, new materials such as fibre-reinforced materials... The list can be supplemented with the students' own suggestions for topics.							
4	Participation requirements Formal: none Content: Knowledge of building materials science at the level of the module 'Technology of Building Materials' of the bachelor's degree programmes							
5	Form of assessment Term paper, presentation and written exam							
6	Condition for the award of credit points Passed examination acc. to 5							
7	Application of the module (in the following study programmes) Integral Construction (M.A. and M.Eng.) – overarching module							
8	Module coordinator Prof. B. Wißmann							
9	Other information							

Construction Marketing								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	1st/3rd sem.	Bi-annual	Winter	1 sem.	Compulsory elective	M.A. M.Eng.
1	Course type		Contact hours	Self-study	Forms of teaching (learning methods)		Planned group size	Language
	Lecture		2 SCH/30 h	60 h			60	German / English
	Exercise		1 SCH /15 h	45 h			60	
2	Learning outcomes/competences							
	After completing the module, students will be able to draw up a business plan for a construction company. As part of the business plan, they can create a marketing concept, assess its impact and plan for marketing success.							
3	Contents							
	- Definition of marketing - Marketing planning and strategies - Market and marketing research - Product policy - Price policy - Communication policy - Distribution policy - Marketing controlling							
4	Participation requirements							
	Formal: none							
5	Form of assessment							
	Term paper / Written exam							
6	Condition for the award of credit points							
	Successful completion of the module							
7	Application of the module (in the following study programmes)							
	Integral Construction (M.A. and M.Eng.) – overarching module							
8	Module coordinator							
	Prof. Dr.-Ing. Gerald Ebel							
9	Other information							

Prevention of Structural Damage								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	1st/3rd sem.	Bi-annual	Winter	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture, sem. lessons	1 SCH/15 h	45 h	Lecture		German
	Laboratory exercise	2 SCH/30 h	60 h	Group work	< 14	German

2 Learning outcomes/competences

- Building awareness for active structural damage prevention within the work steps of project preparation, planning, dimensioning and construction, both for new construction measures and for building in existing structures.
- Learning conceptually improved approaches to solving construction tasks through more targeted consideration of selectable alternatives; recording and discussing recognisable damage effects; defining and securing binding decisions;
- Reviewing construction-related successes for future independent acquisition of knowledge

3 Contents

- Basics of planning law aspects from VOB, BGB, HOAI or building regulations
- Individual treatment of influencing effects from the cause areas: Moisture, frost attack, chemical attack, wear, deformation, cracking, bonding, contact corrosion, and personnel/qualification
- Differentiation between construction defects and acceptable anomalies, professional application, handling of rules and regulations, literature, database information and creation of own archives

4 Participation requirements

Formal: none
Content: Knowledge and skills from a bachelor's degree in civil engineering

5 Form of assessment

Written examination

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction (M.A. and M.Eng.) – overarching module

8 Module coordinator

Prof. Dr.-Ing. Heiko Twelmeier

9 Other information

Limited number of participants due to capacity (laboratory exercise)

Preservation and Reconstruction of Buildings								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	1st/3rd sem.	Bi-annual	Winter	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture, sem. lessons	1 SCH / 15 h	45 h	Lecture		German
	Laboratory exercise	2 SCH / 30 h	60 h	Group work	< 14	German

2 Learning outcomes/competences

Understanding structural damage mechanisms, causes of defects and their analysis; checking and assessing damage; selecting practical implementation steps for repairs; participating in the planning, tendering, awarding, monitoring and accounting of building maintenance measures; integrating and instructing technically necessary participants within the construction implementation;
selecting and applying options for monitoring success that are still available after the fact; acquiring and deepening the knowledge required in this field of activity, which is always updated independently.

3 Contents

Significance of structural damage in the building industry; differences between new and existing buildings; typical building and building material tests in the field of repair as well as characteristic values of damage diagnosis; devices and aids for determining the condition; procedures for preparing substrates; treatment of corrosion problems; use of replacement and surface protection systems; filling cracks and cavities; sealing in the case of moisture damage; presentation of exemplary repair measures; regulations and manufacturer information.

4 Participation requirements

Formal: none
Content: Knowledge of building materials

5 Form of assessment

Written examination

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction (M.A. and M.Eng.) – overarching module

8 Module coordinator

Prof. Dr.-Ing. Heiko Twelmeier

9 Other information

Limited number of participants due to capacity (laboratory exercise)

Building, Contract and Environmental Law in Practice

No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	1st/3rd sem.	Annual	Winter	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	2 SCH/30 h	70 h	Lecture	15	German
	Sem. lessons	1 SCH/15 h	35 h	Group work	15	German

2 Learning outcomes/competences

The module aims to familiarise students with the basics of construction contract law and environmental law. They should acquire the corresponding basic knowledge for engineering tasks and their contractual implementation or the contractual effects during construction and recognise resource-saving, sustainable options for action. Construction contract law: They should be put in a position to know the different interests of clients and contractors as well as the authorities and organisations involved and to include them in the contracts.
Environmental law: Students should learn the basics of environmental law and be able to recognise problems in the application of the law. They should develop a basic understanding of the use of standards and technical norms.

3 Contents

Public and private building law, environmental law, the interactions between the claims of the state, the builder and the performers; the corporatist model of the Federal Republic of Germany;
German law in harmonisation in Europe;

Construction contract law: BGB, VOB, HOAI, in particular: Contract for work and services
Environmental law: Basic knowledge of German environmental law on the basis of the federal environmental protection regulations with reference to the possibilities of regulation under Land law and administrative responsibilities. These include:

- General (German, European and international) environmental law;
- Special environmental law (spatial planning, nature conservation and landscape preservation, soil protection, water protection, immission control, nuclear, radiation protection, genetic engineering, hazardous substances, recycling and waste legislation)

4 Participation requirements

Formal: none

5 Form of assessment

Combination of a project work and other performances

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction (M.A. and M.Eng.) – overarching module

8 Module coordinator

Prof. Dr. Johannes Weinig

9 Other information

Building Information Modelling Practice								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	1st/3rd sem.	Annual	Winter	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	-	-	-	-	
	Sem. lessons	1 SCH/15 h	45 h	Group work	35	German
	Exercise	-	-	-	-	-
	Practical/Seminar	2 SCH/30 h	60 h	Individual/group work	15-20	German

2	Learning outcomes/competences
	Acquisition of practical knowledge about the BIM methodology for the integral planning of construction projects with different specialist planners, ability to collaborate in integral BIM projects by means of the acquired knowledge about the possible model-based planning approaches
3	Contents
	Idea of Building Information Modelling (BIM), requirements for digital integral small BIM planning, structure of a building model, concept of open BIM for integral planning in a specialist model, modelling depth (LOI = Level of information and LOD = Level of detail/development) in the service phases of the HOAI, definition and integration of shared information in specialist building models, legal and liability issues in the use of BIM planning data, BIM-based tools for planning, definition and specification of a workflow for the implementation of planning in BIM, technical implementation = {file-related, database-related}, derivation of drawings from BIM models, definition of a workflow for the implementation of planning in BIM, technical implementation = {file-related, database-related} BIM models
4	Participation requirements
	Formal: none
5	Form of assessment
	Technical and methodical in the form of a presentation/speech on the use of the BIM method in the integral project or oral examination on the module topics. Combination of project work and other assessments
6	Condition for the award of credit points
	Module examination pass
7	Application of the module (in the following study programmes)
	Integral Construction (M.A. and M.Eng.) – overarching module
8	Module coordinator
	Prof. Dr.-Ing. Eisfeld
9	Other information

Building Protection 1								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	2nd sem.	Bi-annual	Summer	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Seminar	1 SCH / 15 h				
	Exercises / Project	2 SCH / 30 h	105 h	Group work	35	German

2 Learning outcomes/competences

In the module "Building Protection 1 – Sustainable Building with the Environment", students are taught the basic knowledge for sustainable building with the increasing environmental influences, such as flooding. Building on the lectures and exercises, they will develop and consolidate their own skills and abilities in this area. With the completion of the module, the students possess the competence to sustainably design different construction methods according to the forces acting on them. The scope of consideration includes the analysis, development, realisation, operation and third-party use of the buildings.

3 Contents

The content of the Building Protection 1 module focuses on the analysis of the environmental parameters, the resulting definition of a strategy (evade, resist, yield) and the operation of the construction methods within the hazard areas with floods and tsunami waves. Here, the effects due to different building transformations are considered, as well as in relation to the sustainability parameters. In addition to looking at individual buildings, the impact on the resilience of our cities and the resulting concepts are also explained.

4 Participation requirements

Formal: none
Content: Knowledge and skills equivalent to a bachelor degree in architecture, civil engineering, project management construction or infrastructure engineering

5 Form of assessment

Project work

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction (M.A. and M.Eng.) – overarching module

8 Module coordinator

Prof. Dr. Matthias Kathmann

9 Other information

Building Protection 2								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	2nd sem.	Bi-annual	Summer	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Seminar	1 SCH/15 h				
	Exercises / Projects	2 SCH/30 h	105 h	Group work	35	German

2 Learning outcomes/competences

In the module "Building Protection 2 – Sustainable Building with the Environment", students are taught the basic knowledge for sustainable building with environmental influences, such as earthquakes and strong wind events. Building on the lectures and exercises, they will develop and consolidate their own skills and abilities in this area. With the completion of the module, the students have the competence to design different construction methods according to the forces acting on them. The scope of consideration includes the analysis, development, realisation, operation and third-party use of the buildings.

3 Contents

The content of the Building Protection 2 module focuses on the analysis of the environmental parameters, the resulting definition of a strategy (evade, resist, yield) and the operation of the construction methods within the hazard areas with earthquakes and strong wind events. Here, the effects due to different building transformations are considered, also in relation to the sustainability parameters. Accordingly, in addition to conceptual planning, detailed tasks are also dealt with, such as the integration of protective elements into a building envelope.

4 Participation requirements

Formal: none
Content: Knowledge and skills equivalent to a bachelor's degree in architecture, civil engineering, project management construction or infrastructure engineering

5 Form of assessment

Project work

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction (M.A. and M.Eng.) – overarching module

8 Module coordinator

Prof. Dr. Matthias Kathmann

9 Other information

Real Estate Valuation								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	2nd sem.	Bi-annual	Summer	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	1 SCH/15h	30 h	Lecture	20	German
	Exercise	2 SCH/30h	75 h	Seminar lessons	15	German

2 Learning outcomes/competences

On successful completion of the module, students have the following knowledge and skills: They are able to

- Determine the market value of real estate using the net asset value, capitalised earnings value and comparative value methods as well as non-standardised methods.
- Assess influences of a structural, legal and economic nature on the real estate value.
- Independently prepare a market value appraisal on the basis of the ImmoWertV.
- Explain the expert system of real estate valuation.
- Analyse the influences of rights and encumbrances on the market value.

3 Contents

- The real estate market and basics of valuation
- Valuation procedure according to ImmoWertV
- Non-standardised valuation procedures
- Valuation of rights and encumbrances
- Valuation under public law
- Valuation by experts
- Methodology of the expert opinion

4 Participation requirements

Formal: none

5 Form of assessment

Term paper

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction (M.A. and M.Eng.) – overarching module

8 Module coordinator

Prof. Dr.-Ing. Oliver Nister

9 Other information

Communication and Negotiation								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	2nd sem.	Annual	Summer	1 sem.	Compulsory elective	M.A. M.Eng.
1	Course type		Contact hours	Self-study	Forms of teaching (learning methods)		Planned group size	Language
	Lecture		2 SCH/30 h	60 h			30	German / English
	Exercise		1 SCH/15 h	45 h			30	
2	Learning outcomes/competences							
	The students can explain and apply the Schulz-von-Thun communication model. They know transactional analysis and are able to use it in conversation at a meta level. They get to know different types of communication. They learn what type of communication they primarily use and how they can change this if necessary.							
3	Contents							
	- The four sides of a message - Self-perception, external perception - The inner team - Body language - Negotiation in the construction industry - Managing building conflicts - Project communication - Staff appraisals							
4	Participation requirements							
	Formal: none							
5	Form of assessment							
	Oral examination							
6	Condition for the award of credit points							
	Successful completion of the module							
7	Application of the module (in the following study programmes)							
	Integral Construction (M.A. and M.Eng.) – overarching module							
8	Module coordinator							
	Prof. Dr.-Ing. Gerald Ebel							
9	Other information							

Architectural Theory								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	2nd/4th sem.	Annual	Summer	1 sem.	Compulsory elective	M.A. M.Eng.
1	Course type		Contact hours	Self-study	Forms of teaching (learning methods)		Planned group size	Language
	Sem. lessons		3 SCH/45 h	105 h	Individual/group work		35	German
2	Learning outcomes/competences With the completion of the module, students can supplement and deepen their specialist knowledge through an examination of contemporary architectural discourse and traditional design and architectural theories. They will gain better judgement and competence for developing and managing design processes in construction projects; They gain a confident demeanour through sound knowledge and quality awareness of the discipline of architecture.							
3	Contents - Analysis of contemporary architectural concepts and design theory approaches - Analysis of the built environment. - Planning theory and methodological aspects of building and the historical development of building typologies with regard to the historical, economic and social circumstances that gave rise to them. - Preparation of topic-related studies and lectures / presentations.							
4	Participation requirements Formal: none							
5	Form of assessment Term Paper/Oral Exam							
6	Condition for the award of credit points Module examination pass							
7	Application of the module (in the following study programmes) Integral Construction – in-depth module M.A.							
8	Module coordinator Prof. Dipl.-Ing. Bettina Georg							
9	Other information							

Ecology and Building (see in-depth modules M.Eng.)								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	1st/3rd sem.	Annual	Winter	1 sem.	Compulsory elective	M.A. M.Eng.
1	Course type		Contact hours	Self-study	Forms of teaching (learning methods)		Planned group size	Language
	Seminar		1 SCH/15 h					
	Exercises / Project		2 SCH/30 h	105 h	Group work		35	German
2	Learning outcomes/competences In the module "Ecology and Building", students are taught the basic knowledge of sustainable building. Building on the lectures and exercises, they should develop and consolidate their own skills and abilities in this area. Upon completion of the module, students have the competences to apply the different certification systems in the building industry and the life cycle assessments contained therein. Furthermore, they can differentiate the relevant pollutants in indoor spaces and have the skills to incorporate knowledge about the recyclability of building materials and the energy efficiency of structures into planning, operation and third-party usability.								
3	Contents The content of the module "Ecology and Construction" focuses on the analysis of parameters that are affected by the construction and operation of buildings. These effects can be mapped with the help of the different certification systems. In this module, the certification systems: DGNB (German Sustainable Building Council), BNB (Sustainable Building Council) and HCH (HafenCity Hamburg) eco-labels and practised the necessary calculation and assessment principles (ecological, economic, socio-cultural, functional and technical quality as well as process and site quality) on the basis of their own project.								
4	Participation requirements Formal: none Content: Knowledge and skills equivalent to a bachelor's degree in architecture, civil engineering, project management construction or infrastructure engineering								
5	Form of assessment Project work								
6	Condition for the award of credit points Module examination pass								
7	Application of the module (in the following study programmes) Integral Construction – in-depth module M.A. and M.Eng.								
8	Module coordinator Prof. Dr. Matthias Kathmann								
9	Other information								

Project Development (see in-depth modules M.Eng.)								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	2nd/4th sem.	Annual	Summer	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	-	-	-	.	.
	Sem. lessons	1 SCH/15 h	30 h	-	≤ 35	German
	Exercise	-	-	-	-	-
	Practical / Seminar	2 SCH/30 h	75 h	Individual/group work	15	German

2 Learning outcomes/competences

After successfully participating in the module, students have the following knowledge and skills:

- Selecting suitable instruments for project development (real estate);
- Contrasting analytical methods;
  Assessing and evaluating project-relevant factors for the development of the respective project task;
- Developing alternative proposals and concepts;
- Examining the results with regard to their fulfilment of objectives for the formation of decision templates for an economic project realisation.

3 Contents

- Economic, technical or design-related, legal and organisational tasks of project development (real estate);
- Process organisation of project development;
- Conception and goal definition of a project;
- Application of various procedures and instruments of project development:
  - Market and location analyses,
  - Development of utilisation concepts and utilisation alternatives,
  - Feasibility studies,
  - Drawing up a space and function programme,
  - Profitability analyses,
  - Examination under building law of a project realisation, etc.

4 Participation requirements

Formal: none

5 Form of assessment

Project work with presentation

6 Condition for the award of credit points

Passing the module examination. Successful submission of the project work.

7 Application of the module (in the following study programmes)

Integral Construction – in-depth module M.A. and M.Eng.

8 Module coordinator

Prof. Dipl.-Ing. Bettina Mons

9 Other information

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Urban Design MIB								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	2nd/4th sem.	Annual	Summer	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	-	-	-	-	-
	Sem. lessons	1 SCH/15 h	30 h	-	35	German
	Exercise	-	-	-	-	-
	Practical / Seminar	2 SCH/30 h	75 h	Individual/group work	15	German

2 Learning outcomes/competences

- The students are able to assess and critically question complex urban design models and theories taking into account the parameters of the shape of the city, sociology, history of the city, ecology and sustainability of the city.
- Urban design theories and models are discussed, applied, analysed, evaluated and further developed.

3 Contents

- Urban design theories and urban design models are reflected upon and placed in a concrete context with an urban development design/project.
- Urban design
- Presentation of the design through the media of text, drawing, visualisation and model.

4 Participation requirements

Formal: none

5 Form of assessment

Project work

6 Condition for the award of credit points

Passing the module examination. Successful submission of the urban design draft/ presentation/ text elaboration

7 Application of the module (in the following study programmes)

Integral Construction – in-depth module M.A.

8 Module coordinator

Prof. Dipl.-Ing. Bernd Niebuhr

9 Other information

Advanced Studies in Technical Building Equipment (see in-depth modules M.Eng.)								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	2nd/4th sem.	Annual	Summer	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	1 SCH/15 h	15 h	Lecture	20	German
	Sem. lessons	2 SCH/30 h	90 h	Group work	20	German

2	Learning outcomes/competences
	Knowledge of innovative and sustainable concepts within the sub-areas of technical building equipment; ability to engage in dialogue with relevant stakeholders and to critically evaluate technical systems; qualification for scientific work.

3	Contents
	In a holistic approach (planning, construction, operation, disposal), specific aspects within the diverse sub-areas of technical building equipment are addressed. The focus is primarily on those innovative and future-oriented concepts that are of particular interest in the context of socio-political discussions (sustainability, energy efficiency, building culture, digitalisation, etc.) (use of renewable energies, conservation of resources, intelligent technologies, etc.).

4	Participation requirements
	Formal: none Content: Basic knowledge in technical building equipment

5	Form of assessment
	Term paper

6	Condition for the award of credit points
	Module examination pass

7	Application of the module (in the following study programmes)
	Integral Construction – in-depth module M.A. and M.Eng.

8	Module coordinator
	Prof. Dr. Ulrich Schramm

9	Other information
	Limited to 20 participants

Visualisation and Presentation Techniques MIB (see in-depth modules M.Eng.)								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	1st/3rd sem.	Annual	Winter	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	1 SCH/15 h	30 h	-Lecture	60	German
	Sem. lessons	-	-	-	-	-
	Exercise	-	-	-	-	-
	Practical / Seminar	2 SCH/30 h	75 h	Individual/group work	35	German

2 Learning outcomes/competences

- Students are able to conceptualise, plan and implement the visual, media design and presentation of projects with contemporary and web-based media and software tools.
- Students achieve professionalism and competence in lectures and presentations.
- Professional media techniques are applied, evaluated and further developed.

3 Contents

Visual design in architecture and engineering:

- Research, text, content structuring, infographics, argumentation
- Basic graphic knowledge (typography, colour, image worlds, layout principles)
- Branding/brand management within the framework of the project presentation
- Photographic and videographic documentation
- Presentation strategies

4 Participation requirements

Formal: none;
Content: Basic knowledge of visual communication and knowledge of Adobe Creative Suite as well as the Microsoft Office programmes

5 Form of assessment

Combination of a project work and other performances

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction – in-depth module M.A. and M.Eng.

8 Module coordinator

Prof. Dipl. Ing. Bernd Niebuhr

9 Other information

Teaching staff: Dipl.-Des. Katja Nortmann

Building in Earthquake Zones

No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	1st/3rd sem.	Bi-annual	Winter	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	2 SCH/30 h	70 h	Lecture	15	German
	Exercise	1 SCH/15 h	35 h	Exercise	15	German

2 Learning outcomes/competences

After successfully completing the module, students will

- be able to name the essential basics and requirements for earthquake protection of buildings and to determine earthquake effects on structures,
- be familiar with the essential requirements for the design of earthquake-resistant structures with regard to plan and elevation, the foundation and structural details,
- be able to differentiate the essential calculation methods and apply them to simple load-bearing structures of common buildings,
- recognise and define the essential verification tasks of earthquake protection according to DIN EN 1998 and solve simple design tasks including the associated construction tasks.

3 Contents

- Basics of earthquake protection of building structures (approx. 6/15 weeks)
  - Earthquake-compatible building design (ground plan, elevation, foundation, regularity)
  - Earthquake action (earthquake zones, soil classes, elastic response spectra)
  - Calculation methods (simplified and modal response spectrum methods, torsional effect)
  - Safety verifications according to DIN EN 1998, primary and secondary components
- Special rules for concrete structures and masonry structures (approx. 3/15 weeks)
- Special rules for steel structures (approx. 3/15 weeks)
- Special rules for wooden buildings (approx. 3/15 weeks)

4 Participation requirements

Formally, none. In terms of content, knowledge of the basic modules and subjects of structural engineering of the bachelor's degree programme in civil engineering is assumed.

5 Form of assessment

Combination of a project work and other performances

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction – in-depth module M.Eng.

8 Module coordinator

Prof. Dr.-Ing. K. Peters

9 Other information

Teaching staff by arrangement from the group of lecturers in structural engineering

International Innovation Management								**Abbr.**
No.	**Workload**	**Credit points**	**Study semester**	**Frequency**	**Sem.**	**Duration**	**Type**	**Q level**
	150 h	**5**	1st/3rd sem.	Annual	Summer	1 sem.	Compulsory elective	M.A. M.Eng.
1	**Course type**		**Contact hours**	**Self-study**	**Forms of teaching (Learning methods)**		**Planned group size**	**Language**
	Lecture		1 SCH / 15 h	45 h	Seminar lessons		60	German/ English
	Exercise		2 SCH / 30 h	60 h	Individual and group work		60	German/ English
2	**Learning outcomes/competences**							
	The students independently define an innovation project in construction. For this, they analyse the framework conditions and design a project management concept. They prepare a presentation on their innovation idea for various stakeholders. They create a contact network for interdisciplinary or intercultural exchange with other students or teaching staff from Bielefeld UAS (other faculties) or other universities. During the implementation, they use digital communication and project management tools.							
3	**Contents**							
	Working on a concrete project in an international context, the students develop additional, in-depth competences in innovation and project management. They develop solutions for a given construction-related task, plan project management measures and their implementation. The project process is controlled and implemented accordingly until the project goal is achieved. For this, the students learn theories of group work and intercultural cooperation. Communication and implementation is mainly conducted in English. The results of the project work are prepared and presented in a target-group-specific way at the project conclusion. Cooperation between students takes place face to face and online, using up-to-date project management and other software tools. Individual and group performance are regularly reflected upon by the students.							
4	**Participation requirements**							
	None							
5	**Form of assessment**							
	Project work							
6	**Condition for the award of credit points**							
	Module examination pass							
7	**Application of the module** (in the following study programmes)**:**							
	Integral Construction (M.Eng.) – in-depth module							
8	**Module coordinator**							
	Prof. Dr.-Ing. Gerald Ebel							
9	**Other information**							
	If possible, this module will take place in cooperation with a partner university of Bielefeld UAS. Literature: Vahs, Dietmar; Brem, Alexander: Innovationsmanagement: Von der Idee zur erfolgreichen Vermarktung. Stuttgart: Schäffer-Poeschel, 2015.							

Bridge Construction

No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	1st/3rd sem.	Bi-annual	Winter	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	2 SCH/30 h	70 h	Lecture	15	German
	Exercise	1 SCH/15 h	35 h	Exercise	15	German

2 Learning outcomes/competences

After successfully completing the module, students will

- be able to name the essential components of bridges as well as the regulations for the design and construction of bridge structures,
- be familiar with the essential requirements and boundary conditions of bridges with regard to longitudinal system and bearing, cross-section design, actions and structural details,
- be able to differentiate between the various types of construction and assess their significance in terms of material use, application limits, economic efficiency, possible construction methods and assembly processes,
- independently recognise and define the main verification tasks for bridge structures in concrete, steel and steel composite and timber construction according to the Eurocodes and solve simple design tasks.

3 Contents

- Basics of bridge construction
  - Road cross-sections, cross-section design and bridge upgrading
  - Construction types: Plate, beam, frame, arch, cable-stayed and suspension cable bridges
  - Design standards and other codes (Eurocodes, ARS, ZTV-ING, RIZ-ING),
  - Actions on bridges,
- Concrete bridges
  - Longitudinal systems and usual slenderness,
  - Transverse systems and cross sections,
  - Construction methods and relevant assembly conditions
- Steel and steel composite bridges
  - Contents as before (concrete bridges)

—— Wooden bridges

- Contents as before (concrete bridges)

4 Participation requirements

Formally, none. In terms of content, knowledge of the basic modules and subjects of structural engineering of the bachelor's degree programme in civil engineering is assumed.

5 Form of assessment

Combination of a project work and other performances

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction – in-depth module M.Eng.

8 Module coordinator

Prof. Dr.-Ing. U. Weitkemper

9 Other information

Further teaching staff by arrangement from the group of lecturers in structural engineering.

Renewal of Traffic, Waterway and River Constructions

No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	1st/3rd sem.	Bi-annual	Winter	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	1 SCH/15 h		Lecture	15	German
	Sem. lessons	2 SCH/30 h	105 h	Group work	15	German

2 Learning outcomes/competences

- Basic knowledge of urban planning contexts
- Knowledge of the theoretical development of infrastructure concepts
- Skills in the presentation and analysis of basic urban planning and transport concepts and knowledge of the integrative structure of transport planning
- Basic knowledge of the development of relevant principles of hydraulic engineering
- Basic understanding of perspectives of water management planning
- Knowledge of the basic elements of hydraulic engineering
- Ability to create designs for near-natural watercourses, to carry out corresponding calculations taking into account local peculiarities
- Software application for runoff calculations
- Writing reports, giving presentations
- Working in groups
- Consolidation of social competence

3 Contents

Planning the development, regulation and utilisation of waterways and rivers.
Measures to prevent damage caused by river structures. River regulation, watercourse correction and renaturation) in order to achieve an even and consistent, largely natural river course. A distinction is made between the headwaters, middle reaches and lower reaches of a river.
River engineering includes torrent shoring, bottom ramps and weirs. In the middle reaches, the focus is on the construction of discharge cross-sections for low water, mean water and high water. In the lower reaches, rivers can be regulated by groynes or guide dams so that a navigable channel remains at low water. Flood protection along rivers can be achieved through the construction of polders and retention basins and the building of dikes.

Structures for irrigation, cultivation of land and as cooling water for power plants. Suitable inlet and outlet structures; also the impounding of rivers by weirs and dams for various purposes, e.g. for energy generation in run-of-river power plants and other hydroelectric power plants or water storage for the provision of drinking and service water

4 Participation requirements

Formal: none
Content: Contents of hydromechanics (cf. BA module Hydromechanics)

5 Form of assessment

Combination of a project work and other performances

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction – in-depth module M.Eng.

8 Module coordinator

Prof. Dr. Johannes Weinig

9 Other information

Geotechnics MIB								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	2nd/4th sem.	Bi-annual	Summer	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	2 SCH/30 h		Lecture	60	German
	Sem. lessons	1 SCH/15 h	105 h	Group work	35	German

2 Learning outcomes/competences

Understanding of the statements of a geotechnical report, implementation of the information in the geotechnical report for planning and design of the construction project,
Knowledge of the basics of geothermal energy, allocation of geothermal variants for specific boundary conditions of the construction project,
Identify special ground engineering problems, develop suitable solutions and prepare the corresponding verification calculations

3 Contents

Geotechnical report, near-surface geothermal energy, securing deep excavations next to existing buildings - observation method, building on old deposits, underpinning, special issues with piled foundations

4 Participation requirements

Formal: none
Content: Knowledge of the basics of geotechnics.

5 Form of assessment

Written / oral exam

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction – in-depth module M.Eng.

8 Module coordinator

Prof. Dr. Hans-Georg Gülzow

9 Other information

Infrastructure (Water, Waste Water, Waste, Traffic)

No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	1st/3rd sem.	Bi-annual	Winter	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	1 SCH/15 h		Lecture	15	German
	Sem. lessons	2 SCH/30 h	105 h	Group work	15	German

2 Learning outcomes/competences

Students acquire the competences to analyse essential issues of infrastructure and competition policy. The findings of New Institutional Economics (NEE) are taken into account. The students have the competence to identify central challenges in the (institutional) economic analysis of practical situations and to recognise economic policy and regulatory issues.

3 Contents

- Basic feature: Philosophy of science and scientific-theoretical classification of (institutional) economic analyses
- Main features of welfare economics and new institutional economics (NIE);
- Ideal-typical procedure for the (institutional) economic analysis of economic policy and regulatory issues in infrastructure sectors in a democracy (technical-systemic understanding, decision-making requirements, ex ante and ex post analyses);
- Forms of governance in the area of service provision (make-or-buy, procurement and contract models [risk allocation, incentive setting and monitoring], regulation of monopolistic infrastructure companies);
- Institutional economic issues in the public sector (politics and administration);
- Infrastructure provision and financing and capacity allocation;
- Discussion of concrete examples (e.g. rail passenger and freight transport, electricity generation), rationality of capacity instruments
- Provisioning decisions in infrastructure systems (e.g. car-road-environment, power generation-power grids-charging infrastructure-electric vehicles)
- Examples from the infrastructure sectors of transport and energy as well as ICT, water management and waste management are provided.

4 Participation requirements

Formal: none

5 Form of assessment

Combination of a project work and other performances

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction – in-depth module M.Eng.

8 Module coordinator

Prof. Dr Johannes Weinig

9 Other information

Concrete and Masonry Structures in Existing Buildings

No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	1st/3rd sem.	Bi-annual	Winter	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	2 SCH/30 h	45 h	Lecture	15	German
	Exercise	1 SCH/15 h	60 h	Exercise	15	German

2 Learning outcomes/competences

After successfully completing the module, students are able to

- differentiate between the areas of structural monitoring and structural testing, to name essential regulations and codes and to assess their significance,
- plan inventories of solid structures with regard to procedure, data to be collected, methods and procedures to be applied as well as the degree of detail,
- decide whether the existing regulations or the current regulations are to be applied for a planning task, taking into account possible protection of existing structures,
- assess given materials with regard to their construction material properties and their condition and to derive material parameters accurately according to current regulations,
- elaborate modifications of the semi-probabilistic safety concept and justify them with reference to the inventory situation as well as the type and extent of the inventory,
- evaluate the load-bearing capacity and serviceability of simple solid structures in existing buildings and to make statements about the expected durability,
- independently provide mathematical verifications for basic methods of strengthening solid structures.

3 Contents

- Rules and regulations for structural monitoring and structural testing for buildings and civil engineering structures,
- Special features of structural design in existing structures, protection of existing structures and listed buildings,
- Type, scope and methods of as-built surveys for solid structures,
- Historical development of the building materials concrete and reinforcing steel including the corresponding regulations and the building material parameters to be applied,
- Application of modified safety factors in the structural analysis, load tests on concrete structures,
- Mathematical verification of the load-bearing capacity and serviceability,
- Fundamentals and computational verifications for the reinforcement of solid load-bearing structures.

4 Participation requirements

Formally, none. In terms of content, knowledge of the modules Design of Reinforced Concrete and Masonry Structures and Design of Reinforced Concrete Structures (Reinforced Concrete Slabs) of the Civil Engineering study programme is assumed.

5 Form of assessment

Combination of a project work and other performances

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction – in-depth module M.Eng.

8 Module coordinator

Prof. Dr.-Ing. Uwe Weitkemper

9 Other information

Post-Occupancy Evaluation								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	1st/3rd sem.	Bi-annual	Winter	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	1 SCH/15 h	15 h	Lecture	20	German
	Sem. lessons	2 SCH/30 h	90 h	Group work	20	German

2	Learning outcomes/competences Understanding of user-oriented building performance evaluation as one of the key concepts in Facility Management (FM). Enable students to independently plan, carry out and implement the Post-Occupancy Evaluation (POE) as an established method for user-oriented building performance evaluation; strengthen social-communicative competence; qualify students for scientific work.
3	Contents The phase of occupancy within the building life cycle is the focus of consideration. The user-oriented building performance evaluation is introduced and the POE is discussed and practised as a possible method in all sub-steps. The evaluation result is interpreted with regard to subsequent phases or building life cycles.
4	Participation requirements Formal: none Content: Basic knowledge of facility management
5	Form of assessment Term paper
6	Condition for the award of credit points Module examination pass
7	Application of the module (in the following study programmes) Integral Construction – in-depth module M.Eng.
8	Module coordinator Prof. Dr. Ulrich Schramm
9	Other information Limited to 20 participants

Ecology and Building (see in-depth modules M.A.)								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	1st/3rd sem.	Annual	Winter	1 sem.	Compulsory elective	M.A. M.Eng.
1	Course type		Contact hours	Self-study	Forms of teaching (learning methods)		Planned group size	Language
	Seminar		1 SCH/15 h					
	Exercises / Project		2 SCH/30 h	105 h	Group work		35	German
2	Learning outcomes/competences In the module "Ecology and Building", students are taught the basic knowledge of sustainable building. Building on the lectures and exercises, they should develop and consolidate their own skills and abilities in this area. Upon completion of the module, students have the competences to apply the different certification systems in the building industry and the life cycle assessments contained therein. Furthermore, they can differentiate the relevant pollutants in indoor spaces and have the skills to incorporate knowledge about the recyclability of building materials and the energy efficiency of structures into planning, operation and third-party usability.								
3	Contents The content of the module "Ecology and Building" focuses on the analysis of parameters that are affected by the construction and operation of buildings. These effects can be mapped with the help of the different certification systems. In this module, the certification systems: DGNB (German Sustainable Building Council), BNB (Sustainable Building Council) and HCH (HafenCity Hamburg) eco-labels and practised the necessary calculation and assessment principles (ecological, economic, socio-cultural, functional and technical quality as well as process and site quality) on the basis of their own project.								
4	Participation requirements Formal: none Content: Knowledge and skills equivalent to a bachelor's degree in architecture, civil engineering, project management construction or infrastructure engineering								
5	Form of assessment Project work								
6	Condition for the award of credit points Module examination pass								
7	Application of the module (in the following study programmes) Integral Construction – in-depth module M.A. and M.Eng.								
8	Module coordinator Prof. Dr. Matthias Kathmann								
9	Other information								

Human Resource Management and Consulting								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	2nd/4th sem.	Bi-annual	Summer	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	1 SCH/15 h	105 h	Lecture	30	German
	Sem. lessons	2 SCH/30 h	total	Group work	30	German

2 Learning outcomes/competences

The module provides essential knowledge in the field of human resources. The students know important processes of personnel management and are familiar with the basics of personnel management. Furthermore, students gain a basic overview of the subject area of coaching and consulting.

3 Contents

Part 1: Human Resource Management
- Human resource planning
- Recruitment
- Staff deployment and development
- Redundancy

Part 3: Leadership
- Leadership theories
- Leadership styles

Part 3: Coaching and Consulting
- Approaches to consulting
- Internal vs. external consultation

4 Participation requirements

Formal: none
Content: none

5 Form of assessment

Written exam

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction – in-depth module M.Eng.

8 Module coordinator

Prof. Dr.-Ing. Gerald Ebel

9 Other information

Project Development (see in-depth modules M.A.)								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	2nd/4th sem.	Annual	Summer	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	-	-	-	.	.
	Sem. lessons	1 SCH/15 h	30 h	-	≤ 35	German
	Exercise	-	-	-	-	-
	Practical / Seminar	2 SCH/30 h	75 h	Individual/group work	15	German

2	Learning outcomes/competences
	After successfully participating in the module, students have the following knowledge and skills: - Selecting suitable instruments for project development (real estate); - Contrasting analytical methods; - Assessing and evaluating project-relevant factors for the development of the respective project task; - Developing alternative proposals and concepts; - Examining the results with regard to their fulfilment of objectives for the formation of decision templates for an economic project realisation.

3	Contents
	– Economic, technical or design-related, legal and organisational tasks of project development (real estate); – Process organisation of project development; – Conception and goal definition of a project; – Application of various procedures and instruments of project development: - Market and location analyses, - Development of utilisation concepts and utilisation alternatives, - Feasibility studies, - Drawing up a space and function programme, - Profitability analyses, - Examination under building law of a project realisation, etc.

4	Participation requirements
	Formal: none

5	Form of assessment
	Project work with presentation (PA)

6	Condition for the award of credit points
	Passing the module examination. Successful submission of the project work.

7	Application of the module (in the following study programmes)
	Integral Construction – in-depth module M.A. and M.Eng.

8	Module coordinator
	Prof. Dipl.-Ing. Bettina Mons

9	Other information

Resource-Efficient Water and Environment Management								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	2nd/4th sem.	Bi-annual	Summer	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	2 SCH/30 h	70 h	Lecture	15	German
	Sem. lessons	1 SCH/15 h	35 h	Group work	15	German

2 Learning outcomes/competences

- Working on the basics of biotic and abiotic raw materials;
- Assessing land consumption in the construction industry;
- Knowing and assessing the recycling of building materials (cradle to cradle);
- Mastering the methods of waste analysis;
- Knowledge of the recycling of building materials;
- Knowledge and application of life cycle assessments;
- Development, assessment and implementation of process concepts;
- Design and calculation of waste treatment and recycling plants;

3 Contents

The module considers soils and (flowing) waters in their mutual relationships, especially with regard to the aspects of protection and sustainable use of biotic and abiotic building materials. Based on the functions of soils, causes and sources of soil pollution are discussed, including the resulting water pollution. The use of biotic and abiotic building materials is considered under the aspect of resource efficiency and recycling. The building materials must be available again as building (raw) materials when recycled (cradle-to-cradle)

4 Participation requirements

Formal: none

5 Form of assessment

Combination of a project work and other performances

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction – in-depth module M.Eng.

8 Module coordinator

Prof. Dr. Johannes Weinig

9 Other information

Steel and Steel Composite Construction								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	1st/3rd sem.	Bi-annual	Winter	1 sem.	Compulsory elective	M.A. M.Eng.
1	Course type		Contact hours	Self-study	Forms of teaching (learning methods)		Planned group size	Language
	Seminar lessons Exercises		2 SCH/30 h 1 SCH/15 h	105 h	Lecture Group work		15 15	German
2	Learning outcomes/competences Design of steel composite structures according to Eurocode 4, Assessment of the load-bearing behaviour, dimensioning, preparation of verifiable static calculations for steel and steel composite structures, Acquiring the ability to recognise special problems in the design and construction of complicated steel structures with special requirements and to solve them in approaches. Maturation of the ability to work independently on projects.							
3	Contents Safety concept, design of beams, columns and slabs, verification of load-bearing capacity and serviceability, total cross-section method, design for fire, manufacture, assembly, monitoring of quality.							
4	Participation requirements Formal: none Content: Basic and elective modules in the field of structural engineering, in particular Statics and Steel Construction 1 and 2							
5	Form of assessment Combination of a project work and other performances							
6	Condition for the award of credit points Passed examination elements according to 5							
7	Application of the module (in the following study programmes) Integral Construction – in-depth module M.Eng.							
8	Module coordinator Prof. K. Peters							
9	Other information							

Reinforced and Prestressed Concrete

No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	2nd/4th sem.	Bi-annual	Summer	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	2 SCH/30 h	45 h	Lecture	15	German
	Exercise	1 SCH/15 h	60 h	Exercise	15	German

2 Learning outcomes/competences

After successfully completing the module, students are able to

- design statically determinate and statically indeterminate beam structures in prestressed concrete construction, to carry out a preliminary design for the structures and to estimate the required prestressing forces on the basis of the decisive verifications,
- determine the internal forces of statically determinate and indeterminate beam structures in prestressed concrete construction as a result of external loads and as a result of a selected prestressing,
- independently identify the necessary verifications in the serviceability limit states and the ultimate limit states and largely produce them ready for execution.
- independently prepare structural designs for beam bridges in the course of roads and paths, taking into account the construction process and relevant intermediate conditions,
- apply the basic understanding developed for prestressed concrete construction to plane load-bearing structures (including floor slabs, ceilings and tanks),
- calculate and design reinforced concrete details using beam models.

3 Contents

- Basics and application areas of reinforced concrete and prestressed concrete construction,
- Preliminary design, verification and construction in prestressed concrete construction:
  - Special features of prestressed concrete construction for statically indeterminate systems,
  - Verifications in the serviceability limit states,
  - Verifications in the ultimate limit state
  - Design of prestressed concrete components and their dimensioning,
  - Construction of prestressed concrete structures and special problems.
- Bridges in reinforced concrete and prestressed concrete construction,
- Design of reinforced concrete details (e.g. load introduction areas) with framework models.

4 Participation requirements

Formally, none. In terms of content, knowledge of the modules Fundamentals of Solid Construction, Solid Construction and Prestressed Concrete / Precast Construction (parts prestressed concrete construction) of the Civil Engineering study programme is assumed.

5 Form of assessment

Combination of a project work and other performances

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction – in-depth module M.Eng.

8 Module coordinator

Prof. Dr.-Ing. Uwe Weitkemper

9 Other information

More in-depth basics of bridge construction are taught in the Bridge Construction module (MIB). This module is useful as a supplement, but its content is not the basis of this module.

Advanced Studies in Technical Building Equipment (see in-depth modules M.A.)								
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	2nd/4th sem.	Annual	Summer	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	1 SCH/15 h	15 h	Lecture	20	German
	Sem. lessons	2 SCH/30 h	90 h	Group work	20	German

2	Learning outcomes/competences
	Knowledge of innovative and sustainable concepts within the sub-areas of technical building equipment; ability to engage in dialogue with relevant stakeholders and to critically evaluate technical systems; qualification for scientific work.

3	Contents
	In a holistic approach (planning, construction, operation, disposal), specific aspects within the diverse sub-areas of technical building equipment are addressed. The focus is primarily on those innovative and future-oriented concepts that are of particular interest in the context of socio-political discussions (sustainability, energy efficiency, building culture, digitalisation, etc.) (use of renewable energies, conservation of resources, intelligent technologies, etc.).

4	Participation requirements
	Formal: none Content: Basic knowledge in technical building equipment

5	Form of assessment
	Term paper

6	Condition for the award of credit points
	Module examination pass

7	Application of the module (in the following study programmes)
	Integral Construction – in-depth module M.A. and M.Eng.

8	Module coordinator
	Prof. Dr. Ulrich Schramm

9	Other information
	Limited to 20 participants

Visualisation and Presentation Techniques MIB (see in-depth modules M.A.)

No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q-level
	150 h	5	1st/3rd sem.	Annual	Winter	1 sem.	Compulsory elective	M.A. M.Eng.

1	Course type	Contact hours	Self-study	Forms of teaching (learning methods)	Planned group size	Language
	Lecture	1 SCH/15 h	30 h	Lecture	60	German
	Sem. lessons	-	-	-	-	-
	Exercise	-	-	-	-	-
	Practical / Seminar	2 SCH/30 h	75 h	Individual/group work	35	German

2 Learning outcomes/competences

- Students are able to conceptualise, plan and implement the visual, media design and presentation of projects with contemporary and web-based media and software tools.
- Students achieve professionalism and competence in lectures and presentations.
- Professional media techniques are applied, evaluated and further developed.

3 Contents

Visual design in architecture and engineering:

- Research, text, content structuring, infographics, argumentation
- Basic graphic knowledge (typography, colour, image worlds, layout principles)
- Branding/brand management within the framework of the project presentation
- Photographic and videographic documentation
- Presentation strategies

4 Participation requirements

Formal: none;

Content: Basic knowledge of visual communication and knowledge of Adobe Creative Suite as well as the Microsoft Office programmes

5 Form of assessment

Combination of a project work and other performances

6 Condition for the award of credit points

Module examination pass

7 Application of the module (in the following study programmes)

Integral Construction – in-depth module M.A. and M.Eng.

8 Module coordinator

Prof. Dipl.-Ing. Bernd Niebuhr

9 Other information

Teaching staff: Dipl.-Des. Katja Nortmann

Closing sheet

Bielefeld / Minden, as of 19 July 2018