

## Appendix 2 Overview of modules in the bachelor's degree study programme Infrastructure Engineering

No.	Syn.	Module	Sub-sections, if applicable	Module coordinator(s)	Lect.	Exer./ Pract.	SCH	CP	Examination
<b>1st–2nd sem.: Basic Knowledge</b>									
		Introduction for First-Semester Students		Wißmann, tutors			0	0	none
		Maths Fitness		Peters	1	1	2	0	none
1	Sy6	Applied Computer Science		Eisfeld	2	2	4	5	Term paper, written exam
2	Sy12	Construction Management 1		Nister	2	2	4	5	Written exam
3	Sy2	Technology of Building Materials		Twelmeier	2	4	6	8	Term paper, written exam
4		Introduction to Infrastructure Engineering		Ebel	2	2	4	5	Learning diary
5	Sy4	Technical English		LfbA Stones	0	4	4	5	Written exam
6	Sy11	Mathematical Methods		Peters	2	2	4	5	Written exam/oral exam
7		Mechanics 1		Kahlfeld, LA	2	2	4	6	Written exam
8		Mechanics 2 BIW		Wißmann	2	2	4	6	Written exam
9		Fluid Mechanics		Kahlfeld	4	0	4	5	Term paper, written exam
10	Sy13	Law		Mons, LA	4	0	4	5	Written exam
11	Sy5	Land Surveying BPB/BIW		Weitkemper, LA	1	3	4	5	Term paper, written exam/Term paper/Oral exam
<b>3rd–5th sem.: Specialist Knowledge</b>									
12		Construction and Operation of Hydraulic Structures		Kahlfeld	4	0	4	5	Term paper, written exam
13		Construction and Operation of Bridges and Tunnels		Weitkemper, Gülzow	3	3	6	6	Term paper, written exam
14	Sy16	Construction Management 2		Nister	2	2	4	5	Term paper, written exam
15	Sy24	Construction Management 3		Nister	2	2	4	5	Written exam
16	Sy25	Organisation & Contract Drafting in Construction Projects		Nister	2	2	4	5	Written exam
17		Assessment and Maintenance of Traffic Routes		Ebel, LA	2	2	4	6	Written exam
18				Gülzow	2	2	4	5	Term paper, written exam/Term paper, oral exam
19		Geotechnics 1 BIW		Gülzow	2	2	4	5	Term paper, written exam/Term paper, oral exam
20		Geotechnics 2 BIW							
21		Fundamentals of Logistics		Ebel	2	2	4	5	Project work
22		Logistics Infrastructure		Ebel	2	2	4	5	Term paper
23		Cost Management in Civil Engineering		Ebel, LA	2	2	4	5	Term paper
24	Sy31	Project Management Infrastructure		Ebel	2	2	4	5	Study paper
25	Sy32	Traffic Engineering 1		LfbA Handke	2	2	4	5	Term paper, written exam
26		Traffic Engineering 2		LfbA Handke	2	2	4	5	Written exam/oral exam
27		Waterways		Kahlfeld, LA	4	0	4	5	Term paper, written exam
27	Sy17	Hydraulic Structures and Hydrology 1		Kahlfeld	4	0	4	5	Term paper, written exam
28, 29		<b>Compulsory Elective Modules Specialist Knowledge (2 modules with 5 ECTS each)</b>					<b>8</b>	<b>10</b>	
	Sy18	Occupational Safety		Nister, LA	4	0	4	5	Written exam
	Sy33	Building Information Modelling		Eisfeld	2	2	4	5	Written exam, project work
	Sy20	Business Administration 1		Ebel, LA	3	1	4	5	Written exam
		Energy Management		Ebel, LA	3	1	4	5	Written exam
		Geographic Information Systems		Ebel, LA	1	3	4	5	Project work
	Sy34	Waste and Resource Management		Weinig	2	2	4	5	Oral exam, written exam
	Sy30	Water and Sanitation 1		Weinig	2	2	4	5	Term paper, written exam
<b>6th sem.: Practice</b>									
30		Bachelor Thesis	8 weeks				0	12	Bachelor thesis
31		Practical Training Period	12 weeks				0	16	Term paper
<b>Total 1st–6th sem. (Bachelor)</b>							<b>120</b>	<b>180</b>	

Sy: Course is run in tandem with one in another study programme

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

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Waste and Resource Management								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	<b>150 h</b>	<b>5</b>	3rd sem.	Annual	Winter	1 sem.	Compulsory elective	
<b>1</b>	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture Sem. lessons Exercise Practical / Seminar		2 SCH/30 h   2 SCH/30 h	45h   45h	Lecture   Group work		   ≤ 15	German   German
<b>2</b>	<b>Learning outcomes / competences</b>							
	<ul style="list-style-type: none"> <li>• Planning, design, construction and operation of waste treatment plants.</li> <li>• Organise waste logistics, waste prevention, waste recycling, resource conservation and energy recovery.</li> </ul>							
<b>3</b>	<b>Contents</b>							
	<ul style="list-style-type: none"> <li>• Connection between waste and circular economy. Legal regulations.</li> <li>• Waste management objectives, waste quantities, collection, transport and handling.</li> <li>• Mechanical-biological pre-treatment. Landfill technology and landfill operation.</li> <li>• Waste prevention, composting, technical gas purification and energy generation.</li> <li>• Thermal and anaerobic processes.</li> <li>• Material cycles and recycling processes.</li> </ul>							
<b>4</b>	<b>Participation requirements</b>							
	None							
<b>5</b>	<b>Form of assessment</b>							
	Oral examination and written exam							
<b>6</b>	<b>Condition for the award of credit points</b>							
	Successful completion of the examination							
<b>7</b>	<b>Application of the module</b> (in the following study programmes):							
	Civil Engineering (B.Eng.) – specialisation: Water Management, Geotechnical Engineering, Waste Management and Traffic Engineering – and Infrastructure Engineering (B.Eng.)							
<b>8</b>	<b>Module supervisor</b>							
	Prof. Dr. Johannes Weinig							
<b>9</b>	<b>Other information</b>							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
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Applied Computer Science								Abbr. AI
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	1st sem.	Annual	Winter	1 sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	40h	Lecture		60	German
	Exercise		1 SCH/15 h	25h	Group work		15–20	German
	Practical		1 SCH/15 h	25h	Individual work		15	German
2	<b>Learning outcomes / competences</b>							
	Computer science sub-module: Teaching conceptual knowledge of data processing using computers. Understanding of how a computer works with its hardware and the different software layers. Presentation of algorithms as a representation of the sequential knowledge of mathematical models. Ability to build models using the concepts learnt							
	CAD sub-module: Teaching skills in modern computer-aided drafting. Understanding the graphical behaviour of model objects as well as visualising them on a computer. Acquisition of machining techniques for standard-compliant drawing and modelling of structures.							
3	<b>Contents</b>							
	Computer science sub-module: Structure of a computer, elementary number systems and operations defined on them as well as languages based on them with their data types, modelling, trees and graphs, statement logic, algorithms on these data types and structures, process descriptions using automata							
	CAD sub-module: Functioning of modern CAD systems for the graphic and informational modelling of buildings and their elements, creation and editing of model objects on the computer of varying complexity, starting with simple objects, through more complex components with auxiliary constructions and structuring techniques, to complete model drawings of buildings with dimensioning and plan frames. Derivation of elevations, sectional views and floor plans taking into account DIN 1356 with regard to correct line widths, line types, hatchings and scales.							
4	<b>Participation requirements</b>							
	None							
5	<b>Form of assessment</b>							
	Subject-related and methodical in the form of a written examination as well as independently in the form of a term paper							
6	<b>Condition for the award of credit points</b>							
	Passed written exam as well as successfully completed term paper, proven participation in the exercises							
7	<b>Application of the module</b> (in the following study programmes):							
	BBW and BIW							
8	<b>Module supervisor</b>							
	Prof. Dr.-Ing. Eisfeld							
9	<b>Other information</b>							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
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Occupational Safety								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	3rd sem.	Annual	Winter	1 sem.	Compulsory elective	BA
<b>1</b>	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>	<b>Planned group size</b>	<b>Language</b>	
	Lecture		4 SCH/60 h	90 h	Lecture	120	German	
<b>2</b>	<b>Learning outcomes / competences</b>							
	<p>On successful completion of the module, students have the following knowledge and skills:</p> <p>They are able to</p> <ul style="list-style-type: none"> <li>- recognise and solve safety-related problems on construction sites by applying the legal regulations.</li> <li>- apply OSH expertise within the framework of special requirement profiles (such as SIGEKO).</li> <li>- Demonstrate partial knowledge of the qualification "Occupational Safety Specialist".</li> </ul>							
<b>3</b>	<b>Contents</b>							
	<ul style="list-style-type: none"> <li>- Social security system and legal bases in occupational health and safety</li> <li>- Responsibility and liability of the project participants</li> <li>- Control system Occupational health and safety management system (AMS) Construction</li> <li>- Handling of work equipment</li> <li>- Safety and personal protective equipment (PPE) when carrying out work</li> <li>- Occupational health and safety in the EU framework and RAB regulations (rules on occupational health and safety on construction sites)</li> </ul>							
<b>4</b>	<b>Participation requirements</b>							
	Basic knowledge of the use of construction equipment and the implementation of construction procedures							
<b>5</b>	<b>Form of assessment</b>							
	Written examination							
<b>6</b>	<b>Condition for the award of credit points</b>							
	Module examination pass							
<b>7</b>	<b>Application of the module</b> (in the following study programmes):							
	Project Management Construction (B.Eng.); Civil Engineering (B.Eng.); Infrastructure Engineering (B. Eng.); Architecture (B.A.)							
<b>8</b>	<b>Module coordinator</b>							
	Prof. Dr.-Ing. Oliver Nister							
<b>9</b>	<b>Other information</b>							
	The course is run by the employers' liability insurance association. The training will not take place at Bielefeld University of Applied Sciences. Students are required to be physically present at the training site.							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
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Bachelor Thesis								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	360 h	12	6th sem.	Anytime	Summer	8 weeks	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>	<b>Planned group size</b>	<b>Language</b>	
	Thesis Colloquium			330 h 30 h	Independent problem solving with scientific documentation		German	
2	<b>Learning outcomes / competences</b> In their bachelor thesis, students demonstrate that they are capable of independently working on a practice-oriented task from a subject area – which is related to the objectives and contents of the study programme – both in its subject-specific details and in the interdisciplinary contexts using scientific methods within a specified period of time. In the subsequent colloquium, the students present the contents to the examiners as a technical lecture. In the technical discussion, students demonstrate their understanding of the topic.							
3	<b>Contents</b> The bachelor thesis is a written paper. It usually entails the conception, implementation and evaluation of an assignment that has a subject-related connection with the objectives and contents of the study programme. It can also take the form of an empirical investigation or conceptual or design tasks or an evaluation of available sources. A combination of these is possible. The length of the bachelor thesis should not exceed 60 pages of text. The results are presented by the student in a colloquium with a technical discussion.							
4	<b>Participation requirements</b> The regulations of the SPO apply.							
5	<b>Form of assessment</b> Bachelor thesis as a written paper in conjunction with a colloquium							
6	<b>Condition for the award of credit points</b> Module examination pass							
7	<b>Application of the module</b> (in the following study programmes): Infrastructure Engineering (B.Eng.)							
8	<b>Module supervisor</b> Prof. Dr.-Ing. Gerald Ebel							
9	<b>Other information</b> Faculty tutoring is provided by teaching staff at the Minden Campus.							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
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Construction and Operation of Bridges and Tunnels								Abbr.
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q level
	180 h	6	5th sem.	Annual	Winter	1 sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>planned Group size</b>	<b>Language</b>
	Lecture - Part 1		1.5 SCH/22.5 h	22.5 h	Lecture		30	German
	Lecture - Part 2		1.5 SCH/22.5 h	22.5 h	Lecture		30	German
	Exercise – Part 1		1.5 SCH/22.5 h	22.5 h	Sem. lessons		30	German
	Exercise – Part 2		1.5 SCH/22.5 h	22.5 h	Sem. lessons		30	German
2	<b>Learning outcomes / competences</b>							
	<p>After successfully completing the module, students are able to</p> <ul style="list-style-type: none"> <li>• present and explain the basic terms, boundary conditions, principles and procedures in the construction of bridges and tunnels,</li> <li>• Solve tasks of engineering and organisational planning of bridge and tunnel structures in simple cases,</li> <li>• Plan and monitor measures for the supervision, operation and maintenance of bridges and tunnels,</li> <li>• Analyse boundary conditions of structures to be planned as well as existing structures and assign suitable solution procedures for tasks of construction or maintenance.</li> </ul>							
3	<b>Contents</b>							
	<p>Sub-section 1: Bridge construction and operation</p> <ul style="list-style-type: none"> <li>• Materials, construction types and design of bridge structures in the course of roads and paths (reinforced concrete, prestressed concrete, steel and steel composite)</li> <li>• Special features of bridge structures in the course of rail transport routes</li> <li>• Construction methods for bridge structures (construction on falsework or launching scaffolding, cantilever with / without bracing, incremental launching, construction with precast elements)</li> <li>• Basics of maintenance and monitoring of bridge structures</li> </ul> <p>Sub-section 2: Construction and operation of tunnels</p> <ul style="list-style-type: none"> <li>• Basic terms, constructions and classifications in tunnel construction</li> <li>• Subsoil investigation, exploration during excavation, traffic and pipeline tunnelling</li> <li>• Load-bearing behaviour, fundamentals of tunnel statics and associated calculation methods</li> <li>• Tunnelling methods and boundary conditions of underground construction (open cut and mining methods, shield driving, pipe driving, microtunnelling)</li> <li>• Risk management and monitoring in tunnelling</li> <li>• Technical equipment, monitoring, maintenance</li> </ul>							
4	<b>Participation requirements</b>							
	Formally, none. In terms of content, knowledge of the modules Mechanics 1 and Geotechnics 1 and Geotechnics 2 is assumed.							
5	<b>Form of assessment</b>							
	Combination examination Term paper and written examination							
6	<b>Condition for the award of credit points</b>							
	Module examination pass							
7	<b>Use of the module</b> (in the following degree programmes)							
	Infrastructure Engineering (B.Eng.)							
8	<b>Module supervisor</b>							
	Prof. Dr.-Ing. Hans Georg Gülzow, Prof. Dr.-Ing. Uwe Weitkemper							
9	<b>Other information</b>							
	In the module Assessment and Maintenance of Traffic Routes, in-depth knowledge of the operation and monitoring of bridge structures is taught.							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
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Construction and Operation of Hydraulic Structures								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	5th sem.	Annual	Summer	1 sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture Exercise		4 SCH/60 h	90 h	Lecture with exercise and excursion (opt.)			German
2	<b>Learning outcomes / competences</b> At the end of the course, participants will be familiar with the legal principles, standards and regulations as well as the methodology of maintaining water bodies and their hydraulic engineering facilities. They have learned to distinguish between the water management and the transport functions of a watercourse and the resulting responsibilities and tasks in maintenance. They have knowledge of maintenance and repair strategies as well as the process of building inspections. They understand the importance of economic feasibility studies over the life cycle of buildings and have learned how to carry them out. They have acquired knowledge of public procurement and tendering procedures.							
3	<b>Contents</b> Differentiation between the maintenance of water bodies and hydraulic engineering structures, legal basis of the maintenance obligation as well as standards and regulations, responsibilities and tasks of federal and state authorities, maintenance associations and water and soil associations, "Life-cycle management" of hydraulic engineering facilities and economic feasibility studies, maintenance and repair strategies, building inspections (preparation, execution and evaluation or documentation) public procurement and tendering procedures.							
4	<b>Participation requirements</b> Knowledge of the basics of hydraulic engineering and hydrology as well as transport engineering							
5	<b>Form of assessment</b> Combination exam: Term paper and written exam							
6	<b>Condition for the award of credit points</b> Passing the module examination.							
7	<b>Application of the module</b> (in the following study programmes): Infrastructure Engineering (B.Eng.), Civil Engineering (B.Eng.)							
8	<b>Module supervisor</b> Prof. Dr.-Ing. Andreas Kahlfeld							
9	<b>Other information</b>							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
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Construction Management 1								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	2nd sem.	Annual	Summer	1 sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	45 h	Lecture		60	German
	Exercise		2 SCH/30 h	45 h	Seminar lessons		25	German
2	<b>Learning outcomes / competences</b>							
	On successful completion of the module, students have the following knowledge and skills: They are able to <ul style="list-style-type: none"> <li>- explain the basics of construction and its economic framework.</li> <li>- assign those involved in construction their respective tasks in the planning and construction process.</li> <li>- explain common construction methods by way of example.</li> </ul>							
3	<b>Contents</b>							
	<ul style="list-style-type: none"> <li>- Basics of construction management</li> <li>- General conditions in the construction industry</li> <li>- Project participants and their tasks</li> <li>- Forms of project organisation</li> <li>- Presentation of examples of construction methods</li> </ul>							
4	<b>Participation requirements</b>							
	None							
5	<b>Form of assessment</b>							
	Written examination							
6	<b>Condition for the award of credit points</b>							
	Module examination pass							
7	<b>Application of the module</b> (in the following study programmes):							
	Project Management Construction (B.Eng.); Civil Engineering (B.Eng.); Infrastructure Engineering (B. Eng.)							
8	<b>Module coordinator</b>							
	Prof. Dr.-Ing. Oliver Nister							
9	<b>Other information</b>							
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Construction Management 2								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	3rd sem.	Annual	Winter	1 sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	45 h	Lecture		60	German
Exercise		2 SCH/30 h	45 h	Supervised group work		24	German	
2	<b>Learning outcomes / competences</b>							
<p>On successful completion of the module, students have the following knowledge and skills:</p> <p>They are able to</p> <ul style="list-style-type: none"> <li>- independently draw up a construction service contract from the point of view of construction management and economics.</li> <li>- understand essential legal aspects.</li> <li>- explain the procurement process of public and private contracting authorities.</li> <li>- use the construction contract as a management tool in construction projects.</li> <li>- determine the contractually owed construction target and identify supplementary potential on its merits.</li> </ul>								
3	<b>Contents</b>							
<ul style="list-style-type: none"> <li>- Basics of construction contract management</li> <li>- Awarding of construction works by public and private contracting authorities</li> <li>- Preparation of service specifications with service specifications and service programme</li> <li>- AVB, ZVB, BVB, ATV, ZTV</li> <li>- Quantity determination and invoice verification on the basis of generally recognised rules of technology</li> <li>- Determination of the construction goal and interpretation of construction contracts</li> </ul>								
4	<b>Participation requirements</b>							
Basic knowledge of construction management and construction industry contexts								
5	<b>Form of assessment</b>							
Written examination and term paper								
6	<b>Condition for the award of credit points</b>							
Module examination pass								
7	<b>Application of the module</b> (in the following study programmes):							
Project Management Construction (B.Eng.); Civil Engineering (B.Eng.); Infrastructure Engineering (B. Eng.)								
8	<b>Module coordinator</b>							
Prof. Dr.-Ing. Oliver Nister								
9	<b>Other information</b>							
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**Module catalogue for Infrastructure Engineering (B.Eng.)  
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Construction Management 3								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	4th sem.	Annual	Summer	1 sem.	Compulsory	BA
<b>1</b>	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	45 h	Lecture		60	German
	Exercise		2 SCH/30 h	45 h	Seminar lessons		20	German
<b>2</b>	<b>Learning outcomes / competences</b>							
	On successful completion of the module, students have the following knowledge and skills: They are able to <ul style="list-style-type: none"> <li>- determine and evaluate the duration of operations in construction.</li> <li>- independently prepare schedules for construction projects from the perspective of the client and the contractor.</li> <li>- apply common costing methods in the construction industry.</li> <li>- calculate service specifications with service descriptions.</li> <li>- identify potential for additional costs and assess them from a costing perspective.</li> </ul>							
<b>3</b>	<b>Contents</b>							
	<ul style="list-style-type: none"> <li>- Basics of scheduling / effort values</li> <li>- Bar and network scheduling plans</li> <li>- Basics of costing in the construction industry</li> <li>- Calculation of the final bid amount</li> <li>- Calculation with pre-calculated surcharges</li> <li>- Calculation in turnkey construction</li> <li>- Identify and evaluate modified and additional services</li> </ul>							
<b>4</b>	<b>Participation requirements</b>							
	Basic knowledge of construction management and construction industry interrelationships, knowledge of construction contract design and the AVA process in the construction industry							
<b>5</b>	<b>Form of assessment</b>							
	Written examination							
<b>6</b>	<b>Condition for the award of credit points</b>							
	Module examination pass							
<b>7</b>	<b>Application of the module</b> (in the following study programmes):							
	Project Management Construction (B.Eng.); Civil Engineering (B.Eng.); Infrastructure Engineering (B.Eng.)							
<b>8</b>	<b>Module coordinator</b>							
	Prof. Dr.-Ing. Oliver Nister							
<b>9</b>	<b>Other information</b>							
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**Module catalogue for Infrastructure Engineering (B.Eng.)  
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Organisation & Contract Drafting in Construction Projects								Abbreviation
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	5th sem.	Annual	Winter	1 sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	45 h	Lecture		60	German
	Exercise		2 SCH/30 h	45 h	Seminar lessons		25	German
2	<b>Learning outcomes / competences</b> On successful completion of the module, students have the following knowledge and skills: They are able to <ul style="list-style-type: none"> <li>- set up a project organisation under different objectives and framework conditions.</li> <li>- develop a construction project in accordance with VOB and other contractual/legal regulations.</li> <li>- develop an effective supplementary contract management from the perspective of the client and the contractor.</li> <li>- analyse options for action of project participants under institutional and behavioural economic aspects.</li> </ul>							
3	<b>Contents</b> <ul style="list-style-type: none"> <li>- Structural organisation and workflow management</li> <li>- Knowledge of the tasks and activities of construction management/project management</li> <li>- Instruments of construction management/project management</li> <li>- Application of the VOB/B under construction management and economic aspects</li> <li>- Supplementary contract management from the perspective of the client and the contractor</li> <li>- Institutional and behavioural economic foundations</li> </ul>							
4	<b>Participation requirements</b> Basic knowledge of construction management and construction economics, knowledge of contract design, the AVA process, scheduling and costing in the construction industry							
5	<b>Form of assessment</b> Written examination							
6	<b>Condition for the award of credit points</b> Module examination pass							
7	<b>Application of the module</b> (in the following study programmes): Project Management Construction (B.Eng.); Civil Engineering (B.Eng.); Infrastructure Engineering (B. Eng.)							
8	<b>Module coordinator</b> Prof. Dr.-Ing. Oliver Nister							
9	<b>Other information</b> -							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
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Technology of Building Materials								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	<b>240 h</b>	<b>8</b>	1st + 2nd sem.	Annual	Winter + summer	2 sem.	Compulsory	BA
<b>1</b>	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	45 h	Lecture		< 35	German
	Sem. lessons		2 SCH/30 h	45 h	Seminar + Exercise			German
	Exercise		2 SCH/30 h	30 h + 30 h	Present. + Group work		< 12	German
Laboratory practical								
<b>2</b>	<b>Learning outcomes / competences</b>							
	Describe the origin/production and possible uses of important building materials; state advantages and disadvantages or limits of use within the application of building materials; define objectives in the development of construction solutions in everyday working life; determine and apply short building material designations and design values; explain significant incompatibilities and formulate the possible uses; carry out and compare common building material tests and possible quick tests; describe technical problems and present technical approaches to solutions; argue as well as evaluate and conclude for a binding use of building materials; derive a necessary ability to self-criticism for the regularly required questioning of selection, testing and calculation processes under constantly changing construction conditions.							
<b>3</b>	<b>Contents</b>							
	Introduction to the use of building materials in the construction industry (including historical developments); extraction, production and use of relevant building materials; typical and potentially harmful basic chemical reactions during production; chemical and physical behaviour of binders and building materials in construction; methods of practical calculation of compositions and characteristic values of building materials; testing and assessment through construction site or laboratory tests within the application; aspects of durability and corrosion behaviour as well as environmental and health compatibility; application of associated standards and other regulations as well as literature sources Primarily for: Natural stone, aggregates, binders, concrete, artificial stones, steel and wood							
<b>4</b>	<b>Participation requirements</b>							
	None							
<b>5</b>	<b>Form of assessment</b>							
	Combination exam: Term paper (consisting of a presentation in the laboratory practical and submission of the evaluation of all laboratory protocols in the laboratory portfolio submitted), Written examination							
<b>6</b>	<b>Condition for the award of credit points</b>							
	Proven participation in the laboratory practicals and passing the module examination							
<b>7</b>	<b>Application of the module</b> (in the following study programmes):							
	Architecture (B.A.), Civil Engineering (B.Eng.), Project Management Construction (B.Eng.) and Infrastructure Engineering (B.Eng.)							
<b>8</b>	<b>Module supervisor</b>							
	Prof. Dr.-Ing. Heiko Twelmeier							
<b>9</b>	<b>Other information</b>							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Assessment and Maintenance of Traffic Routes								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	180 h	6	5th sem.	Annual	Winter	1 sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	60 h			60	German
	Exercise		2 SCH/30 h	60 h			60	German
2	<b>Learning outcomes / competences</b> At the end of the course, the students have acquired basic knowledge of the procedures for recording the condition of roads and infrastructure objects, of double-entry bookkeeping and of the possibilities for maintenance measures. They can analyse the condition of traffic routes and are able to compare and evaluate possible measures for repairing damage. They can assign and plan measures to secure construction operations in active traffic and construction. They have knowledge of analysing, allocating and evaluating steps in investment planning, including depreciation.							
3	<b>Contents</b> <ul style="list-style-type: none"> <li>• Basics of traffic routes maintenance</li> <li>• Data exchange with information systems, application of geographic information systems</li> <li>• Condition assessment and evaluation (target/actual comparison) of roads and infrastructure objects (road and rail), double-entry bookkeeping (depreciation, investment planning)</li> <li>• Damage repair strategies, prevention and repair strategies</li> <li>• Technical aspects of conservation measures, use of new materials</li> <li>• Construction operation in active traffic (construction operation coordination)</li> </ul>							
4	<b>Participation requirements</b> None							
5	<b>Form of assessment</b> Written examination							
6	<b>Condition for the award of credit points</b> Module examination pass							
7	<b>Application of the module</b> (in the following study programmes): Infrastructure Engineering (B.Eng.)							
8	<b>Module supervisor</b> Prof. Dr.-Ing. Gerald Ebel							
9	<b>Other information</b>							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Business Administration 1								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	3rd sem.	Annual	Winter	1 sem.	Compulsory elective	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		3 SCH / 45 h	60 h			120	German / English
	Exercise		1 SCH / 15 h	30 h			120	German / English
2	<b>Learning outcomes / competences</b> After completing the module, the students have an overview of the field of business administration. They know the fundamental control variables, methods and instruments of business administration as well as the necessary terminology. They can also transfer their knowledge to applications and tasks of business administration in the construction industry and explain them.							
3	<b>Contents</b> <ul style="list-style-type: none"> <li>• Fundamentals and basic terms of business administration</li> <li>• Introduction to economic thinking</li> <li>• Legal influencing factors</li> <li>• Phases of corporate development</li> <li>• Legal forms of the companies</li> <li>• Mergers and acquisitions</li> <li>• Functions of business administration</li> <li>• Business organisation</li> <li>• Business plan</li> </ul>							
4	<b>Participation requirements</b> None							
5	<b>Form of assessment</b> Written examination							
6	<b>Condition for the award of credit points</b> Module examination pass							
7	<b>Application of the module</b> (in the following study programmes): Architecture (B.A.), Project Management Construction (B.Eng.), Infrastructure Engineering (B.Eng.)							
8	<b>Module supervisor</b> Prof. Dr.-Ing. Gerald Ebel							
9	<b>Other information</b> The teaching is carried out by a teaching assistant.							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Building Information Modelling								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	4th sem.	Annual	Summer	1 sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	40 h	Lecture		60	German
	Exercise		1 SCH/15 h	15 h	Group work		up to 35	German
	Practical		1 SCH/15 h	35 h	Individual work		15	German
2	<b>Learning outcomes / competences</b> Acquisition of conceptual knowledge about the BIM methodology with its different concepts and application limits, ability to create models using the concepts learned, acquisition of processing techniques for modelling structures in a BIM software							
3	<b>Contents</b> Idea of Building Information Modelling (BIM), development and current status with regard to standards and guidelines, why BIM = added value of structured modelling of building information, description of complex data objects and their dependencies by means of constraints, structure of building models, partial and subject models, coordination model, LOI = Level of information and LOD = Level of detail/development, concepts little bim, big BIM, open BIM and closed BIM, technical implementation = {file-related, database-related} and current application limits, industry foundation classes of buildingsmart e. V. as an exchange format for building models, roles and application scenarios in the BIM process, use of building models to automate classic activities in planning and construction.  Functionality of BIM software for the geometric and informational modelling of buildings and their elements, creation and editing of model objects on the computer of varying complexity, starting with simple objects, through more complex components and systems using constraints and structuring techniques, to the complete modelling of an example project.							
4	<b>Participation requirements</b> None							
5	<b>Form of assessment</b> subject-related and methodical in the form of a written examination as well as independently in the form of a project work							
6	<b>Condition for the award of credit points</b> Passed written exam and successfully completed project work							
7	<b>Application of the module</b> (in the following study programmes): PMB and BIW							
8	<b>Module supervisor</b> Prof. Dr.-Ing. Eisfeld							
9	<b>Other information</b>							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Introduction to Infrastructure Engineering								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	1st sem.	Annual	Winter	1 sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	45 h			120	German
	Exercise		2 SCH/30 h	45 h			30	German
2	<b>Learning outcomes / competences</b> After completing the module, students have an overview of the work environment of project management. They know the basic tasks and actions expected of a project manager in the construction industry. They understand which competences are necessary for successfully working as a project manager. They have learned basic techniques for studying.							
3	<b>Contents</b> Project management basics <ul style="list-style-type: none"> <li>• Delimitation and definition, project management service profile, project organisation, introduction to schedule, cost and quality management, project phases, tools of project management</li> </ul> Key competences for studying <ul style="list-style-type: none"> <li>• Organisation of studies, learning types and skills, basics of scientific work, presentation skills, body language and rhetoric, writing and reading skills, memory training</li> </ul>							
4	<b>Participation requirements</b> None							
5	<b>Form of assessment</b> Learning diary							
6	<b>Condition for the award of credit points</b> Successful passing of the examination							
7	<b>Application of the module</b> (in the following study programmes): Infrastructure Engineering (B.Eng.)							
8	<b>Module supervisor</b> Prof. Dr.-Ing. Gerald Ebel							
9	<b>Other information</b>							



**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Energy Management								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	4th sem.	Annual	Summer	1 sem.	Compulsory elective	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		3 SCH / 45 h	60 h			60	German
	Exercise		1 SCH / 15 h	30 h			30	German
2	<b>Learning outcomes / competences</b> The students acquire the competence to apply the conditions of the energy market to projects and to consider the different levels – law, costs, technology and organisation. They work out the separation of the energy system into grid and energy trading and know how to allocate the various requirements of projects. They know the sources and generation technologies for electricity and gas. Competence in energy saving and energy efficiency is developed.							
3	<b>Contents</b> <ul style="list-style-type: none"> <li>• Market structure of electricity and gas supply in the liberalised energy system</li> <li>• Technical structure of the electricity and gas grids with legal framework and cost mapping.</li> <li>• The current technology of electricity generation – conventional, CHP and renewable, and pricing based on costs and trading at energy exchanges.</li> <li>• Sources and structure of gas supply.</li> <li>• Structure and connection of district heating and its importance for energy efficiency.</li> <li>• Structure of energy demand and approaches to increasing efficiency and saving. Integration into the international energy system.</li> </ul>							
4	<b>Participation requirements</b> None							
5	<b>Form of assessment</b> Written examination							
6	<b>Condition for the award of credit points</b> Module examination pass							
7	<b>Application of the module</b> (in the following study programmes): Infrastructure Engineering (B.Eng.)							
8	<b>Module supervisor</b> Prof. Dr.-Ing. Gerald Ebel							
9	<b>Other information</b> The teaching is carried out by a teaching assistant.							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Introduction for First-Semester Students								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	-	.	1st sem.	Annual	Winter	1 week	elective	BA
<b>1</b>	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		One-week	60 h	Lecture			German
	Sem. lessons		introduction	30 h	Exercise and tutorials			
	Exercise		+ courses in		Excursions			
Internship / Seminar		the 2nd week		Projects				
<b>2</b>	<b>Learning outcomes / competences</b> Students get to know their university campus. They are familiar with the conditions of study and gain knowledge of the course schedule, examination procedures and the exchange of information on campus.							
<b>3</b>	<b>Contents</b> The faculty, its facilities and the venue of study, Minden Structure of the degree programmes, timetables Introduction to the faculty library and how to use it Information on the university organisation and the student self-governing bodies Introduction to data processing Safety briefings							
<b>4</b>	<b>Participation requirements</b> Acceptance letter							
<b>5</b>	<b>Form of assessment</b> No examination							
<b>6</b>	<b>Condition for the award of credit points</b> -							
<b>7</b>	<b>Application of the module</b> (in the following study programmes): This module can be used in all study programmes.							
<b>8</b>	<b>Module supervisor</b> Prof. Dr.-Ing. B. Wißmann							
<b>9</b>	<b>Other information</b> Introductory events by tutors (students from higher semesters from the individual degree programmes), professors and academic staff from the various fields of study, safety officers, etc.							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Technical English								Abbr. GME
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	2nd sem.	Annual	Summer	1 sem.	Compulsory	B.A.
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Sem. lessons		4 SCH/60 h	90 h	Sem. lessons Exercise		25	English
2	<b>Learning outcomes / competences</b>							
	<p>On successful completion of the module, students have the following knowledge and skills:</p> <ul style="list-style-type: none"> <li>• They can understand and summarise English construction-related texts and documents</li> <li>• They are able to communicate in English with colleagues in meetings about construction projects</li> <li>• They can make telephone calls in English</li> <li>• They can produce simple written documents in English about construction projects</li> <li>• They are able to use English technical vocabulary in their profession</li> </ul>							
3	<b>Contents</b>							
	<ul style="list-style-type: none"> <li>• Professions in the construction industry</li> <li>• Components and building constructions (e.g. foundation, roof)</li> <li>• Building materials</li> <li>• Drawings and plans</li> <li>• Negotiations with clients</li> <li>• Tenders and contracts</li> <li>• Construction sites and construction organisation</li> <li>• Telephone communication</li> </ul>							
4	<b>Participation requirements</b>							
	None							
5	<b>Form of assessment</b>							
	Written exam							
6	<b>Condition for the award of credit points</b>							
	Module examination pass							
7	<b>Application of the module</b> (in the following study programmes):							
	Project Management Construction (B.Eng.), Infrastructure Engineering (B.Eng.), Architecture (B.A.), Civil Engineering (B.Eng.),							
8	<b>Module supervisor</b>							
	Cathrine Stones							
9	<b>Other information</b>							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Geographic Information Systems								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	<b>150 h</b>	<b>5</b>	3rd sem.	Annual	Winter	1 sem.	elective	BA
<b>1</b>	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		1 SCH/15 h	22.5 h	Lecture		20	German
	Exercise		3 SCH/45 h	67.5 h	Group work		2	German
					-		-	-
					-		-	-
<b>2</b>	<b>Learning outcomes / competences</b>							
	After successful participation, students will be able to describe the different characteristics and forms of geodata. Furthermore, the students can name areas of application of geoinformation systems. They can distinguish different spatial reference systems. Basic spatial operations of geodata management can be performed using FME Desktop. For the visualisation of the results, the students can create an ArcGIS Online WebApp.							
<b>3</b>	<b>Contents</b>							
	<ul style="list-style-type: none"> <li>• Introduction to the terminology of geographic information systems</li> <li>• Introduction to the handling of geographic information systems</li> <li>• Geodata management with a focus on data conversion and data transformation using FME Desktop</li> <li>• Geodata: Location and elevation models</li> <li>• Basics of geodetic coordinate systems /Geodetic Datum</li> <li>• Web GIS: Availability of geodata on the internet</li> <li>• Creating web maps and geo applications with ArcGIS Online</li> </ul>							
<b>4</b>	<b>Participation requirements</b>							
	Basic knowledge of computer science							
<b>5</b>	<b>Form of assessment</b>							
	Project work							
<b>6</b>	<b>Condition for the award of credit points</b>							
<b>7</b>	<b>Application of the module</b> (in the following study programmes):							
	Infrastructure Engineering (B.Eng.)							
<b>8</b>	<b>Module supervisor</b>							
	Prof. Dr.-Ing. Gerald Ebel							
<b>9</b>	<b>Other information</b>							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Geotechnics 1 BIW								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	3rd sem.	Annual	Winter	1 sem.	Compulsory	BA
<b>1</b>	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30h	30 h	Lecture		≤ 60	German
	Sem. lessons		1 SCH/15 h	30 h	Exercise		≤ 35	German
	Exercise							
	Practical / Seminar		1 SCH/15 h	30 h	Group work		≤ 15	German
<b>2</b>	<b>Learning outcomes / competences</b>							
	Distinguish between the common types of soils and the significant mechanical properties of the soils, knowledge of the investigation methods in the laboratory and in the field, mastery of the basic stability verifications; Experience in teamwork in the laboratory practical; Experience in working independently with teaching media (lecture notes, textbooks, internet) when working through comprehension questions; Experience in optimising time management in exam preparation using sample exams							
<b>3</b>	<b>Contents</b>							
	Soil mechanics 1 and 2 Soil classification, plane seepage flow (associated laboratory tests), stress-strain behaviour of soils (associated laboratory tests), subsoil investigation, field tests, earth pressure and earth resistance, stability of shallow foundations, embankment failure							
<b>4</b>	<b>Participation requirements</b>							
	Knowledge of hydromechanics, engineering mechanics, mathematics and building materials science.							
<b>5</b>	<b>Form of assessment</b>							
	Combination exam: Term paper and written exam or term paper and oral exam							
<b>6</b>	<b>Condition for the award of credit points</b>							
	Module examination pass							
<b>7</b>	<b>Application of the module</b> (in the following study programmes):							
	Infrastructure Engineering (B.Eng.)							
<b>8</b>	<b>Module supervisor</b>							
	Prof. Dr.-Ing. Hans-Georg Gülzow							
<b>9</b>	<b>Other information</b>							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Geotechnics 2 BIW								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	4th sem.	Annual	Summer	1 sem.	Compulsory	BA
<b>1</b>	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	45 h	Lecture		≤ 60	German
	Sem. lessons		2 SCH/30 h	45 h	Exercise		≤ 30	German
	Exercise							
	Practical / Seminar							
<b>2</b>	<b>Learning outcomes / competences</b>							
	<p>Knowledge of ground engineering constructions and procedures, mastery of calculation procedures, knowledge of designing ground engineering constructions, Recognise problems in ground engineering tasks and constructions, develop solutions for specific problems;            Experience in working independently with teaching media (lecture notes, textbooks, internet) when working through comprehension questions;            Experience in optimising time management in exam preparation using sample exams</p>							
<b>3</b>	<b>Contents</b>							
	<p>Foundation engineering 1            Excavation pits (retaining walls, anchorages, groundwater retention), retaining structures (gravity/angular retaining walls, reinforced earth), foundations (shallow and deep foundations, foundation slabs, piling systems), ground improvement (compaction, deep compaction, injections), geotextiles (fabrics, fleeces, geogrids)</p>							
<b>4</b>	<b>Participation requirements</b>							
	Knowledge of hydromechanics, engineering mechanics, mathematics, building materials and soil mechanics							
<b>5</b>	<b>Form of assessment</b>							
	Combination exam: Term paper and written exam or term paper and oral exam							
<b>6</b>	<b>Condition for the award of credit points</b>							
	Module examination pass							
<b>7</b>	<b>Application of the module</b> (in the following study programmes):							
	Infrastructure Engineering (B.Eng.)							
<b>8</b>	<b>Module supervisor</b>							
	Prof. Dr.-Ing. Hans-Georg Gölzow							
<b>9</b>	<b>Other information</b>							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Fundamentals of Logistics								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	3rd sem.	Annual	Winter	1 sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	45 h			120	German
Exercise		2 SCH/30 h	45 h	45 h			30	German
2	<b>Learning outcomes / competences</b> The students know concepts and instruments of logistics in the fields of technology, computer science and business administration. They will be able to formulate simple logistics planning and modelling tasks and identify possible solutions. They understand the principle of process management and can apply it to simple systems.							
3	<b>Contents</b> <ul style="list-style-type: none"> <li>• Definition and delimitation</li> <li>• Structure and goals</li> <li>• Business management logistics</li> <li>• Process chain instruments</li> <li>• Intralogistics, in particular construction site logistics</li> <li>• Warehousing and merchandise management</li> <li>• Transport logistics</li> <li>• Building logistics</li> </ul>							
4	<b>Participation requirements</b> None							
5	<b>Form of assessment</b> Project work							
6	<b>Condition for the award of credit points</b> Module examination pass							
7	<b>Application of the module</b> (in the following study programmes): Infrastructure Engineering (B.Eng.)							
8	<b>Module supervisor</b> Prof. Dr.-Ing. Gerald Ebel							
9	<b>Other information</b>							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Logistics Infrastructure								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	4th sem.	Annual	Summer	1 sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	45 h			120	German
	Exercise		2 SCH/30 h	45 h			30	German
2	<b>Learning outcomes / competences</b> Students acquire insights into concepts and instruments for the design of a logistics infrastructure for the handling of goods and people. The students know the processes in the plants as well as their fundamentally required infra- and suprastructure. They can estimate the changes to processes in the event of structural interventions in the logistics infrastructure. They understand the needs of an infrastructure in the event of a change in logistics processes. The students are able to write a scientific paper.							
3	<b>Contents</b> Infrastructure and logistical processes of <ul style="list-style-type: none"> <li>• Rail freight transport</li> <li>• Air freight transport</li> <li>• Road freight transport</li> <li>• Inland waterway and sea transport</li> <li>• Piping systems</li> <li>• Passenger transport</li> </ul> <p>The module also deals with "scientific work" as a cross-sectional competence.</p>							
4	<b>Participation requirements</b> Knowledge of the contents of the module "Fundamentals of Logistics" is assumed.							
5	<b>Form of assessment</b> Term paper and oral examination with poster presentation as a combined examination							
6	<b>Condition for the award of credit points</b> Module examination pass							
7	<b>Application of the module</b> (in the following study programmes): Infrastructure Engineering (B.Eng.)							
8	<b>Module supervisor</b> Prof. Dr.-Ing. Gerald Ebel							
9	<b>Other information</b>							



**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Cost Management in Civil Engineering								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	5th sem.	Annual	Winter	1 sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	45 h	Lecture		30	German
	Practicals		2 SCH/30 h	45 h	Practical		30	German
2	<b>Learning outcomes / competences</b>							
	<p>The participants are familiar with the methods and procedures of cost planning and cost management and the use of IT.</p> <p>After successful completion of the module, the students are able to</p> <ul style="list-style-type: none"> <li>• Prepare realistic cost calculations in early project phases,</li> <li>• Check which project scope can be realised within a given cost framework,</li> <li>• Select and use the optimal IT for the specific project and for independent knowledge enhancement</li> </ul>							
3	<b>Contents</b>							
	<p>Cost determination according to procedures in road construction and civil engineering on the basis of the element method according to AKS-85, AKVS, DIN 276-4 or others with parameterisable quantity approaches; cost element catalogues; quantity determination for cost determination; quantity split according to cost unit and/or location; consistency of cost planning, control and management; preview, correlation of costs and time, significance of risk management in cost management</p>							
4	<b>Participation requirements</b>							
	None							
5	<b>Form of assessment</b>							
	Term paper							
6	<b>Condition for the award of credit points</b>							
	Module examination pass							
7	<b>Application of the module</b> (in the following study programmes):							
	Infrastructure Engineering (B.Eng.)							
8	<b>Module supervisor</b>							
	Prof. Dr.-Ing. Gerald Ebel							
9	<b>Other information</b>							
	Teaching is carried out by a teaching assistant.							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Maths Fitness								Abbreviation
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	- h	-	1st sem.	Annual	Winter	0.5 sem.	Elective	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		1 SCH	on demand	Lecture		35	German
Exercises and tutorials		1 SCH	on demand	Sem. lessons		35	German	
2	<b>Learning outcomes / competences</b> After successful completion of the module <input type="checkbox"/> Students are able to apply mathematics in engineering studies by refreshing their knowledge in the Maths Fitness module, <input type="checkbox"/> The students are able to integrate the knowledge they have acquired into the module Mathematical Methods or Mathematics 1 (students of the Civil Engineering study programme), <input type="checkbox"/> The students have strengthened their study skills in terms of their social, methodological and social competences and their school knowledge.							
3	<b>Contents</b> Mathematics: <input type="checkbox"/> Numbers, fundamentals of calculating real numbers, <input type="checkbox"/> Fractions, percentages and powers, <input type="checkbox"/> Binomial formulas and quantities, <input type="checkbox"/> Solving equations, <input type="checkbox"/> Calculation and presentation of linear and quadratic functions.							
4	<b>Participation requirements</b> Acceptance letter							
5	<b>Form of assessment</b> No examination							
6	<b>Condition for the award of credit points</b> -							
7	<b>Application of the module</b> (in the following study programmes): This module can be used in all study programmes.							
8	<b>Module supervisor</b> Prof. Dr.-Ing. K. Peters							
9	<b>Other information</b> Introductory lecture with exercises of 2 SCH on a total of 5 days in the morning until the middle of the semester in a block.							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Mathematical Methods								Abbreviation
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	1st sem.	Annual	Winter	1 Sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	45 h	Lecture		60	German
	Sem. lessons		2 SCH/30 h	45 h	Exercise		≤ 35	German
2	<b>Learning outcomes / competences</b> Application of the various mathematical methods to engineering problems and economic tasks Learning the mathematical skills Developing a feeling for mathematical operations, dealing with variables, calculating with numerical values, calculating numerical solutions Use of modern tools such as spreadsheets; Experience in working independently with teaching media (script, textbooks, internet) in working through comprehension questions.							
3	<b>Contents</b> <b>Part 1: Mathematical basics</b> Fundamentals of financial mathematics Application of functions in business mathematics, differential and integral calculus for business problems, matrix calculation Linear optimisation <b>Part 2: Statistical methods</b> Descriptive statistics (means, standard deviation, frequency distribution), probability theory (conditional probability, Bayesian formula), distribution functions, evaluative statistics (estimation of parameters, confidence interval, static tests), regression (time series, moving average, least squares): Ability to apply mathematical methods, in particular to solve problems in business mathematics							
4	<b>Participation requirements</b> None							
5	<b>Form of assessment</b> Written examination or oral examination							
6	<b>Condition for the award of credit points</b> Module examination pass							
7	<b>Application of the module</b> (in the following study programmes): Project Management Construction (B.Eng.), Infrastructure Engineering (B.Eng.)							
8	<b>Module supervisor</b> Prof. Dr.-Ing. K. Peters							
9	<b>Other information</b>							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Mechanics 1								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	180 h	6	1st sem.	Annual	Winter	1 sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture Exercise		2 SCH/30 h 2 SCH/30 h	120 h			60 up to 30	German
2	<b>Learning outcomes / competences</b> The participants develop an understanding of the basic physical units and the derived units (mass, density, weight, length, time, velocity, acceleration, force, moment, work, stress and mechanical work). At the end of the module, students will be able to determine the resulting forces and moments, handle the equilibrium conditions with confidence, determine internal forces on statically determined systems in different ways and carry out the corresponding plausibility checks, and they will have acquired general basic knowledge of engineering mechanics.							
3	<b>Contents</b> Loads, forces, moments, bearing and internal forces, equilibrium conditions, internal loads as functions, graphical methods, relationship between shear force, bending moment and load, counting criteria, principle of virtual displacements, friction laws							
4	<b>Participation requirements</b> School knowledge in mathematics and physics							
5	<b>Form of assessment</b> Written exam							
6	<b>Condition for the award of credit points</b> Module examination pass							
7	<b>Application of the module</b> (in the following study programmes): Infrastructure Engineering (B.Eng.)							
8	<b>Module supervisor</b> Prof. Dr.-Ing. Andreas Kahlfeld							
9	<b>Other information</b> Provision of basic knowledge for the modules Mechanics 2 and Fluid Mechanics as well as for the entire study programme							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Mechanics 2 BIW								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	180 h	6	2nd sem.	Annual	Summer	1 sem.	Compulsory	BA
<b>1</b>	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	120 h			60	
	Exercise		2 SCH/30 h				up to 30	
<b>2</b>	<b>Learning outcomes / competences</b> The students can calculate stresses in simple bar-shaped components and know the basics of the design of components.							
<b>3</b>	<b>Contents</b> Stresses, Mohr's stress circle, strains, Hooke's law Cross-section values, stress determination from internal forces Differential equations of technical bending theory, calculation of deformations, stability Design of simple bar-shaped components							
<b>4</b>	<b>Participation requirements</b> Knowledge of Mechanics 1 BIW							
<b>5</b>	<b>Form of assessment</b> Written exam							
<b>6</b>	<b>Condition for the award of credit points</b> Module examination pass							
<b>7</b>	<b>Application of the module</b> (in the following study programmes): Infrastructure Engineering (B.Eng.)							
<b>8</b>	<b>Module supervisor</b> Prof. Dr.-Ing. Britta Wißmann							
<b>9</b>	<b>Other information</b>							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Practical Training Period								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	480 h	16	6th sem.	anytime	Summer	12 weeks	Compulsory	BA
<b>1</b>	<b>Course type</b>	<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>	<b>Planned group size</b>	<b>Language</b>		
	Professional practice		480 h	Practical activity		German		
<b>2</b>	<b>Learning outcomes / competences</b> After successfully completing the module, students are able to <ul style="list-style-type: none"> <li>- apply knowledge and skills acquired in their previous studies,</li> <li>- work in companies and organisations in the construction industry on the basis of concrete tasks, and</li> <li>- reflect on and evaluate the experiences made during the practical activity.</li> </ul>							
<b>3</b>	<b>Contents</b> <ul style="list-style-type: none"> <li>- Introduction to engineering work based on previously acquired knowledge</li> <li>- Practical work in a construction company, on the client side, e.g. in public administration, in a planning office or in a consulting firm</li> <li>- Recognise the company-specific process flows, project organisation and project management</li> <li>- Enhancement of social skills</li> </ul>							
<b>4</b>	<b>Participation requirements</b> The regulations of the SPO apply.							
<b>5</b>	<b>Form of assessment</b> Presentation of certificate of successful completion of the practical training period and report on the practical training period.							
<b>6</b>	<b>Condition for the award of credit points</b> Module examination pass							
<b>7</b>	<b>Application of the module</b> (in the following study programmes): Infrastructure Engineering (B.Eng.)							
<b>8</b>	<b>Module supervisor</b> Prof. Dr.-Ing. Gerald Ebel							
<b>9</b>	<b>Other information</b> Faculty tutoring is provided by teaching staff at the Minden Campus.							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Project Management Infrastructure								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	5th sem.	Annual	Winter	1 sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	45 h	Seminar lessons		120	German
Exercise		2 SCH/30 h	45 h	Group work		30	German	
2	<b>Learning outcomes / competences</b> The students learn about the special characteristics of project management for infrastructure measures. They are able to understand the role of the public sector. They recognise the organisation of major projects and understand the project management processes during planning and construction. They will gain in-depth knowledge in the area of project management tools.							
3	<b>Content</b> <ul style="list-style-type: none"> <li>• Role of public institutions for infrastructure</li> <li>• Task and change management</li> <li>• Project organisation</li> <li>• Planning</li> <li>• Public relations and stakeholder management</li> <li>• Planning law and environment</li> <li>• Financing and risk management</li> <li>• Project management and controlling</li> <li>• Tendering and awarding</li> <li>• Construction</li> <li>• Contract management</li> </ul>							
4	<b>Participation requirements</b> Basic knowledge of project management in the construction industry is assumed.							
5	<b>Form of assessment</b> Tasks assigned during the semester							
6	<b>Condition for the award of credit points</b> Module examination pass							
7	<b>Application of the module</b> (in the following study programmes): Infrastructure Engineering (B.Eng.)							
8	<b>Module supervisor</b> Prof. Dr.-Ing. Gerald Ebel							
9	<b>Other information</b>							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Law								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	1st sem.	Annual	Winter	1 sem.	Compulsory	BA
<b>1</b>	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		4 SCH/60 h	90h	Lecture/Script		150	German
<b>2</b>	<b>Learning outcomes / competences</b>							
	After successfully participating in the module, students have the following knowledge and skills: By acquiring knowledge of the legal foundations of public and private building law, students will be able to analyse the legal issues of simple case studies from practice at the end of the course and to find a justifiable solution to the case studies using basic solution techniques.							
<b>3</b>	<b>Contents</b>							
	Part A: <b>Private/Public Building Law</b> General legal orientation and decision-making skills in the preparatory planning and implementation phases of construction with regard to the resulting general and project-related framework conditions and consequences: <b>Planning law</b> <input type="checkbox"/> Construction planning <input type="checkbox"/> Land use plan; development plan <input type="checkbox"/> Determination of the building plan; safeguarding urban land use planning; preserving the plan <input type="checkbox"/> Building law permissibility of buildings; BauGB, BauNVO (German building regulations law/construction law) <b>Building regulations</b> <input type="checkbox"/> Functions and contents of the building code; BauO NRW <input type="checkbox"/> Protection against hazards, aesthetic concerns <input type="checkbox"/> Material and formal building code <input type="checkbox"/> Legal protection of the citizen Part B: <b>Contractual Law</b> Differentiation of contractual forms and legal relationships of the parties involved in the construction: <input type="checkbox"/> Law on contracts for work and services according to BGB, differentiation from purchase contracts, contract for work and services, contract for work and services, architect law, basic principles of architect and engineer contracts with special consideration of the new regulations to the BGB as of 01.01.2018 and the HOAI <input type="checkbox"/> VOB Part A, B, C incl. their historical development and legal nature as GTCs and basic features of public procurement law <input type="checkbox"/> Differences between VOB and BGB and the special considerations of parties involved (specialist contractor, main contractor, subcontractor, general contractor, general contractor, developer, forms of cooperation); organisation; deadlines, quality, remuneration and disputes in construction (organisation of court, independent procedure for the taking of evidence, lawsuit, notice of dispute, joint and several obligation)							
<b>4</b>	<b>Participation requirements</b>							
	None							
<b>5</b>	<b>Form of assessment</b>							
	Written examination							
<b>6</b>	<b>Condition for the award of credit points</b>							
	Successful completion of the joint module examination (written examination parts A and B)							
<b>7</b>	<b>Application of the module</b> (in the following study programmes):							
	Architecture (B.A.); Project Management Construction (B.Eng.); Civil Engineering (B.Eng.); Infrastructure Engineering (B.Eng.)							
<b>8</b>	<b>Module supervisor</b>							
	Professor Bettina Mons							
<b>9</b>	<b>Other information</b>							



**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

The courses are taught by lecturers, currently: NN

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Water and Sanitation 1								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	4th sem.	Annual	Summer	1 sem.	Elective	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	45 h	Lecture			German
Sem. lessons		2 SCH/30 h	45 h				≤35	German
2	<b>Learning outcomes / competences</b>							
	<b>Knowledge:</b> <ul style="list-style-type: none"> <li>• Water extraction</li> <li>• Water supply, quality, demand, rainwater harvesting and water protection</li> <li>• legal framework</li> <li>• Water demand assessment, water extraction, water pumping, water treatment, water storage, water distribution</li> </ul> <b>Sewage technology</b> <ul style="list-style-type: none"> <li>• Types of waste water, waste water quantities and properties</li> <li>• Local drainage systems and structures</li> <li>• Rainwater management and wastewater prevention</li> <li>• Wastewater and sludge treatment processes</li> </ul>							
3	<b>Contents</b>							
	<b>Skills:</b> <ul style="list-style-type: none"> <li>• Developing concepts for the above-mentioned thematic areas</li> <li>• understand associated design bases and apply approximate design;</li> <li>• Plan and dimension water supply and wastewater engineering systems;</li> </ul> <b>Competence:</b> <ul style="list-style-type: none"> <li>• Understanding of the interdisciplinary and ecological tasks of urban water management and its processes as a cornerstone of environmental engineering</li> <li>• Participation in the planning, construction and operation of water supply and wastewater technology facilities</li> <li>• coordinate services of general interest with the various interest groups</li> </ul>							
4	<b>Participation requirements</b>							
5	<b>Form of assessment</b>							
	Term paper and written exam							
6	<b>Condition for the award of credit points</b>							
	Passing the term paper and the module examination							
7	<b>Application of the module</b> (in the following study programmes):							
	Civil Engineering (B.Eng.) and Infrastructure Engineering (B.Eng.)							
8	<b>Module supervisor</b>							
	Prof. Dr.-Ing. Johannes Weinig							
9	<b>Other information</b>							
	References and script cf. Ilias							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Fluid Mechanics								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	<b>150 h</b>	<b>5</b>	2nd sem.	Annual	Summer	1 sem.	Compulsory	BA
<b>1</b>	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture Exercise Sem. lessons Laboratory practical course		4 SCH/60 h	90h	Lecture with exercise and tutorial as well as laboratory practical course			German
<b>2</b>	<b>Learning outcomes / competences</b> Participants develop understanding of basic physical units (mass, density, specific weight, viscosity, length, time, velocity, acceleration, pressure, work, energy and power). At the end of the module, you will be able to understand, evaluate and optimise hydrostatic, hydrodynamic systems in technical plants and in nature. They improve their teamwork skills and understanding through illustration and group work during the accompanying laboratory practical.							
<b>3</b>	<b>Contents</b> Properties of fluids (forces, pressure, viscosity), hydrostatics, hydrodynamics (Reynolds number, continuity equation, Bernoulli's equation, momentum equation), water and gas flows in pipelines (roughness, energy head losses, pipeline characteristic, pump duty point, efficiency), open-channel flow (super-/subcritical flow, underflow, overflow, discharge for overfall spillways, basic equations for uniform flow, e.g. Manning-Strickler equation).							
<b>4</b>	<b>Participation requirements</b> None							
<b>5</b>	<b>Form of assessment</b> Combination exam: Term paper and written exam							
<b>6</b>	<b>Condition for the award of credit points</b> Passing the module examination.							
<b>7</b>	<b>Application of the module</b> (in the following study programmes): Infrastructure Engineering (B.Eng.)							
<b>8</b>	<b>Module supervisor</b> Prof. Dr.-Ing. Andreas Kahlfeld							
<b>9</b>	<b>Other information</b>							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Traffic Engineering 1								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	3rd sem.	Annual	Winter	1 sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	45 h	Lecture		60	German
	Sem. lessons						35	
	Exercise Practical / Seminar		2 SCH/30 h	45 h	Calculations		30 15	German
2	<b>Learning outcomes / competences</b>							
	<p>The students acquire knowledge about the basics of traffic construction and its regulations. They understand theories and models for realisation concepts. They are able to apply the fundamentals in their interrelationships to achieve unity in the planning, design, construction and operation of transport facilities.</p> <p>They are proficient in analysing the dependencies between driver, vehicle and traffic infrastructure.</p> <p>They can assess the effects of traffic facilities on safety, economic efficiency and the environment.</p>							
3	<b>Contents</b>							
	<p>Fundamentals of Road and Rail Transport in Transport Planning - Transport planning fundamentals, methodology, survey, analysis and forecasting, network design, regulations and guidelines</p> <p>Design with its elements in floor plan, elevation and cross-section</p> <p>Design of spaces for all users</p> <p>Three-dimensional earthwork, road and track construction with quantity take-offs</p> <p>Operation of road and rail traffic, traffic control, traffic signals, train operation protection</p>							
4	<b>Participation requirements</b>							
	None							
5	<b>Form of assessment</b>							
	Term paper and written exam							
6	<b>Condition for the award of credit points</b>							
	Module examination pass							
7	<b>Application of the module</b> (in the following study programmes):							
	Civil Engineering (B.Eng.) and Infrastructure Engineering (B.Eng.)							
8	<b>Module supervisor</b>							
	Dr.-Ing. Norbert Handke							
9	<b>Other information</b>							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Traffic Engineering 2								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	4th sem.	Annual	Summer	1 sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		2 SCH/30 h	45 h	Lecture		60	German
	Sem. lessons						35	
	Exercise		2 SCH/30 h	45 h	Calculations		30	German
Practical / Seminar						15		
2	<b>Learning outcomes / competences</b>							
<p>The students gain knowledge about the innovations of traffic construction for current demands. They understand the new digital theories and models. They are able to apply the interrelationships in Car2Car and Car2Infrastructure approaches. They are able to analyse the interdependencies in multimodal mobility systems. They can assess the effects of traffic information on the overall network.</p>								
3	<b>Contents</b>							
<p>Special areas of road and rail transport in transport planning - Special areas for network redesign in cities            Design of special facilities (e.g. border facilities, event areas, car parks, GVZ)            Special requirements for earthworks, road and track construction (tunnels, pedestrian zones, high-speed lines)            Operation of road and rail traffic via modern facilities for traffic and mobility management</p>								
4	<b>Participation requirements</b>							
None								
5	<b>Form of assessment</b>							
Oral examination or written exam								
6	<b>Condition for the award of credit points</b>							
7	<b>Application of the module</b> (in the following study programmes):							
Civil Engineering (B.Eng.) and Infrastructure Engineering (B.Eng.)								
8	<b>Module supervisor</b>							
Dr.-Ing. Norbert Handke								
9	<b>Other information</b>							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Waterways								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	4th sem.	Annual	Summer	1 sem.	Compulsory	BA
<b>1</b>	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture Exercise		4 SCH/60 h	90 h	Lecture with exercise and excursion (opt.)			German
<b>2</b>	<b>Learning outcomes / competences</b>							
	At the end of the course, participants will be able to design and plan hydraulic structures of natural and artificial waterways. This also includes knowledge of the planning process and approval procedures. They are familiar with the construction methods and procedures in hydraulic engineering and have knowledge of the boundary conditions for construction in waterways. They recognise specific construction and traffic engineering problems and can assign suitable solution procedures. They have the knowledge and skills to operate and maintain waterways.							
<b>3</b>	<b>Contents</b>							
	Waterways as part of the transport network, development of natural and artificial waterways and their structures and installations, transshipment points, berths, ports, culverts, locks and ship lifts, canal bridges, Operation and maintenance of waterways, technical equipment, monitoring, repair, transport of hazardous substances and traffic regulation, seaport hinterland transport and intermodal transport chains via inland ports.							
<b>4</b>	<b>Participation requirements</b>							
	Knowledge of fluid mechanics and hydromechanics as well as the basics of hydraulic engineering and hydrology							
<b>5</b>	<b>Form of assessment</b>							
	Combination exam: Term paper and written exam							
<b>6</b>	<b>Condition for the award of credit points</b>							
	Passing the module examination.							
<b>7</b>	<b>Application of the module</b> (in the following study programmes):							
	Infrastructure Engineering (B.Eng.) and Civil Engineering (B.Eng.)							
<b>8</b>	<b>Module supervisor</b>							
	Prof. Dr.-Ing. Andreas Kahlfeld							
<b>9</b>	<b>Other information</b>							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Land Surveying BPB/BIW								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	2nd sem.	Annual	Summer	1 sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		1 SCH/15 h	25 h	Lecture		40	German
Practical		3 SCH/45 h	65 h	Practical		5	German	
2	<b>Learning outcomes / competences</b> After successfully completing the module, students are able to <input type="checkbox"/> describe various methods of height determination and options for implementation, <input type="checkbox"/> perform and evaluate a hydrostatic and a geometric levelling, <input type="checkbox"/> derive a profile representation from a geographic image using the GNSS system and a correction data service, <input type="checkbox"/> describe and execute various methods and tools of position measurement and options for implementation, <input type="checkbox"/> survey an object in a local and in a coordinate system and depict it on a site map, <input type="checkbox"/> carry out a building survey as a manual survey, tachymetric and photogrammetric survey, <input type="checkbox"/> calculate stakeout data from coordinates and transfer it to the terrain orthogonally and pole-oriented, <input type="checkbox"/> perform basic geodetic calculations (coordinates, areas and volumes).							
3	<b>Contents</b> <ul style="list-style-type: none"> <li>• Mathematical and geodetic basics</li> <li>• Geodetic instruments for height and position measurement and their handling</li> <li>• Structure and function of machine controls</li> <li>• geodetic calculations, longitudinal and transverse profiles, routing elements</li> <li>• Building survey methods</li> </ul>							
4	<b>Participation requirements</b> None							
5	<b>Form of assessment</b> Combination exam: Term paper and written exam or term paper and oral exam							
6	<b>Condition for the award of credit points</b> Proven participation in the practicals, passing the module examination							
7	<b>Application of the module</b> (in the following study programmes): Project Management Construction (B.Eng.), Infrastructure Engineering (B.Eng.)							
8	<b>Module supervisor</b> Prof. Dr.-Ing. Uwe Weitkemper							
9	<b>Other information</b> The courses are taught by Dipl.-Ing. Andreas Nobbe. The module is offered synergistically in the BIW (compulsory, 2nd semester) and BPB (compulsory elective, 4th semester).							

**Module catalogue for Infrastructure Engineering (B.Eng.)  
of the Faculty of Minden Campus**

Hydraulic Structures and Hydrology 1								Abbr.
No.	Workload	Credit Points	Study semester	Frequency	Sem.	Duration	Type	Q level
	150 h	5	3rd sem.	Annual	Winter	1 sem.	Compulsory	BA
1	<b>Course type</b>		<b>Contact hours</b>	<b>Self-study</b>	<b>Forms of teaching (learning forms)</b>		<b>Planned group size</b>	<b>Language</b>
	Lecture		4 SCH/60 h	90 h	Lecture with exercise and laboratory practical course			German
2	<b>Learning outcomes / competences</b> In the course of the module, the participants acquire basic engineering knowledge about hydrology as a basis for planning, the phenomena of water bodies as well as the structures and construction methods of structural hydraulic engineering. They improve their teamwork skills and understanding through illustration and group work during the accompanying laboratory practical.							
3	<b>Contents</b> Hydraulic engineering: Inland rivers, dams, artificial waterways, tides and tidal rivers, coasts and seas, watercourse development and maintenance, associated structures and construction methods Hydrology: Water cycle and water balance, main hydrological parameters, hydrology as a basis for water management and water engineering planning, hydrology, catchment area survey, precipitation-runoff process, flood generation and occurrence, hydrological yearbook							
4	<b>Participation requirements</b> Knowledge of fluid mechanics or hydromechanics							
5	<b>Form of assessment</b> Combination exam: Term paper and written exam							
6	<b>Condition for the award of credit points</b> Passing the module examination.							
7	<b>Application of the module</b> (in the following study programmes): Infrastructure Engineering (B.Eng.), Civil Engineering (B.Eng.)							
8	<b>Module supervisor</b> Prof. Dr.-Ing. Andreas Kahlfeld							
9	<b>Other information</b>							