



Module Catalogue

for the master's degree study programmes

“Integrated Technology and System Development”
full-time (ITSD-FT) and
part-time (ITSD-PT)

at the Faculty of Minden Campus of
Bielefeld University of Applied Sciences



FH Bielefeld
University of
Applied Sciences

Module catalogue

Integrated Technology and System Development (M.Eng. full-time/part-time)

Table of contents

Applied Numerics and Higher Mathematics	3
Modelling and Simulation	4
Systems Engineering.....	5
Strategic Corporate Development	6
Actuators and Sensors.....	7
Communications Technology	8
Control Systems	9
Information Systems Engineering	10
Engineering Project Controlling.....	11
Operations Management.....	12
Flexible Automation for Small Batch Sizes	13
Energy and Resource Efficiency	14
Applied Technology Project	15
Project Work.....	16
Master Thesis.....	17
Colloquium	18

Please note: The modules' study semesters and numbering refer to the full-time version. The alternative sequence for the part-time version is indicated in footnotes.

**Module Catalogue for "Integrated Technology and System Development" (M.Eng.)
at the Faculty of Minden Campus**

Applied Numerics and Higher Mathematics								Module ID ANM
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q level
1.1	125 h	5	1st sem.	Annual	Summer	1 sem.	Compulsory	MA
1	Course type	Contact time	Self-study	Teaching forms (learning methods)		Planned group size	Language	
	Sem. lessons	2 SCH	85 h	Group work		40	German	
	Exercise	0.5 SCH		-		32		
	Practical/Seminar	0.5 SCH		Portfolio work		16		
		approx. 40 h						
2	Learning outcomes/competences The covered methods and concepts of applied mathematics are utilised throughout the master degree. The students are able to apply numerical algorithms, stability concepts and models as well as ordinary differential equations, which constitute prerequisites for the modelling of technical and business systems and for the running of computational simulations. The participants are able to determine the spectra of matrices and solutions of matrix exponential equations and obtain basic knowledge about stochastic methods, as they are required, for example, in the control of dynamic systems in the statistical analysis of production data.							
3	Contents Numerics <ul style="list-style-type: none"> Numerical solution of analytical equations Numerical integration and differentiation Introduction: Numerical solution of partial differential equations Introduction: Iterative solution of linear systems of equations, function approximation Eigenvalues and matrix equations <ul style="list-style-type: none"> Eigenvalues and eigenvectors, spectrum of a matrix Principal axis theorem Matrix exponentials utilised for solving linear ODE (Ordinary Differential Equations) systems Stochastics <ul style="list-style-type: none"> State variables, expected value, variance Distribution functions with focus on Gaussian normal distribution 							
4	Participation requirements Formally, none. For the "Numerics" unit, basic knowledge of <u>any</u> higher programming language (such as C, C++, also Matlab or NumPy) is required, so that small programmes can be written and executed independently by participants. The unit "Eigenvalues and Matrix Equations" requires solid knowledge in solving linear equation systems, matrix calculation and inverse matrices. The "Stochastics" unit does not require any prior knowledge.							
5	Form of assessment Performance exam or written exam							
6	Condition for the award of credit points Module examination pass							
7	Application of the module (in the following study programmes): "Integrated Technology and System Development" (M.Eng., full-time and part-time version)							
8	Module coordinator Prof. Dr.-Ing. Tilman Hetsch							
9	Other information "Modelling & Simulation": both modules and practical courses complement each other thematically. ANM teaches methods & solution strategies, MUS applications & modelling.							

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 "Integrated Technology and System Development" (M.Eng.)
at the Faculty of Minden Campus**

Modelling and Simulation								Module ID MUS
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q level
1.2	125 h	5	1st sem. ¹	Annual	Summer	1 sem.	Compulsory	MA
1	Course type		Contact time	Self-study	Teaching forms (learning methods)		Planned group size	Language
	Sem. lessons		2 SCH	85 h	Group work		40	
	Exercise		0.5 SCH		-		32	
	Practical/Seminar		0.5 SCH approx. 40 h		Portfolio work		16	
2	Learning outcomes/competences The students recognise the nature (spatially distributed or discrete, at rest or in flow) of various real-world technical systems and can grasp and explain their physical, mathematical properties. They can extract the underlying model and prepare it for a suitable simulation environment. They carry out digital simulations, validate and interpret the simulation results in relation to the expected value to be assumed from the real world.							
3	Contents <ul style="list-style-type: none"> • Typical spatially distributed or discrete, at rest or in flux, mechanically electrical systems in mechanical engineering, electrical engineering and business management/logistics • Mathematical and physical basic equations for model description • Introduction to Fourier series, Fourier transform, as well as Laplace transformation and their application in ODEs • Solution of ODEs with the help of transformation theorems and transformation tables. • Modelling: From the real world to the model • Numerical solution approaches for selected model classes • Simulation tools and their numerical foundations • Simulation: Approach, implementation and interpretation of results • Real project 							
4	Participation requirements Formally, none. Basic knowledge of physics (mechanics, electrical engineering, thermodynamics), control engineering and automation technology as well as business administration/logistics facilitate the understanding of the individual model worlds.							
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): "Integrated Technology and System Development" (M.Eng., full-time and part-time version)							
8	Module coordinator Prof. Dr.-Ing. Oliver Wetter							
9	Other information -							

¹ Part-time version: 3rd semester

**Module Catalogue for "Integrated Technology and System Development" (M.Eng.)
at the Faculty of Minden Campus**

Systems Engineering								Module ID SYS
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q level
1.3	125 h	5	1st sem. ²	Annual	Summer	1 sem.	Compulsory	MA
1	Course type		Contact time	Self-study	Teaching forms (learning methods)		Planned group size	Language
	Sem. lessons Exercise		2 SCH 1 SCH approx. 40 h	85 h	Group work -		40 32	German
2	Learning outcomes/competences Students understand systems engineering as a team-oriented interdisciplinary approach to develop and realise large complex systems according to customer requirements. They are able to apply methods and tools of systems engineering in a targeted manner and thus substantially participate in the development of technical-business systems in various roles. To this end, they can delimit (sub-)systems, define the system boundaries and interfaces and set up corresponding projects and sub-projects (e.g. mechanical, electrotechnical, information technology and organisational sub-systems/projects). They have extensive knowledge and skills to actively supervise the conception and realisation of the subsystems, their integration into the overall system and its introduction, taking into account cost, time and quality aspects.							
3	Contents <ul style="list-style-type: none"> • Purpose, approach and methods of systems engineering • Methodical analysis and definition of requirements • Problem-solving methods • Sustainable development of the system (interface specification) • Model-based systems engineering (MBSE) with UML and SysML • Risk management • Product and quality assurance (e.g., FMEA) • System verification and validation 							
4	Participation requirements None							
5	Form of assessment Written or performance exam							
6	Condition for the award of credit points Module examination pass							
7	Application of the module (in the following study programmes): "Integrated Technology and System Development" (M.Eng., full-time and part-time version)							
8	Module coordinator Prof. Dr.-Ing. Vanessa Uhlig-Andrae, Prof. Dr.-Ing. Sven Battermann							
9	Other information -							

² Part-time version: 3rd semester

**Module Catalogue for "Integrated Technology and System Development" (M.Eng.)
at the Faculty of Minden Campus**

Strategic Corporate Development								Module ID SUE
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q level
1.4	125 h	5	1st sem.	Annual	Summer	1 sem.	Compulsory	MA
1	Course type		Contact time	Self-study	Teaching forms (learning methods)		Planned group size	Language
	Sem. lessons		2 SCH		Group work		40	
	Exercise		1 SCH	85 h	-		32	German
			approx. 40 h					
2	Learning outcomes/competences							
	Students understand basic theoretical approaches, methods, forms and concepts of strategic corporate development. They are able to plan, control and evaluate development processes. In addition, they know the importance of innovations for corporate development and are able to reflect on this from an ethical point of view. Application-related aspects are deepened by means of case studies.							
3	Contents							
	Fundamentals of strategic corporate development <ul style="list-style-type: none"> • Theoretical approaches • Methods and instruments • Concepts in the context of strategic corporate development • Forms & obstacles of implementation • Evaluation & reflection Innovation Management <ul style="list-style-type: none"> • Theoretical approaches • Innovation strategies, types and forms of innovation • Innovation processes • Personnel dimensions of innovation • Business model development Ethics <ul style="list-style-type: none"> • Ethics and society • Ethics and business (compliance, corporate social responsibility, etc.) • Ethics and people • Ethics and innovations • Technology assessment, risk assessment/management Current topics in organisational and management research Case studies							
4	Participation requirements							
	None							
5	Form of assessment							
	Written exam, project work or performance exam							
6	Condition for the award of credit points							
	Module examination pass							
7	Application of the module (in the following study programmes):							
	"Integrated Technology and System Development" (M.Eng., full-time and part-time version)							
8	Module coordinator							
	Prof. Dr. Michael Mohe							
9	Other information							
	-							

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 "Integrated Technology and System Development" (M.Eng.)
at the Faculty of Minden Campus**

Actuators and Sensors								Module ID AKT
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q level
1.5	125 h	5	1st sem.	Annual	Summer	1 sem.	Compulsory	MA
1	Course type		Contact time	Self-study	Teaching forms (learning methods)		Planned group size	Language
	Sem. lessons		2 SCH	85 h	Group work		40	
	Exercise		0.5 SCH		-		32	
	Practical/Seminar		0.5 SCH		Portfolio work		16	
			approx. 40 h					
2	Learning outcomes/competences							
	The students know the characteristics and operating principles of different types of actuators and drives for influencing technical systems in a targeted way. The students master the functionality of drives and controlled drive systems and can apply this to actuator chains with sensor enrichments, connections between bus interfaces and physical mechanisms/principles, intelligent sensors/actuators, assembly groups, high integration.							
3	Contents							
	Actuators and drive systems in technical systems Electric drives <ul style="list-style-type: none"> DC motors, rotary field machines, stepper motors Fluidic drives <ul style="list-style-type: none"> Hydraulic drives, pneumatic drives Piezo and other types of actuators Integrated sensors and sensor systems Embedding actuators/drive systems with sensors in complex drive tasks Modelling and control of drive systems using selected examples Application areas and trends (automation, robotics, IoT integration, ...)							
4	Participation requirements							
	Formally, none. Basic knowledge of electrical engineering, engineering mechanics and control engineering							
5	Form of assessment							
	Written exam or project work or combination exam							
6	Condition for the award of credit points							
	Module examination pass							
7	Application of the module (in the following study programmes):							
	"Integrated Technology and System Development" (M.Eng., full-time and part-time version)							
8	Module coordinator							
	Prof. Dr.-Ing. Volker Becker							
9	Other information							
	-							

**Module Catalogue for "Integrated Technology and System Development" (M.Eng.)
at the Faculty of Minden Campus**

Communications Technology								Module ID KMT
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q level
1.6	125 h	5	1st sem. ³	Annual	Summer	1 sem.	Compulsory	MA
1	Course type		Contact time	Self-study	Teaching forms (learning methods)		Planned group size	Language
	Sem. lessons		2 SCH	85 h	Group work		40	German
	Exercise		0.5 SCH		-		32	
	Practical/Seminar		0.5 SCH approx 40 h		Portfolio work		16	
2	Learning outcomes/competences The students know the basic principles of communication (interfaces, network topologies, communication processes) between sources and sinks in the control and automation area. Taking into account the requirements of a specific task, they are able to identify and design a suitable communication system, whether wired or wireless.							
3	Contents <ul style="list-style-type: none"> • Transition from point-to-point wiring to bus systems • Network topologies • ISO-OSI Reference Model • Telegram structure (start, routing and address, data, checksums) • Internet protocol (IP) and transmission control (TCP, UDP) • Overview of communication models • Standardised communication and fieldbuses • Special properties of wireless and IoT systems • Distributed systems • Real-world examples of communication systems 							
4	Participation requirements Formally, none. Basic knowledge of electrical engineering, control and automation technology							
5	Form of assessment Written exam or project work							
6	Condition for the award of credit points Module examination pass							
7	Application of the module (in the following study programmes): "Integrated Technology and System Development" (M.Eng., full-time and part-time version)							
8	Module coordinator Prof. Dr. rer. nat. Philip Wette							
9	Other information -							

³ Part-time version: 3rd semester

**Module Catalogue for "Integrated Technology and System Development" (M.Eng.)
at the Faculty of Minden Campus**

Control Systems								Module ID RES
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q level
2.1	125 h	5	2nd sem. ⁴	Annual	Winter	1 sem.	Compulsory elective, focus module	MA
1	Course type		Contact time	Self-study	Teaching forms (learning methods)		Planned group size	Language
	Sem. lessons		2 SCH		Group work		40	
	Exercise		1 SCH approx. 40 h	85 h	-		32	German
2	Learning outcomes/competences Students can analyse complex dynamic systems, describe their behaviour and design controllers for linearised systems. Coupled multivariable systems and higher order systems can be treated as well as time-discrete systems. They are able to apply methods for smoothing noisy data and to design estimators for variables that are not directly observable. They can assess the applicability of classical and more advanced methods. The students apply this content to solve real-world technical problems, such as machines, autonomous transport systems or the like.							
3	Contents <ul style="list-style-type: none"> • System description, state space analysis • Multi-variable systems, higher order systems • Time-discrete systems, filters and smoothing • Parameter estimation, observers • Optimal estimation methods, Kalman filters • State-control • Further developments • Project application 							
4	Participation requirements Formally, none. Contents of the ITSD modules "Applied Numerics and Higher Mathematics," "Modelling and Simulation" and "Systems Engineering." Knowledge of the terms and methods of continuous single-input single-output control engineering, matrix calculation and eigenvalues, basic knowledge in the description of stochastic quantities.							
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): "Integrated Technology and System Development" (M.Eng., full-time and part-time version)							
8	Module coordinator Prof. Dr.-Ing. Philipp Boysen, Prof. Dr.-Ing. Oliver Wetter							
9	Other information -							

⁴ Part-time version: 4th semester

**Module Catalogue for "Integrated Technology and System Development" (M.Eng.)
at the Faculty of Minden Campus**

Information Systems Engineering								Module ID EIS
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q level
2.2	125 h	5	2nd sem. ⁵	Annual	Winter	1 sem.	Compulsory elective, focus module	MA
1	Course type		Contact time	Self-study	Teaching forms (learning methods)		Planned group size	Language
	Sem. lessons Exercise		2 SCH 1 SCH approx. 40 h	85 h	Group work -		40 32	German
2	Learning outcomes/competences The students are able to check the feasibility of technical and business information systems in advance, to specify them and to put them out to tender. They can initiate, plan, and control corresponding IT projects and accompany their realisation, acceptance, and introduction. For this purpose, they can model and professionally document processes, functions, and data by systematically applying standard diagramming languages. This enables them to substantially participate in information system projects or life cycle phases in various roles and to act in a leading capacity.							
3	Contents <ul style="list-style-type: none"> • Types of information systems and projects • Software development processes to realise information system projects • Technical and IT concepts, requirements and functional specifications • Diagram modelling languages (UML) • Project-accompanying documentation • Feasibility study • IT requirements engineering, testability, test planning, and test execution • Types of subcontracting, tendering, contract design, and acceptance 							
4	Participation requirements Formally, none. Contents of the ITSD modules "Strategic Corporate Development" and "Systems Engineering." Basic knowledge of computer science, control & automation technology.							
5	Form of assessment Project work or performance examination							
6	Condition for the award of credit points Module examination pass							
7	Application of the module (in the following study programmes): "Integrated Technology and System Development" (M.Eng., full-time and part-time version)							
8	Module coordinator Prof. Dr. rer. nat. Philip Wette							
9	Other information -							

⁵ Part-time version: 4th semester

**Module Catalogue for "Integrated Technology and System Development" (M.Eng.)
at the Faculty of Minden Campus**

Engineering Project Controlling								Module ID EPC
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q level
2.3	125 h	5	2nd sem.	Annual	Winter	1 sem.	Compulsory elective	MA
1	Course type		Contact time	Self-study	Teaching forms (learning methods)		Planned group size	Language
	Sem. lessons		2 SCH		Self-study material		40	
	Exercise		1 SCH approx. 40 h	85 h	Exercise, incl. PC		32	German
2	Learning outcomes/competences Based on their existing competences of management accounting and project management, students have extended or deepened knowledge and skills to ensure the profitability of engineering projects. They are able to adequately apply selected methods to various profitability controlling tasks that occur in engineering and to prepare and interpret controlling results in a management-oriented manner.							
3	Contents "Engineering Project Controlling (EPC)": <ul style="list-style-type: none"> • Subject matter and economic-technical context • Functional-methodical basics, standards, methods/tools Application in <ul style="list-style-type: none"> • Product planning and development projects • Process optimisation projects • Processing project-oriented customer enquiries and orders • Other, e.g. marketing/sales projects 							
4	Participation requirements Formally, none. Fundamental knowledge of project management as well as cost accounting and investment budgeting as part of industrial management.							
5	Form of assessment Written exam or combination exam							
6	Condition for the award of credit points Module examination pass							
7	Application of the module (in the following study programmes): "Integrated Technology and System Development" (M.Eng., full-time and part-time version)							
8	Module coordinator Prof. Dr. rer. pol. Christoph von Uthmann							
9	Other information -							

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 "Integrated Technology and System Development" (M.Eng.)
at the Faculty of Minden Campus**

Operations Management								Module ID OPM
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q level
2.4	125 h	5	2nd sem.	Annual	Winter	1 sem.	Compulsory elective	MA
1	Course type		Contact time	Self-study	Teaching forms (learning methods)		Planned group size	Language
	Sem. lessons		2 SCH		Supervised self-study		40	German
Exercise		1 SCH	approx. 40 h	85 h	Exercise, incl. PC Simulation game		32	
2	Learning outcomes/competences Complementary to the module "Strategic Business Development," students have integrative knowledge and skills for planning and controlling as well as optimising the "operations" process, i.e. the order fulfilment process for the production of goods and services. They can transfer these to their business practice and are able to make decisions about the adequacy of individual qualitative and quantitative approaches (operations research) and thus carry out optimisations of (sub-)processes. The focus is on the quotation/order phase, manufacturing and logistics/SCM as well as on the handling of engineering services.							
3	Contents <ul style="list-style-type: none"> • Operations Management: Positioning, technical-business context, functional-methodical basics, standards, methods and tools • Operations process – sub-processes, standard systems and their interaction • Operations Strategy: Interface to strategic corporate development • Product development • Process development: Process design, order planning and control 							
4	Participation requirements Formally, none. Basic knowledge of industrial management or industry-related business administration, incl. internal accounting.							
5	Form of assessment Written exam or project work							
6	Condition for the award of credit points Module examination pass							
7	Application of the module (in the following study programmes): "Integrated Technology and System Development" (M.Eng., full-time and part-time version)							
8	Module coordinator Prof. Dr. rer. pol. Christoph von Uthmann							
9	Other information -							

**Module Catalogue for "Integrated Technology and System Development" (M.Eng.)
at the Faculty of Minden Campus**

Flexible Automation for Small Batch Sizes								Module ID FAL
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q level
2.5	125 h	5	2nd sem. ⁶	Annual	Winter	1 sem.	Compulsory elective, focus module	MA
1	Course type		Contact time	Self-study	Teaching forms (learning methods)		Planned group size	Language
	Sem. lessons Exercise		2 SCH 1 SCH approx. 40 h	85 h	Supervised self-study Exercise		40 32	German
2	Learning outcomes/competences The module teaches theoretical basics for the development and design of a highly individualised industrial mass production system. The students master the organisational framework conditions and their representation and implementation in the form of a technological concept. This enables them to understand the technology behind a flexible automation solution for "batch size 1" production, design it, critically assess it in the specific context, and apply it successfully on an industrial scale.							
3	Contents <ul style="list-style-type: none"> • Mass customisation/highly individualised mass production • Organisational integration of "batch size 1" and mass series production • Technological interlinking by means of handling and conveyor technology • Use of generative manufacturing technologies metal and plastic • Flexibility vs. automation – Elimination of set-up times • Quality management at "batch size 1" • Identification & statistical analysis of suitable production data • Real-time monitoring and traceability of materials, components, products • Case studies for successful implementation 							
4	Participation requirements Formally, none. Contents of the ITSD modules "Systems Engineering," "Actuators and Sensors" and "Communications Technology." Basic knowledge of production engineering.							
5	Form of assessment Written exam or combination exam							
6	Condition for the award of credit points Module examination pass							
7	Application of the module (in the following study programmes): "Integrated Technology and System Development" (M.Eng., full-time and part-time version)							
8	Module coordinator Prof. Dr.-Ing. Daniel Paßmann							
9	Other information -							

⁶ Part-time version: 4th semester

**Module Catalogue for "Integrated Technology and System Development" (M.Eng.)
at the Faculty of Minden Campus**

Energy and Resource Efficiency								Module ID ERE
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q level
2.6	125 h	5	2nd sem.	Annual	Winter	1 sem.	Compulsory elective	MA
1	Course type		Contact time	Self-study	Teaching forms (learning methods)		Planned group size	Language
	Sem. lessons		2 SCH		Group work		40	German
	Exercise		1 SCH	85 h	-		32	
2	Learning outcomes/competences Students master basic methods for evaluating the energy and resource efficiency of plants, processes and buildings. They know basic organisational and technical methods for energy procurement, consumption recording and evaluation. They are able to assess and select suitable materials and equipment for technical applications with regard to their efficiency. They can build simple models for resource and energy-related questions and processes and carry out corresponding simple balancing simulations. The students know the process of resource and energy efficiency projects, are familiar with the possible applications of renewable energy systems and can evaluate the possible applications of energy storage systems in practice. Students are familiar with the current legal regulations and standards.							
3	Contents <ul style="list-style-type: none"> • Sustainability, CO₂ balances, climate protection • Efficient use of resources • Energy recovery and storage • Modelling and balancing of material and energy flows • Implementation of resource efficiency projects and energy audits • Energy monitoring and management • Legal regulations and standards, certificates • Sustainability as a quality feature of a product • Sustainability in factory planning and operation 							
4	Participation requirements None							
5	Form of assessment Written exam or project work							
6	Condition for the award of credit points Module examination pass							
7	Application of the module (in the following study programmes): "Integrated Technology and System Development" (M.Eng., full-time and part-time version)							
8	Module coordinator Prof. Dr. Frank Hamelmann							
9	Other information -							

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 "Integrated Technology and System Development" (M.Eng.)
at the Faculty of Minden Campus**

Applied Technology Project								Module ID ATP
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q level
2.7	125 h	5	2nd sem.	Annual	Winter	1 sem.	Compulsory elective	MA
1	Course type		Contact time	Self-study	Teaching forms (learning methods)		Planned group size	Language
	Project			125 h	Project work		16	German
2	Learning outcomes/competences Students are able to grasp concrete interdisciplinary technological problems in research and practice, structure them into meaningful sub-projects and work packages, use teamwork and apply their knowledge and skills already acquired and yet to be learned, in a targeted manner.							
3	Contents The topics to be worked on are related to engineering or/and economics and are oriented towards the module contents of the curriculum. The topic is agreed individually between the student(s) and the university. The practical implementation or the use of technologies in the labs can be deepened.							
4	Participation requirements At least two passed ITSD modules or individual proof of skills/successful participation in a similar project. Basic knowledge of project management.							
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): "Integrated Technology and System Development" (M.Eng., full-time and part-time version)							
8	Module coordinator Prof. Dr.-Ing. Oliver Wetter (ITSD programme director)							
9	Other information -							

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 "Integrated Technology and System Development" (M.Eng.)
at the Faculty of Minden Campus**

Project Work								Module ID PRA
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q level
2.8	125 h	5	2nd sem.	Annual	Winter	1 sem.	Compulsory	MA
1	Type of course		Contact time	Self-study	Teaching forms (learning methods)		Planned group size	Language
	Project work			125 h	University/individual/ company project/ study work		typically 1, possibly 2	German
2	Learning outcomes/competences With the project work, the students should demonstrate that they are capable of independently working on a task from the respective subject area, both in its subject-specific details and in the interdisciplinary contexts, according to scientific methods and within a given period of time.							
3	Contents During or outside of the lecture period, individual problems from research or practice (also possible on site in a company) are worked on. The topics to be worked on must be related to engineering and/or business administration and be oriented towards the module contents of the curriculum. Lecturers or students may propose topics. The topic will be approved by the lecturers. The project work is to be documented in a written paper.							
4	Participation requirements At least 4 passed ITSD modules.							
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): "Integrated Technology and System Development" (M.Eng., full-time and part-time version)							
8	Module coordinator Prof. Dr.-Ing. Oliver Wetter (ITSD programme director)							
9	Other information -							

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 "Integrated Technology and System Development" (M.Eng.)
at the Faculty of Minden Campus**

Master Thesis								Module ID MAT
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q level
3.1	600 h	24	3rd sem.	Annual	Summer	1 sem.	Compulsory	MA
1	Course type		Contact time	Self-study	Teaching forms (learning methods)		Planned group size	Language
	Master thesis			600 h	University/individual/ company master thesis		typ. 1	German
2	Learning outcomes/competences With the master thesis, the students should demonstrate that they are capable of independently working on a task from the respective subject area, both in its subject-specific details and in the interdisciplinary contexts, according to scientific methods and within a given period of time.							
3	Contents The master thesis is a written paper and describes an investigation of an engineering and/or business problem and a detailed description and explanation of its solution. Lecturers or students may propose topics. The topic will be approved by the lecturers. The master thesis can be done in a subject-specific way or also through an empirical investigation or through conceptual or creative projects, or through an evaluation of available sources. A combination of these is possible. The scope of the master thesis is regulated in the Study Programme Examination Regulations (SPO) Section 15 (1).							
4	Participation requirements According to SPO Section 15 (3)							
5	Form of assessment Master thesis							
6	Condition for the award of credit points Passed master thesis							
7	Application of the module (in the following study programmes): "Integrated Technology and System Development" (M.Eng., full-time and part-time version)							
8	Module coordinator Prof. Dr.-Ing. Oliver Wetter (ITSD programme director)							
9	Other information -							

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 "Integrated Technology and System Development" (M.Eng.)
at the Faculty of Minden Campus**

Colloquium								Module ID MAK
No.	Workload	Credit points	Study semester	Frequency	Sem.	Duration	Type	Q level
3.2	150	6	3rd sem.	Annual	Summer	1 sem.	Compulsory	MA
1	Course type		Contact time	Self-study	Teaching forms (learning methods)		Planned group size	Language
	Colloquium			150	University/individual/ company master thesis		typically 1	German
2	Learning outcomes/competences The colloquium complements the master thesis. It serves to determine whether the candidate is capable of orally presenting and independently justifying the results and benefits of the master thesis, its subject-specific foundations, the procedure, the interdisciplinary connections and the extra-subject references, as well as assessing its significance for practice. In addition, it is examined whether the candidate is able to discuss the above-mentioned points in a critical and differentiated manner.							
3	Contents Oral scientific disputation or defence of the written master thesis. The colloquium is to be assessed as an independent examination.							
4	Participation requirements Passed master thesis.							
5	Form of assessment Oral examination							
6	Condition for the award of credit points Module examination pass							
7	Application of the module (in the following study programmes): "Integrated Technology and System Development" (M.Eng., full-time and part-time version)							
8	Module coordinator Prof. Dr.-Ing. Oliver Wetter (ITSD programme director)							
9	Other information -							