Appendix B: Module catalogue

for the study programme Digital Logistics (work-integrated) B.Eng.

Bachelor Thesis					**BA**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3133	360 h	12	7th sem.	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	0	SCH	0	h	360	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h

2	Learning outcomes/competences:	
	After successfully completing the bachelor thesis, students are able to independently work on and appropriately present a practice-oriented task from their special subject area, both in the subject-specific details and in the interdisciplinary contexts, using scientific methods within a specified period of time.	
3	Contents:	
	The bachelor thesis is an independent scientific work from the subject area of the respective study programme with a description and explanation of its solution. It can be derived from current research projects at the university or from operational problems with an engineering character. It can also be determined by an empirical investigation or by conceptual or design tasks or by an evaluation of existing sources. The different forms can be combined.	
4	Forms of teaching:	
	Written composition with faculty tutoring	
5	Participation requirements:	
	Formal:	-
	Content:	Coordinated topic from the student's special subject area
6	Forms of assessment:	
7	Prerequisite for the award of credit points:	
8	Application of the module (in the following study programmes)	
	Digital Logistics (work-integrated) B.Eng., Digital Technologies (work-integrated) B.Eng., Mechatronics/Automation (work-integrated) B.Eng., Product-Service Engineering (work-integrated) B.Eng. and Industrial Engineering (work-integrated) B.Eng.	
9	Importance of the grade for the final grade:	
	according to BRPO	
10	Module coordinator:	
	N. N.	
11	Other information:	
	-	
12	Language:	
	German	

Procurement, Production and Logistics					**BPL**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3333	150 h	5	2nd sem.	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	2	SCH	16	h	62	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students can explain the functions "procurement", "production" and "logistics" in a differentiated way, understand their interrelationships as well as the weaknesses of these functions. With the help of the selected contents and methods, they can recognise and properly assess real economic tasks and problem areas in particular and independently develop approaches to solutions.
Students will be able to carry out a sound supplier evaluation and selection and, based on production planning, investigate suitable sourcing concepts and decide which scientific method is appropriate for sourcing and demand calculation. They can systematically analyse procurement markets to increase their transparency and recognise developments relevant to procurement.
Students learn about basic production systems and can evaluate their applicability for specific industries. They can independently calculate bottleneck-oriented production programmes and transfer the results to operational production planning and control.
In the field of logistics, students understand practice-relevant objects from intralogistics, transport logistics and supply chain management. They can also analyse complex logistical systems.

3 Contents:

- Procurement market research (objects and processes)
- Procurement planning (principles, routes, dates and quantities),
- Procurement execution (supplier selection, request for proposal, testing, selection and ordering),
- Procurement controlling (cost and process control)
- Demand assessment (programme-oriented, consumption-oriented and heuristic demand assessment)
- Inventory planning (inventory types, strategies, management and monitoring)
- Planning of logistics and production processes
- Systematisation of production factors
- Planning and management of production
- Logistics planning
- Logistics systems (intralogistics, transport logistics and storage systems)
- Distribution logistics

4	Forms of teaching: Learning materials for self-study, classroom events in the form of exercises	
5	Participation requirements:	
	Formal:	
	Content:	
6	Forms of assessment: Term paper or written examination	
7	Prerequisite for the award of credit points: Module examination pass	
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng. and Industrial Engineering and Management (work-integrated) B.Eng.	
9	Importance of the grade for the final grade: according to BRPO	
10	Module coordinator: Prof. Dr. rer. oec. Pascal Reusch	
11	Other information:	
12	Language: German	

Business Intelligence					**BUI**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3216	150 h	5	5th sem.	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	64	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	1	SCH	8	h	46	h
	Practical or seminar	15 students	1	SCH	16	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students:

- are familiar with the central methods and requirements of controlling operational processes as well as the essential requirements and action strategies associated with the management of business processes.
  have the holistic view of the problem that is necessary in this context and are able to understand the many interactions in the different areas of business administration in a way that is appropriate to the problem.

3 Contents:

- Basics of logistics controlling (strategic, tactical, operational)
- Derivation of key performance indicators for the quality of operational processes
- Indicator systems in practice
- Recording and reporting of logistics services, revenues and calculation of logistics costs
- Data sources in the company (e.g. ERP) and evaluation tools (e.g. business warehouse)
- Extract, Transform, Load (ETL) processes
- Reporting and dashboard applications
- Data discovery and business intelligence (e.g. with SAP BO)
- Project-related logistics controlling
- Integrating approaches for the design of logistics controlling: Supply Chain Operations Reference Model, Balanced Scorecard

4 Forms of teaching:

Learning units for self-study, classroom events in the form of exercises and practicals

5 Participation requirements:

Formal:	-
Content:	-

6 Forms of assessment:

Term paper, written examination, project work or oral examination

7 Prerequisite for the award of credit points:

Module examination pass and course assessment

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

Digital Logistics (work-integrated) B.Eng. and Digital Technologies (work-integrated) B.Eng.

9 Importance of the grade for the final grade:

according to BRPO

10	Module coordinator: Prof. Dr. rer. oec. Pascal Reusch
11	Other information: -
12	Language: German

Cyberphysical Logistics Systems					**CPL**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3203	150 h	5	6th sem.	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	1	SCH	8	h	54	h
	Practical or seminar	15 students	1	SCH	16	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students:

- know the interrelationships of complex technical systems for the provision of logistics services.
- can combine the detailed knowledge of hardware and software components acquired in previously completed modules and design complex overall systems for the flow of information and materials.

3 Contents:

- Functions and performance classes of cyber-physical systems (CPS) or intelligent objects
- System architectures from embedded hardware and software to communication with web server
- Application-specific requirements and corresponding technical solutions and assignment of requirements to individual system components
- Potential and characterisation of a cyber-physical logistics system based on a case study
- Cooperation of backend systems such as PPS, ERP or disposition systems with production-logistic resources, e.g. CPS workpiece carriers, CPS machines, sensors, RFID readers, mobile devices and human interaction in cyber-physical environments
- Networking and communication of the systems involved
- Self-control of IoT devices in the logistics process (decision-making and execution)
- Networking across process and operational boundaries
- Design of technology roadmaps and pre-development strategy

4 Forms of teaching:

Learning units for self-study, classroom events in the form of exercises and practicals

5 Participation requirements:

Formal:	-
Content:	-

6 Forms of assessment:

Term paper, written examination, project work or oral examination

7 Prerequisite for the award of credit points:

Module examination pass and course assessment

8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr. rer. oec. Pascal Reusch
11	Other information: -
12	Language: German

Data Analytics					**DML**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3204	150 h	5	5th sem.	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	1	SCH	8	h	54	h
	Practical or seminar	15 students	1	SCH	16	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students:

- know and master the basic concepts and methods of data analysis and statistical learning.
- are able to access internal and external data sources.
- can understand the procedures for classification, modelling and prediction on the basis of large data sets and apply them to examples.
- master the basic handling of NoSQL databases
- can describe numerical data by statistical parameters and visualise them in a common way.
- are able to analyse large amounts of data in a targeted as well as exploratory manner, whereby a diverse range of methods from the field of statistics and machine learning is available to them.
- are able to explain the basic procedure for analysing very large data sets on Hadoop clusters.

3 Contents:

- Introduction and general overview ("Small Data" vs. "Big Data")
- NoSQL database systems
- Tapping data sources
- Basics of programming with Python (which is used in the exercises for practical data analysis)
- Basics of descriptive statistics
- Data visualisation
- Correlation analysis and regression
- Time series analysis
- Basics of machine learning
- Pre-processing of data (e.g. dimension reduction)
- Unsupervised learning (e.g. clustering)
- Supervised learning I: Classification (e.g. via support vector machines)
- Supervised learning II: learning any input-output correlations (e.g. with artificial neural networks)
- Entry into large-scale data analysis with Hadoop

4 Forms of teaching:

Learning units for self-study, classroom events in the form of exercises and practicals

5	Participation requirements:	
	Formal:	-
	Content:	-
6	Forms of assessment: Term paper, written examination, project work or oral examination	
7	Prerequisite for the award of credit points: Module examination pass and course assessment	
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng. and Product-Service Engineering (work-integrated) B.Eng.	
9	Importance of the grade for the final grade: according to BRPO	
10	Module coordinator: N. N.	
11	Other information: -	
12	Language: German	

Databases					**DUD**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3019	150 h	5	2nd sem.	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	68	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	1	SCH	8	h	34	h
	Practical or seminar	15 students	1	SCH	16	h	0	h
	Supervised self-study	60 students	1.5	SCH	24	h	0	h

2 Learning outcomes/competences:

Students:

- acquire basic knowledge about the architecture, functioning and use of database systems and know the principles of the organisation of a database system
- acquire knowledge about modern (object-oriented) and classical data modelling including the meaning of normalisation rules
- are able to carry out a complete relational database design, starting from a requirements specification
- are proficient in standard SQL to perform simple and complex queries, as well as change operations.
- gain the ability to evaluate and select database technologies
- can plan and carry out database projects and plan and implement a modern database application

3 Contents:

- Introduction to database concepts and database technologies (data modelling, normalisation theory, database language SQL)
- Basics of database systems (database design, database definitions, database queries)
- Data Manipulation Language (DML, German "Datenverarbeitungssprache"), Data Definition Language (DDL, German “Datenbeschreibungssprache"), Data Control Language (DCL, German “Datenaufsichtsprache")
- Efficiency of SQL queries, index structures
- Authorisation concepts

4 Forms of teaching:

Learning units for self-study, classroom events in the form of exercises and practicals

5 Participation requirements:

Formal:	-
Content:	-

6 Forms of assessment:

Term paper, written examination, combined examination, project work, oral examination or examination accompanying the course

7 Prerequisite for the award of credit points:

Module examination pass and course assessment

8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng., Digital Technologies (work-integrated B.Eng., Product-Service Engineering (work-integrated) B.Eng. and Industrial Engineering (work-integrated) B.Eng.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Dr. rer. nat. Sabrina Proß
11	Other information: -
12	Language: German

Digital Service Engineering and Services Marketing					**DSE**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3205	150 h	5	4th sem.	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	2	SCH	16	h	62	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students will be able to answer basic questions of service modelling and service development and develop creative concepts with the help of corresponding process models and basic methods.

Students will be able to apply the theoretical principles of Resource Based View (RBV), Service Dominant Logic (SDL) as well as Service Engineering and New Service Development in a practice-oriented manner.

Students are able to use the most important instruments of branding/sales in a socially and ethically responsible manner and to identify and highlight special features in the marketing of services, e.g. logistics marketing.

3 Contents:

- Process models in service engineering
- Relationship between service engineering and quality
- Customer orientation in service engineering
- Identification of innovative value-added services (VAS) with creativity techniques
- Acquisition of development partners with the help of the "lead user" approach (von Hippel)
- Description of value-added services with the help of the "service blueprinting" approach
- Introduction to the theoretical basis for the development of VAS in logistics and supply chain management (RBV and SDL)
- Market research and information
- Marketing strategy (product and programme policy, contracting policy, distribution policy, communication policy, marketing mix including social, intercultural and ethical aspects)
- Aspects of social responsibility

4 Forms of teaching:

Learning units for self-study, classroom sessions in the form of exercises

5 Participation requirements:

Formal:	-
Content:	-

6 Forms of assessment:

Term paper, written examination, project work or oral examination

7	Prerequisite for the award of credit points: Module examination pass
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: N. N.
11	Other information: -
12	Language: German

Digital Factory Planning and Simulation					**WSS**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3228	150 h	5	6th sem.	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	1	SCH	8	h	54	h
	Practical or seminar	15 students	1	SCH	16	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students:

- gain knowledge in the modelling and simulation of production and logistics systems and can describe them.
- gain practical experience in carrying out and evaluating simulations.
- are enabled to abstract the learned contents and to use them to solve company-specific problems by learning and practising the general methodical procedure for the preparation of simulation studies.
- can analyse, design and optimise technical information and material flow systems in production with the help of simulation studies.
- have in-depth knowledge of optimising warehouse and transport handling systems.
- can derive and verify optimisation measures using IT-supported material flow simulation.

3 Contents:

- Methods of factory and work planning and the use and influence of stochastics in simulation
- Method-based procedure of a simulation based on the procedure model from VDI Guideline 3633 Sheet 1
- Testing and estimation methods, methods of data collection and preparation, modelling, verification and validation, and evaluation of results
- Integration of simulation into the overall planning process (digital factory)
- Planning and calculation of simulation studies as well as their organisational embedding in planning projects
- Typical mistakes as well as basic rules and guiding principles when using simulation

Development, evaluation and optimisation of simulation models for the mapping of logistical processes within production, using event-oriented standard simulation software

- Exercises on the practical application of a simulation tool

4 Forms of teaching:

Learning units for self-study, classroom events in the form of exercises and practicals

5 Participation requirements:

	Formal:	-
	Content:	-
6	Forms of assessment: Term paper, written examination, project work or oral examination	
7	Prerequisite for the award of credit points: Module examination pass and course assessment	
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng.	
9	Importance of the grade for the final grade: according to BRPO	
10	Module coordinator: Prof. Dr. rer. oec. Pascal Reusch	
11	Other information: -	
12	Language: German	

Introduction to the Professional Field					**EBF**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3312	150 h	5	1st sem.	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	1	SCH	0	h	35	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	1	SCH	8	h	46	h
	Practical or seminar	15 students	2	SCH	32	h	13	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2	Learning outcomes/competences: Students have insights into the historical development and training structures of logistics. They are familiar with the job description of logisticians. They have an understanding of the economic framework conditions of German companies at home and abroad and gain knowledge of important corporate functions. In addition, students gain insights into the professional and personal requirements for logisticians and can then compare these with their own competences.
3	Contents: 1. Job description 2. Basic introduction to economic thinking 3. Economic framework conditions for companies 4. Important corporate functions for logisticians 5. Industries for logisticians 6. Strategic management analysis of industries and markets 7. Personal development prospects for logisticians 8. Success factors in study and practice Excursions to selected companies in the region with the focus on getting to know and understand company processes and to get to know the fields of activity of logisticians.
4	Forms of teaching: Learning materials for self-study, classroom events in the form of exercises
5	Participation requirements: Formal: None Content: None
6	Forms of assessment: Term paper, written examination, project work or oral examination
7	Prerequisite for the award of credit points: Module examination pass
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng.
9	Importance of the grade for the final grade: according to BRPO

10	Module coordinator: Prof. Dr. rer. oec. Pascal Reusch
11	Other information: Supplementary literature will be announced at the beginning of the course.
12	Language: German

Business Process Modelling and IT Systems					**GPM**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3210	150 h	5	3rd sem.	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	64	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	1	SCH	8	h	46	h
	Practical or seminar	15 students	1	SCH	16	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students:

- structure and evaluate the specific mode of operation of integrated standard business software (ERP software).
- design and model processes in the company with the help of modern software architectures (e.g. SOA and BPMS).
- analyse processes and requirements of companies for the use, operation and maintenance of integrated software systems (adaptation options, interfaces to other IT systems, etc.)

3 Contents:

- Process modelling and data modelling using modelling tools (e.g. ARIS)
- Evaluation of concepts of integrated data processing
- Drafting reference models for designing the data, process and function models (e.g. Aachen PPS model)
- Analysis of ERP systems (architecture, structuring, database models, HANA)
- Overview of the core modules and applications of ERP systems in the process: e.g. order to cash process)

Application-oriented use cases are used to demonstrate how business processes can be implemented consistently and across software modules.

4 Forms of teaching:

Learning units for self-study, classroom events in the form of exercises and practicals

5 Participation requirements:

Formal:	-
Content:	-

6 Forms of assessment:

Term paper, written examination, project work or oral examination

7 Prerequisite for the award of credit points:

Module examination pass and course assessment

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

Digital Logistics (work-integrated) B.Eng., Digital Technologies (work-integrated) B.Eng. and Industrial Engineering and Management (work-integrated) B.Eng.

9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Jörg Nottmeyer
11	Other information: -
12	Language: German

Basics of Programming					**GDP**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3104	150 h	5	1st sem.	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	64	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	1	SCH	8	h	46	h
	Practical or seminar	15 students	1	SCH	16	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students:

- master and use the terminology of computer science.
- gain basic knowledge of the functioning of accounting systems and can apply it.
- gain the ability to structure simple information technology problems and to convert them into solution modules.
- are enabled to solve simple problems independently in a programming language.
- gain basic knowledge in the application and implementation of simple algorithms.
- acquire basic competences for the analysis of problems and structured transfer into simple procedural and modularised system solutions.

3 Contents:

- Basic concepts
- Basic structure of computer systems and peripheral devices, functioning of computer systems
- Basic representation of data in computer systems, Boolean algebra
- Use of development environments
- Introduction to a programming language
- General structure of programmes
- Variable types, structures
- Functions for input and output
- Control structures
- Functions
- Vectors and pointers
- Recursion / Iteration, modular programming
- Algorithms and data structures: Sorting algorithms, Q-Sort, Bubbel-Sort, etc.

4 Forms of teaching:

Learning units for self-study, classroom events in the form of exercises and practicals

5 Participation requirements:

Formal:	-
Content:	-

6 Forms of assessment:

Term paper, written examination, project work or oral examination

7	Prerequisite for the award of credit points: Module examination pass
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng. and Industrial Engineering and Management (work-integrated) B.Eng.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr. rer. oec. Pascal Reusch
11	Other information: -
12	Language: German

Fundamentals of Economic Sciences					**GWW**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
6121	150 h	5	1st sem.	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	2	SCH	16	h	62	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2	Learning outcomes/competences: The students can classify and present the interplay of market and price and their significance for economic systems. They have basic knowledge of essential issues of business administration and can apply this to business practice. They can recognise and assess the overall interrelationships between goods, services and finance. In this way, they understand the fundamental interrelationships of the individual sub-areas of business administration. Thus, students are able to think in business terms. Students have the basic understanding to attend the modules "Accounting, Investment, Financing and Taxes", "Human Resources and Organisation", "Business Process Modelling and IT Systems", "Procurement, Production and Logistics", "Digital Service Engineering and Services Marketing", " Accounting and Financing", "Cost and Investment Accounting ", "Planning and Controlling", "Marketing and Sales", "Business Law", "Lean Production"
3	Contents: • Corporate functions • Economic fundamentals of the market and competition • Importance of the enterprise in the social market economy • Companies as the subject of business administration • Corporate goals • Legal forms of companies/combinations of companies • Marketing basics
4	Forms of teaching: Learning materials for self-study, classroom sessions in the form of exercises
5	Participation requirements: Formal: Content:
6	Forms of assessment: Term paper, written examination, project work or oral examination
7	Prerequisite for the award of credit points: Module examination pass
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng. and Industrial Engineering and Management (work-integrated) B.Eng.

9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Economist Ulrike Franke
11	Other information:
12	Language: German

Identification Systems					**IDS**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3337	150 h	5	5th sem.	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	1	SCH	8	h	54	h
	Practical or seminar	15 students	1	SCH	16	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students:

- design technical concepts from identification technology for the efficient and effective operation of logistics systems.
- assess the requirements and latest techniques of identification systems for optimal use in logistics.
- plan and analyse the use cases in logistics in a professional manner on the basis of standards, regulations and technical feasibility.

3 Contents:

Basic techniques of data input, data transport, data traffic for identification, e.g. optical data entry (barcode, magnetic, RFiD).

Application-specific integration and modelling of IT conventions for data exchange (e.g. EAN code, EAN 128, EDI etc.), mathematical codification of barcode systematics

Evaluation of possible applications and development of application scenarios for the identification of transport, goods and load carriers (e.g. parameterisation of QR barcode printers, conceptual design of scanner applications in the outgoing goods area)

Tracking and tracing of data in logistics systems (data modelling and standardisation of tracking information along the logistics chain, traceability, data protection, IT security)

4 Forms of teaching:

Learning units for self-study, classroom events in the form of exercises and practicals

5 Participation requirements:

Formal:	
Content:	

6 Forms of assessment:

Term paper, written examination, project work or oral examination

7 Prerequisite for the award of credit points:

Module examination pass

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

Digital Logistics (work-integrated) B.Eng.

9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Jörg Nottmeyer
11	Other information:
12	Language: German

Industrial Engineering					**IEN**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3240	150 h	5	5th sem.	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	2	SCH	16	h	62	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

The students are able to apply the technical and methodical basics of work studies as well as industrial engineering.
They can describe the characteristic forms of operational production-related organisation (structure, process, work organisation) in a differentiated manner, both institutionally and functionally/process-related. The focus is on work planning, production planning and control, maintenance and industrial logistics.
The students are able to describe, classify and analyse the current operational organisation of a production company qualitatively and quantitatively on the basis of characteristic documents and surveys.
Furthermore, the students know the basics for the introduction and optimisation of operational group work for both conventional and globally/internationally networked companies.
Students learn the essential methods for transforming classically function-oriented structured companies into flexible, value-added structures.

3 Contents:

- Design, planning and optimisation of service provision processes
- Target states and standard of processes
- Work plan preparation
- Time management
- Remuneration
- Resource planning
- Method planning
- REFA / MTM
- Productivity development under consideration of human aspects
- Design of the value stream from product planning via production planning/process planning to production optimisation

4 Forms of teaching:

Learning materials for self-study, classroom events in the form of exercises

5 Participation requirements:

Formal:	
Content:	

6	Forms of assessment: Term paper or written examination
7	Prerequisite for the award of credit points: Module examination pass
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr. rer. oec. Pascal Reusch
11	Other information:
12	Language: German

Innovation and Project Management					**IPM**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3211	150 h	5	3rd/4th/5th/7th sem.	each semester	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	2	SCH	16	h	62	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students:

- are prepared to lead product development and innovation projects and teams to success in terms of holistic and strategically oriented project management (also including agile methods).
- understand the basics of project management and can use the elementary technical vocabulary.
- can explain the most important instruments of project management.
- are able to lead/manage a project in a given process-organisational project organisation.
- are able to develop and specifically use control options for different project phases (controlling of the degree of completion, cost controlling).
- can explain the specifics of team building and project management.
- can carry out the moderation of team meetings projects.
- know instruments of IT-supported project management.
- can explain the importance of corporate goals and are able to distinguish between different leadership cultures.
- can name essential aspects of industrial property protection.

3 Contents:

- Basics of project management (terms/methods/instruments)
- Project phase models and planning systems (project preparation, project planning, project implementation, project completion)
- Agile project management
- Forms of project organisation
- Innovation and change management, self-management
- Project planning (project structure plan/cost plan/resource plan/time plan)
- Project documentation/project controlling
- Risk management
- Special features of use of methods in innovation projects

	(Strategic preparation / initiation, planning, monitoring and control of innovation projects) • Leading project and innovation teams (social structures, special communication situations in projects, real and virtual project work, problem analysis and concepts for action) • Stakeholder management (factors influencing the successful management of projects) • Methods of idea generation (creativity techniques etc.) • Trainings and workshops on selected technical examples • Basic aspects of industrial property protection
4	Forms of teaching: Learning units for self-study, classroom sessions in the form of exercises
5	Participation requirements:
	Formal: -
	Content: -
6	Forms of assessment: Term paper, written examination, project work or oral examination
7	Prerequisite for the award of credit points: Module examination pass
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng., Digital Technologies (work-integrated) B.Eng., Mechatronics/Automation (work-integrated) B.Eng., Product-Service Engineering (work-integrated) B.Eng. and Industrial Engineering and Management (work-integrated) B.Eng.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Michael Fahrig
11	Other information: -
12	Language: German

Intercultural Communication					**IKP**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3212	150 h	5	6th sem.	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	1	SCH	0	h	28	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	3	SCH	24	h	74	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	1.5	SCH	24	h	0	h

2	Learning outcomes/competences:	
	The students are able to classify the most important terms, theories and models of intercultural management, have developed a deeper understanding of their own and foreign cultural imprints and understand how culture influences the perception individually and collectively and thus also shapes the perception processes in the world of work. Students can take intercultural aspects into account in communicative processes in working life.	
3	Contents:	
	• Multiculturalism: Phenomenon of a globalised economy • Gender and diversity aspects • Cultural dimensions • Corporate culture • Typical application situations and concrete national cultures	
4	Forms of teaching:	
	Learning units for self-study, classroom sessions in the form of exercises	
5	Participation requirements:	
	Formal:	-
	Content:	-
6	Forms of assessment:	
	Term paper, written examination, project work or oral examination	
7	Prerequisite for the award of credit points:	
	Module examination pass	
8	Application of the module (in the following study programmes)	
	Digital Logistics (work-integrated) B.Eng.	
9	Importance of the grade for the final grade:	
	according to BRPO	
10	Module coordinator:	
	Economist Ulrike Franke	
11	Other information:	
	-	
12	Language:	
	German	

Colloquium					**KOL**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3134	90 h	3	7th sem.	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	0	SCH	0	h	90	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h

2	Learning outcomes/competences:	
	In the colloquium, students demonstrate that they are able to present the results of the bachelor thesis, its subject-specific foundations, its interdisciplinary connections and its extra-subject references orally and justify them independently. Students can critically question the results of their work and are able to assess their significance for practice.	
3	Contents:	
	The colloquium complements the bachelor thesis and is to be assessed independently. Content of the thesis according to the topic Disputation on the procedure in the preparation of the thesis and the issues that arose in the context of the thesis.	
4	Forms of teaching:	
	Oral examination	
5	Participation requirements:	
	Formal:	All modules of the study programme must be successfully completed. The bachelor thesis must be successfully completed.
	Content:	Treatment of the bachelor thesis
6	Forms of assessment:	
	Oral examination	
7	Prerequisite for the award of credit points:	
8	Application of the module (in the following study programmes)	
	Digital Logistics (work-integrated) B.Eng., Digital Technologies (work-integrated) B.Eng., Mechatronics /Automation (work-integrated) B.Eng., Product-Service Engineering (work-integrated) B.Eng. and Industrial Engineering (work-integrated) B.Eng.	
9	Importance of the grade for the final grade:	
	according to BRPO	
10	Module coordinator:	
	N. N.	
11	Other information:	
	-	
12	Language:	
	German	

Lean Production					**LPM**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3215	150 h	5	4th or 6th semester	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	2	SCH	16	h	62	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students:

- can independently apply selected lean methods from the areas of production, administration and development.
- can document production processes in a structured manner and identify potential for improvement in the process flow as well as derive measures for optimisation.
  can implement the methods of "leadership on the ground" and establish constructive cooperation in a team of production workers.

3 Contents:

- Vision of a Lean Company
- Problem solving techniques and strategies
- Effects of lean management methods
- Value stream mapping / value stream design (theory and concrete examples)
- Production systems using the example of the Toyota Production System
- Muda (types of waste and their avoidance)
- Jidoka Principle (Quality in Process Andon, Poka Yoke)
- Just-in-time principle (Kanban, levelling)
- One-piece production using the flow principle (one-piece flow)
- Set-up time reduction (SMED "Single Minute Exchange of Die")
- Employee participation and responsibility
- Process standardisation and improvement work (Kaizen)
- Planning, steering and communicating successful change processes

4 Forms of teaching:

Learning units for self-study, classroom sessions in the form of exercises

5 Participation requirements:

Formal:	-
Content:	-

6 Forms of assessment:

Term paper, written examination, project work or oral examination

7 Prerequisite for the award of credit points:

Module examination pass

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

Digital Logistics (work-integrated) B.Eng. and Industrial Engineering and Management (work-integrated) B.Eng.

9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr. rer. oec. Pascal Reusch
11	Other information: -
12	Language: German

Logistics IT Systems					**LES**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3217	150 h	5	4th sem.	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	64	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	1	SCH	8	h	46	h
	Practical or seminar	15 students	1	SCH	16	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students:

- evaluate the requirements and processes for the introduction and operation of logistics IT systems in a company context (e.g. setting up a new warehouse management system, selecting transport-optimised shipping software, etc.).

- analyse and design logistical and digital business processes with regard to their requirements for information technology implementation model the requirements for the IT-relevant sub-processes (single-stage packaging) and outline their prerequisites and boundary conditions for integration into the higher-level IT systems (e.g. definition and validation of master data, modulation of interfaces, etc.).

3 Contents:

Requirements on IT due to different tasks from different logistics areas (distributed, networked, mobile, transparent, integrated ...). IT interfaces (application of different standards, e.g. EDIFACT, VDA)

Requirements of warehouse management systems for logistical sub-processes: (e.g. development of serial number management), extensions (e.g. selection, implementation and adaptation of pick-by-voice systems in logistics processes, environment and risk analyses for IT applications in different environments, e.g. cold, high-temperature areas, food regulations).
Transport management systems: Development of data models for route planning, selection of telematics concepts, evaluation of common tracking and tracing systems, concepts for freight cost accounting / credit note systems.

Data modelling and adaptation of Manufacturing Execution System (MES), structure and mode of action of traceability requirements in IT systems

4 Forms of teaching:

Learning units for self-study, classroom events in the form of exercises and practicals

5 Participation requirements:

Formal:	-

	Content:	-
6	Forms of assessment: Term paper, written examination, project work or oral examination	
7	Prerequisite for the award of credit points: Module examination pass and course assessment	
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng.	
9	Importance of the grade for the final grade: according to BRPO	
10	Module coordinator: Prof. Dr.-Ing. Jörg Nottmeyer	
11	Other information: -	
12	Language: German	

Material Flow Technology					**ILG**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3213	150 h	5	2nd sem.	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	1	SCH	8	h	54	h
	Practical or seminar	15 students	1	SCH	16	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students:

- assess the central aspects of internal logistics, from incoming goods to outgoing goods, taking into account all technical, logistical and informational interfaces to suppliers and customers.
- conceptualise the essential requirements for efficient and effective material flow systems on the basis of the logistics components.
- evaluate and define planning basics for effective operation the right transport and storage equipment.
- interpret equipment-specific technology data for the selection, operation and fall-out scenarios of all logistics technology systems

3 Contents:

- Systematic classification of implements, evaluation of the technical and constructive design as well as their product and operating characteristics, determination of application concepts and operating conditions
- Planning, visualisation, capacitive dimensioning and technical design of conveying, storage and handling techniques and concepts, calculation of conveying loads, creation of load capacity diagrams of conveying and storage systems.
- Application of planning and material flow approaches, including creation of Sankey diagrams, calculation of productivity ratios in commissioning systems, approaches to optimising times based on MTM / REFA time concepts
- Evaluation of product-specific packaging for suitable use in material flow systems (KLT; pallets etc.), design of packaging cycles and their environmental disposal concepts and facilities (pressing of packaging)
- Standards, guidelines and laws on the operation of conveyors. Storage and transport equipment, safety and environmental regulations (VDI 2490 ff).

4 Forms of teaching:

Learning units for self-study, classroom events in the form of exercises and practicals

5 Participation requirements:

Formal:	-
Content:	-

6	Forms of assessment: Term paper, written examination, project work or oral examination
7	Prerequisite for the award of credit points: Module examination pass
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Jörg Nottmeyer
11	Other information:
12	Language: German

Mathematics I					**MATH1**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3218	150 h	5	1st sem.	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	2	SCH	16	h	62	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2	Learning outcomes/competences: The students are familiar with the mathematical working method and have mastered the basic terms and methods from the areas of analysis and linear algebra, which they can also apply to practice-oriented questions from technology, science and business.
3	Contents: • General basics (set theories, inequalities, propositional logic, methods of proof) • Functions of one variable (limit and continuity, polynomial functions, rational functions, trigonometric functions, exponential function, logarithm function) • Differential calculus for functions of one variable (differentiability, derivation rules, applications) • Linear algebra (vectors, matrices, determinants, systems of linear equations, eigenvalues and eigenvectors)
4	Forms of teaching: Learning units for self-study, classroom sessions in the form of exercises
5	Participation requirements: Formal: - Content: -
6	Forms of assessment: Written examination, combined examination, oral examination or examination during the course
7	Prerequisite for the award of credit points: Module examination pass
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng., Digital Technologies (work-integrated) B.Eng., Mechatronics /Automation (work-integrated) B.Eng., Product Service Engineering work-integrated B.Eng. and Industrial Engineering and Management (work-integrated) B.Eng.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Dr. rer. nat. Sabrina Proß
11	Other information: -

12	Language: German

Microcontroller Programming	**MCP**

Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3220	150 h	5	6th sem.	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	1	SCH	8	h	46	h
	Practical or seminar	15 students	1	SCH	16	h	0	h
	Supervised self-study	60 students	1.5	SCH	24	h	0	h

2 Learning outcomes/competences:

Students:

- learn the basics of embedded systems based on microcontrollers and single-board computers.
- get hands-on experience in designing hardware-based microcontroller product architectures and cloud solutions, low-power M2M communication as well as sensor networks.
- are capable of implementing their own small hardware projects.
- can evaluate and make judgements about systems or products based on embedded systems.
- can translate customer requirements into viable technical concepts and product architectures, taking into account efficiency and modularity.

3 Contents:

- Basics Embedded Systems 'Internet of Things' (IoT)
- Network technologies (Ethernet, Wifi, Bluetooth, etc.).
- Identification technology (barcode scanners, RFID systems)
- Concepts and tools of embedded systems and IoT
- Embedded systems platforms (e.g. Ardunio/Energia, Raspberry PI, ARM microcontrollers, etc.)
- Communication via bus systems (e.g. I2C, SPI, UART)
- Readout of sensors
- Special components (A/D converter, D/A converter)
- Integration into overall systems

4 Forms of teaching:

Learning units for self-study, classroom events in the form of exercises and practicals

5 Participation requirements:

Formal:	-
Content:	-

6 Forms of assessment:

Term paper, written examination, project work or oral examination

7 Prerequisite for the award of credit points:

Module examination pass and course assessment

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

Digital Logistics (work-integrated) B.Eng., Mechatronics/Automation (work-integrated) B.Eng. and Industrial Engineering and Management (work-integrated)

	B.Eng.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Christian Stöcker
11	Other information: -
12	Language: German

Operations Research					**MOR**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3219	150 h	5	2nd sem.	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	1	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	3	SCH	24	h	46	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	1.5	SCH	24	h	0	h

2	Learning outcomes/competences:	
	Students: • can apply operations research methods and models in a situation-appropriate manner. • are able to solve relevant real-world problems from the field of economics and in particular logistics with the help of suitable models and methods of operations research or to provide decision support.	
3	Contents:	
	• Introduction to Operations Research • Models in Operations Research • Sub-areas of Operations Research • Linear optimisation • Fundamentals of Graph Theory • Transport problems • Integer optimisation problems (pure-integer linear optimisation problems, knapsack problems) • Combinatorial optimisation problems (assignment problems, round trip problems, postman problems, route planning problems, machine allocation problems, location problems) • Dynamic optimisation (batch size planning)	
4	Forms of teaching:	
	Learning units for self-study, classroom sessions in the form of exercises	
5	Participation requirements:	
	Formal:	-
	Content:	- Modules: 3218 Mathematics I;
6	Forms of assessment:	
	Written examination, combination examination, project work, oral examination or examination during the course	
7	Prerequisite for the award of credit points:	
	Module examination pass	
8	Application of the module (in the following study programmes)	
	Digital Logistics (work-integrated) B.Eng. and Digital Technologies (work-integrated) B.Eng.	
9	Importance of the grade for the final grade:	
	according to BRPO	

10	Module coordinator: Dr. rer. nat. Sabrina Proß
11	Other information: -
12	Language: German

Personnel and Organisation					**PUO**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3011	150 h	5	7th sem.	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	2	SCH	16	h	62	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

The students have a basic overview of the tasks of human resource management. They know the essential methods of personnel recruitment, personnel development and personnel evaluation and can evaluate them with regard to their suitability and applicability.
They are familiar with essential theoretical concepts on communication, understand the problems that can occur during the communication process and have practised possible solutions.
They understand the importance of learning for change processes and can shape the conditions for successful learning.
They can explain the principles of organisational theory and have checked their significance using practical examples. They can use primary and secondary organisational forms with regard to their applicability.
They are familiar with important topics of organisational change and can assess their significance for entrepreneurial activity.
They have a basic knowledge of the characteristics and significance of key qualifications and have demonstrated this with the help of examples, e.g. in conflict resolution and motivational skills.

3 Contents:

- Significance, goals and tasks of human resource management
- Fundamentals of labour law
- Fundamentals of communication
- Fundamentals of learning theory
- Environmental conditions, learning control, lifelong learning strategies
- Organisational and operational structure, forms of primary and secondary organisation
- Organisational change
- Personnel management and conflict resolution

4 Forms of teaching:

Learning materials for self-study, classroom events in the form of exercises

5 Participation requirements:

Formal:	None

	Content:	None
6	Forms of assessment: Term paper, written examination, performance examination, project work or oral examination	
7	Prerequisite for the award of credit points: Module examination pass	
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng., Mechatronics/Automation (work-integrated) B.Eng. and Industrial Engineering and Management (work-integrated) B.Eng.	
9	Importance of the grade for the final grade: according to BRPO	
10	Module coordinator: Economist Ulrike Franke	
11	Other information:	
12	Language: German	

Practical Module I					**PX1**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3112	150 h	5	3rd sem.	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	0	SCH	0	h	150	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h

2	Learning outcomes/competences:	
	Students acquire and deepen knowledge and skills specific to the study programme. For this purpose, individual problems are worked on holistically and under practical conditions during the work term at the company and solution options are developed independently. In addition to the professional competence, the students acquire the ability of working scientifically and successively develop it further.	
3	Contents:	
	The topics to be worked on must be related to engineering science and be oriented towards the module contents of the curriculum. The topic is coordinated between the student, the faculty tutor in the company and the examiner at the university of applied sciences.	
4	Forms of teaching:	
	Work-related module	
5	Participation requirements:	
	Formal:	-
	Content:	-
6	Forms of assessment:	
	Term paper	
7	Prerequisite for the award of credit points:	
	Module examination pass	
8	Application of the module (in the following study programmes)	
	Digital Logistics (work-integrated) B.Eng., Digital Technologies (work-integrated) B.Eng., Mechatronics /Automation (work-integrated) B.Eng., Product-Service Engineering (work-integrated) B.Eng. and Industrial Engineering and Management (work-integrated) B.Eng.	
9	Importance of the grade for the final grade:	
	according to BRPO	
10	Module coordinator:	
	Prof. Dr.-Ing. Andrea Kaimann	
11	Other information:	
	-	
12	Language:	
	German	

Practical Module II					**PX2**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3122	150 h	5	5th sem.	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	0	SCH	0	h	150	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h

2	Learning outcomes/competences:	
	Students acquire and deepen knowledge and skills specific to the study programme. For this purpose, individual problems are worked on holistically and under practical conditions during the work term at the company and solution options are developed independently. In addition to the professional competence, the students acquire the ability of working scientifically and successively develop it further.	
3	Contents:	
	The topics to be worked on must be related to engineering science and be oriented towards the module contents of the curriculum. The topic is coordinated between the student, the faculty tutor in the company and the examiner at the university of applied sciences.	
4	Forms of teaching:	
	Work-related module	
5	Participation requirements:	
	Formal:	module examination pass in work-related module I
	Content:	-
6	Forms of assessment:	
	Term paper	
7	Prerequisite for the award of credit points:	
	Module examination pass	
8	Application of the module (in the following study programmes)	
	Digital Logistics (work-integrated) B.Eng., Digital Technologies (work-integrated) B.Eng., Mechatronics/Automation (work-integrated) B.Eng., Product Service Engineering (work-integrated) B.Eng. and Industrial Engineering and Management (work-integrated) B.Eng.	
9	Importance of the grade for the final grade:	
	according to BRPO	
10	Module coordinator:	
	Prof. Dr.-Ing. Andrea Kaimann	
11	Other information:	
	-	
12	Language:	
	German	

Practical Module III					**PX3**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3129	150 h	5	6th sem.	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	0	SCH	0	h	150	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	0	SCH	0	h	0	h

2	Learning outcomes/competences:	
	Students acquire and deepen knowledge and skills specific to the study programme. For this purpose, individual problems are worked on holistically and under practical conditions during the work term at the company and solution options are developed independently. In addition to the professional competence, the students acquire the ability of working scientifically and successively develop it further.	
3	Contents:	
	The topics to be worked on must be related to engineering science and be oriented towards the module contents of the curriculum. The topic is coordinated between the student, the faculty tutor in the company and the examiner at the university of applied sciences.	
4	Forms of teaching:	
	Work-related module	
5	Participation requirements:	
	Formal:	module examination pass in work-related module II
	Content:	-
6	Forms of assessment:	
	Term paper	
7	Prerequisite for the award of credit points:	
	Module examination pass	
8	Application of the module (in the following study programmes)	
	Digital Logistics (work-integrated) B.Eng., Digital Technologies (work-integrated) B.Eng., Mechatronics/Automation (work-integrated) B.Eng., Product Service Engineering (work-integrated) B.Eng. and Industrial Engineering and Management (work-integrated) B.Eng.	
9	Importance of the grade for the final grade:	
	according to BRPO	
10	Module coordinator:	
	Prof. Dr.-Ing. Andrea Kaimann	
11	Other information:	
	-	
12	Language:	
	German	

Production Planning and Control					**PPS**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3024	150 h	5	6th sem.	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	2	SCH	16	h	62	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students understand the business fundamentals and interrelationships of production management.

The students can apply tools and methods of production planning and control to practice-oriented examples.

They are able to evaluate the planning results in terms of plausibility and efficiency and to assess their impact on holistic business processes between suppliers and customers.

The students understand the procedures in the sub-processes of product planning and are able to evaluate the information exchanged between the sub-processes and assess it with regard to the effects in other planning steps.

Students understand the core and cross-sectional functions of production planning and control systems on the basis of data management (PPS systems) depending on the respective business typology and can classify them in context.

3 Contents:

- Operational tasks in the area of production planning and control
- Relationship between development and the production processes to be planned: production-oriented product design
- Market requirements for production processes and their control
- Typical areas of EDP application to support production planning and control
- Information flow and associated data structures in the IT systems (master data management: material master, parts lists, workstation master, routings)
- Programme planning and primary needs assessment
- Material requirements planning with BOM explosion and net requirements planning
- Scheduling and capacity balancing
- Order processing and production order management,
- Mapping a Kanban control system
- Shipping preparation, delivery and invoicing
- Computer-aided production planning and controlling

4	Forms of teaching: Learning materials for self-study, classroom events in the form of exercises	
5	Participation requirements:	
	Formal:	None
	Content:	None
6	Forms of assessment: Term paper, written examination, project work or oral examination	
7	Prerequisite for the award of credit points: Module examination pass	
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng.	
9	Importance of the grade for the final grade: according to BRPO	
10	Module coordinator: Prof. Dr. rer. oec. Pascal Reusch	
11	Other information: Supplementary literature will be announced at the beginning of the course.	
12	Language: German	

Quality Management					**QMG**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3201	150 h	5	4th or 6th semester	Annual (Summer)	1 semester

	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
1	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	2	SCH	16	h	62	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students:

- can determine/assess the "value" (cost/benefit) of quality for a company and can understand the development of quality management.
- understand and distinguish between the existing quality management models and can apply quality management systems in a purposeful manner.
- can integrate quality management into existing management structures of a company.

3 Contents:

- The term ‘quality’
- Basics of quality management systems (QMS), tasks and objectives of QMS in the company
- Terms and definitions in quality management
- Analysis of the costs/benefits of a QM system
- Strategies for increasing and ensuring ‘quality’ in the company (PDCA cycle)
- Tools, procedures, resources, processes of quality planning, control, inspection and improvement

Prerequisites for the successful use of management systems for quality management in the company
Overarching aspects of quality management: Standardisation, certification, etc.

4 Forms of teaching:

Learning units for self-study, classroom sessions in the form of exercises

5 Participation requirements:

Formal:	-
Content:	-

6 Forms of assessment:

Term paper, written examination, project work or oral examination

7 Prerequisite for the award of credit points:

Module examination pass

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

Digital Logistics (work-integrated) B.Eng., Product Service Engineering (work-integrated) B.Eng. and Industrial Engineering and Management (work-integrated) B.Eng.

9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr. rer. oec. Pascal Reusch
11	Other information: -
12	Language: German

Accounting, Investment, Financing and Taxes					**RIF**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3223	150 h	5	2nd sem.	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	2	SCH	16	h	62	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students can distinguish and assess the respective benefits and information content of external and internal accounting. They have a basic understanding of financial statements and financial statement analysis. They have a critical understanding of financial issues and understand the relationship between the use of capital and the raising of capital, including its impact on the balance sheet. They know the instruments and the structuring of capital procurement. They have a basic understanding of cost accounting and know basic standards and terms of cost accounting. They critically assess and interpret the practical applications of cost accounting procedures with regard to the significance of their results. Furthermore, they can incorporate a profitability-oriented assessment into all entrepreneurial activities and decision-making areas.
The students know the basics of company-relevant taxes and are able to include their effects in business decisions.

3 Contents:

- Accounting principles
- Fundamentals of financial statement analysis
- Fundamentals of operational financing decisions
- Instruments of external, internal, equity and debt financing
- Fundamentals of financial mathematics
- Fundamentals of business investment decisions
- Static investment calculation methods
- Dynamic investment calculation methods
- Introduction to cost accounting
- Cost type, cost centre, cost unit accounting
- Short-term income statement on full and partial cost basis
- Business taxes

4 Forms of teaching:

Learning units for self-study, classroom sessions in the form of exercises

5 Participation requirements:

Formal:	-
Content:	-

6 Forms of assessment:

Term paper, written examination, project work or oral examination

7	Prerequisite for the award of credit points: Module examination pass
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Economist Ulrike Franke
11	Other information: -
12	Language: German

Statistics					**STAT**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3224	150	5	3rd semester or 4th semester	every semester	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	2	SCH	16	h	62	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2	Learning outcomes/competences: Students: • can explain basic concepts of statistics. • can apply the basic methods and procedures of descriptive statistics and probability theory. • are able to analyse economic questions and problems with statistical methods and to show correlations. • can work on tasks with the help of suitable software (SPSS, Excel,...).
3	Contents: • Descriptive statistics (one-dimensional frequency distributions, measures, multivariate statistics, regression analysis) • Probability calculation (discrete and continuous distributions) • Statistical interference • Use of Excel/SPSS
4	Forms of teaching: Learning units for self-study, classroom sessions in the form of exercises
5	Participation requirements: Formal: - Content: -
6	Forms of assessment: Term paper, written examination, combined examination, project work, oral examination or examination accompanying the course
7	Prerequisite for the award of credit points: Module examination pass
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng., Digital Technologies (work-integrated) B.Eng., Mechatronics /Automation (work-integrated) B.Eng., Product-Service Engineering (work-integrated) B.Eng. and Industrial Engineering (work-integrated) B.Eng.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Dr. rer. nat. Sabrina Proß
11	Other information: -

12	Language: German

Supply-Chain Management					**SCM**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3208	150 h	5	5th sem.	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	2	SCH	16	h	62	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students will be able to analyse and evaluate operational business processes in industrial value chains and optimise them, especially with regard to the interfaces between organisations.

The students can evaluate value chains with regard to their most important performance parameters and derive optimisation proposals, especially on the basis of digital technologies.

Students will be able to analyse and design Lean concepts to cross-organisational information and material flow systems and Just-In-Time and Just-In-Sequence systems.

3 Contents:

Make or buy decisions (in-house production or outsourcing incl. co-operation option)

Strategic and operational procurement (incl. purchasing to ensure the legal availability of goods)

Supply early warning systems

Sourcing concepts (in- and outsourcing, local and global sourcing, sole, single, dual and multiple sourcing, parts and modular sourcing as well as other sourcing concepts such as e-sourcing, cooperative sourcing, parallel sourcing etc.)

Organisational processes in procurement and purchasing, in particular information and material flows between suppliers and customers up to the provision of goods for production: from national and international supplier search to supplier selection, negotiation and conclusion of contracts up to supplier assessment, controlling and auditing

Aspects of social responsibility

4 Forms of teaching:

Learning units for self-study, classroom sessions in the form of exercises

5 Participation requirements:

Formal:	-

	Content:	-
6	Forms of assessment: Term paper, written examination, project work or oral examination	
7	Prerequisite for the award of credit points: Module examination pass	
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng.	
9	Importance of the grade for the final grade: according to BRPO	
10	Module coordinator: Prof. Dr. rer. oec. Pascal Reusch	
11	Other information: -	
12	Language: German	

Technical Basics					**TGL**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3334	150 h	5	1st sem.	Annual (Winter)	1 semester

	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
1	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	1	SCH	8	h	54	h
	Practical or seminar	15 students	1	SCH	16	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students:

- calculate the mechanical and dynamic dimensions (forces, paths, energies) for the design, layout and operation of logistical elements (e.g. storage racks, transport conveyor systems).
- design, plan logistical facilities using the essential principles of construction technology.
- select the correct, specific materials for the technical applications in the logistics systems.

3 Contents:

- Technical mechanics (statics, dynamics and strength theory) for the design and dimensioning of transport and storage systems (dimensioning of driven roller conveyors and their motor power, calculation of the load-bearing capacity of pallet racks, etc.)
- Application of the basics of construction technology and methods, standards and product design
- Technical drawing for the conception of technical systems and specifications (including conceptual design of simple mechanical and automatic storage systems)
- Fundamentals of materials science, evaluation and selection of application-specific materials and materials for storage systems under heterogeneous environmental conditions

4 Forms of teaching:

Learning units for self-study, classroom events in the form of exercises and practicals

5 Participation requirements:

Formal:	
Content:	

6 Forms of assessment:

Term paper, written examination, project work or oral examination

7 Prerequisite for the award of credit points:

Module examination pass

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

Digital Logistics (work-integrated) B.Eng.

9 Importance of the grade for the final grade:

according to BRPO

10 Module coordinator:

Prof. Dr.-Ing. Jörg Nottmeyer

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11	Other information:
12	Language: German

Technical English					**TCE**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3121	150 h	5	1st, 3rd or 5th sem.	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars		0	SCH	0	h	0	h
	Exercise		0	SCH	0	h	0	h
	Practical or seminar	15 students	2	SCH	32	h	46	h
	Supervised self-study	30 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

- Expertise: The students acquire an extended active language competence at the upper B2 level. They have a sound specialist vocabulary of Technical English and can combine it with Business English terminology relevant to their profession.
- Social competence: they develop sensitivity to differences in intercultural communication, especially in English-speaking business environment.
- Methodological competence: They are able to skim specialist texts for essential information and present them shortly and concisely both in speaking and in writing. They establish wider contexts and make a critical assessment.
- Personal competence: They show English fluency and a pro-active approach to managing authentic English sources.

3 Contents:

- Students can actively participate in international conferences.
- They master engineering-relevant terminology (e.g. manufacturing processes; mathematical operations; dimensions and shapes; forces and mechanisms; properties of materials; automated systems and Industry 4.0).
- They possess interdisciplinary skills (e.g. discussing readings and trends; pitching a technical product; managing projects; designing conference posters; academic writing).

4 Forms of teaching:

Seminar-based teaching / individual and group work, etc. / semester project (Assignment)

5 Participation requirements:

Formal:	Regular attendance (70%) and active participation
Content:	English language competence: B2.1 (according to the European Reference Framework for Languages)

6	Forms of assessment: Combination examination
7	Prerequisite for the award of credit points: Passed semester project and written exam
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng., Digital Technologies (work-integrated) B.Eng., Mechatronics/Automation (work-integrated) B.Eng., Product-Service Engineering (work-integrated) B.Eng. and Industrial Engineering and Management (work-integrated) B.Eng.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: OStR Cornelia Biegler-König
11	Other information: -
12	Language: English

Transport, Forwarding, Customs and Foreign Trade Law					**TZR**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3225	150 h	5	7th sem.	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	2	SCH	16	h	62	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students:

- identify deficits and risks along the supply chain and develop suitable technical, organisational and information technology measures and concepts for risk management.
- evaluate process-related transactions in the transport sector with regard to process-specific issues from day-to-day operations (e.g. liability issues in the case of inappropriate pallet exchange).
- are familiar with the customs and foreign trade regulations of the international export and import laws that are applied in international trade and transport.

3 Contents:

- IT applications to secure legal transactions in the transport sector.
- Concept and definition of international transport law, legal bases in transport law, national/international, analysis and activities of the parties involved in the transport business, civil and commercial bases of transport and insurance law, contractual bases and concepts.
- International contract of carriage for the international carriage of goods by road (CMR)
- Provisions of the HGB on the freight business, forwarding business and warehousing business
  Introduction to customs and foreign trade law (legal provisions/principles, customs processes in goods traffic, customs simplifications, customs and security/risk prevention in the customs area/supply chain)

4 Forms of teaching:

Learning units for self-study, classroom sessions in the form of exercises

5 Participation requirements:

Formal:	-
Content:	-

6 Forms of assessment:

Term paper, written examination, project work or oral examination

7 Prerequisite for the award of credit points:

Module examination pass

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

Digital Logistics (work-integrated) B.Eng.

9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: N. N.
11	Other information: -
12	Language: German

Transport Logistics					**TLG**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3226	150 h	5	6th sem.	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	2	SCH	16	h	62	h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students:

- can determine the importance and objectives of national and international transport and traffic logistics.
- can classify the macroeconomic framework conditions for the transport and traffic industry.
- can analyse the national and international markets and providers of transport and transport logistics services.
- understand the principles of national and international transport and transport logistics service provision.
- can apply the individual management areas of transport management.

3 Contents:

- Goals and tasks of national and international transport and traffic logistics
- Service provision of national and international transport and traffic companies
- Examples of questions relevant to transport technology, methods for the representation and description of transport technologies
- Requirements for transport technologies. Evaluation and selection procedure
- Truck, air, rail and sea transport
- Means of transport and carriers, container, loading and transshipment systems, combined transport
- Information and communication management
- Fleet management
- Container and cargo management
- Quality and performance management
- Environmentally and climate-friendly, quiet and safe transport

4 Forms of teaching:

Learning units for self-study, classroom sessions in the form of exercises

5 Participation requirements:

Formal:	-
Content:	-

6 Forms of assessment:

Term paper, written examination, project work or oral examination

7 Prerequisite for the award of credit points:

Module examination pass

8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Jörg Nottmeyer
11	Other information: -
12	Language: German

Packaging Technology and Load Securing	**WVT**

Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3227	150 h	5	3rd sem.	Annual (Winter)	1 semester

1

Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
Lecture	60 students	2	SCH	0	h	56	h
Tuition in seminars	30 students	0	SCH	0	h	0	h
Exercise	20 students	2	SCH	16	h	62	h
Practical or seminar	15 students	0	SCH	0	h	0	h
Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students:

- evaluate the transport processes and the goods to be transported and their product-specific properties in accordance with the relevant technical standards and regulations.
- conceptualise and assess the resulting requirements for packaging, load unit formation, loading and load securing for goods and transport concepts (including shipping regulations) based on the essential technical principles of packaging technology.

3 Contents:

Selection, design of packaging means for goods (piece goods, bulk goods and liquids), determination and dimensioning of loading units and selection for transport and securing of loading units (e.g. mechanical or electronic seals for containers DIN ISO 18185).
Optimum load distribution through centre of gravity calculation (e.g. load capacity of containers according to DIN 1496 payload calculation diagrams and simulation models as well as application-specific measures for load securing (straps, supports, etc.).

Assessment of product- and cargo-specific transport risks and derivation of measures to avoid, prevent and mitigate damage (IMO classes, incoterms 2010, international sanctions lists).
Load securing / securing devices / load and transport safety according to international standards and laws (e.g. VDI 2700 'Load securing on road vehicles)

4 Forms of teaching:

Learning units for self-study, classroom sessions in the form of exercises

5 Participation requirements:

Formal:	-
Content:	-

6 Forms of assessment:

Term paper, written examination, project work or oral examination

7 Prerequisite for the award of credit points:

Module examination pass

8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Jörg Nottmeyer
11	Other information: -
12	Language: German

Distribution and Sorting Systems					**VSO**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3335	150 h	5	5th sem.	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	56	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	1	SCH	8	h	54	h
	Practical or seminar	15 students	1	SCH	16	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students:

- evaluate the principles of picking technology for adequate use in sorting and distribution systems, e.g. at logistics service providers.
- design the process structures of the sorting and distribution systems with regard to design requirements from the logistical processes.
- assess sorting and distribution systems in terms of logistical parameters (e.g. throughput times, picking frequencies, worst case failure scenarios).

3 Contents:

- Use and selection criteria for sorting and distribution systems, determination and dimensioning of operating models and states in start-up, ramp-up and working areas
- Technical-constructive design and logistical application of storage and distribution systems in logistics facilities, calculation of mechanical elements of storage and conveying technology
- Measurement of energy efficiencies when using electric motors, calculation of losses and efficiencies, application of common test methods
- Application of material flow control principles (e.g. FIFO, LIFO) and application of visualisation methods (e.g. layout design of sorting and picking systems by means of flow chart representations)

4 Forms of teaching:

Learning units for self-study, classroom events in the form of exercises and practicals

5 Participation requirements:

Formal:	
Content:	

6 Forms of assessment:

Term paper, written examination, project work or oral examination

7 Prerequisite for the award of credit points:

Module examination pass

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

Digital Logistics (work-integrated) B.Eng.

9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Jörg Nottmeyer
11	Other information:
12	Language: German

Elective Module: Digital Logistics					**WM**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
9024	150 h	5	5th or 6th sem.	each semester	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students		SCH		h		h
	Tuition in seminars	30 students		SCH		h		h
	Exercise	20 students		SCH		h		h
	Practical or seminar	15 students	0	SCH	0	h	0	h
	Supervised self-study	60 students		SCH		h		h

2	Learning outcomes/competences:	
3	Contents:	
4	Forms of teaching:	
5	Participation requirements:	
	Formal:	
	Content:	
6	Forms of assessment:	
7	Prerequisite for the award of credit points:	
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng.	
9	Importance of the grade for the final grade:	
10	Module coordinator: Prof. Dr. rer. oec. Pascal Reusch	
11	Other information:	
12	Language: German	

Web Technologies					**WEB**
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3207	150	5	4th Semester	annually in the summer semester	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	0	h	64	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	1	SCH	8	h	46	h
	Practical or seminar	15 students	1	SCH	16	h	0	h
	Supervised self-study	60 students	1	SCH	16	h	0	h

2 Learning outcomes/competences:

Students:

- implement simple websites with the help of appropriate tools;
- apply markup languages and common data exchange formats for web programming and data exchange;
- link databases to web interfaces;
- explain the basic concepts of the semantic web and place it in the canon of web technologies;
- explain the various technical, logical and legal influencing factors that play a role in e-business;
- discuss current and upcoming developments in the various areas and evaluate the effects on existing or planned E-business systems in the overall operational framework;
- explain the structure and the administration of E-business tools and of comprehensive platform solutions.

3 Contents:

Internet technologies and architectures :

- Foundations of web programming
- Markup languages (e.g. XML) and data exchange formats (e.g. JSON)
- Integration of databases with web interfaces
- Fundamental concepts of the Semantic Web

E-business standards (data formats and rules for the exchange of information):

- Identification standards e.g. GTIN (Global Trade Item Number)
- Classification standards e.g. eCl@ss
- Catalogue exchange formats e.g. BMEcat
- Transaction standards e.g. EDIFACT, EDIFOR
- Process standards e.g. ECR (efficient consumer response)

Platform solutions:

- Cross-Channel Commerce Management Solutions
- E-commerce logistics fulfilment networks that enable national and international storage, handling and delivery of products (via an interface to online shop or ERP systems)

4 Forms of teaching:

Learning units for self-study, classroom events in the form of exercises and practicals

5	Participation requirements:	
	Formal:	-
	Content:	• Good programming skills • Good knowledge of database technologies
6	Forms of assessment: Term paper, written examination, project work or oral examination	
7	Prerequisite for the award of credit points: module examination pass and course assessment	
8	Application of the module (in the following study programmes) Digital Logistics (work-integrated) B.Eng. and Digital Technologies (work-integrated) B.Eng.	
9	Importance of the grade for the final grade: according to BRPO	
10	Module coordinator: N. N.	
11	Other information: -	
12	Language: German	