Appendix A: Course Schedule

for the study programme Apparative Biotechnology B.Sc.
(six semesters)

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

First semester			L	ST	E	P/S	SSS	CP
Module number	Module title	Module ID						
1039	Chemistry	CH	2	1	0	1	0	5
1073	Electrical Engineering 1	ET1	2	1	0	1	0	5
1106	Computer Science 1 – Imperative Programming	IN1	2	1	0	1	0	5
1129	Construction Basics	KG	2	1	0	1	0	5
1149	Mathematics 1	MA1	2	2	0	0	0	5
1177	Molecular Biology of the Cell	MBZ	0	2	2	0	0	5
							Total CP:	30
Second semester			L	ST	E	P/S	SSS	CP
Module number	Module title	Module ID						
1033	Biotechnology 1	BT1	0	2	2	0	0	5
1063	Electronics	EL	2	1	0	1	0	5
1110	Computer Science 2 – Object-Oriented Programming	IN2	2	1	0	1	0	5
1155	Mathematics 2	MA2	2	2	0	0	0	5
1319	Physics	PHY	2	1	0	1	0	5
1204	Practical Course Biotechnology 1	PB1	0	0	0	4	0	5
							Total CP:	30
Third semester			L	ST	E	P/S	SSS	CP
Module number	Module title	Module ID						
1034	Biotechnology 2	BT2	0	2	2	0	0	5
1326	Chemistry 2	CH2	0	2	1	1	0	5
1160	Mathematics 3	MA3	2	2	0	0	0	5
1168	Metrology	MT	2	1	0	1	0	5
1205	Practical Course Biotechnology 2	PB2	0	0	0	4	0	5
1216	Project	PR	0	0	0	2	0	5
							Total CP:	30
Fourth semester			L	ST	E	P/S	SSS	CP
Module number	Module title	Module ID						
1027	Business Administration	BWL	3	1	0	0	0	5
1035	Biotechnology 3	BT3	0	2	2	0	0	5
1206	Practical Course Biotechnology 3	PB3	0	0	0	4	0	5
1234	Automatic Control Engineering	RT	2	1	0	1	0	5
1263	Technical English	TEN	0	4	0	0	0	5

9020	Elective Module: Apparative Biotechnology	WM				0		5
							Total CP:	30
Fifth semester			L	ST	E	P/S	SSS	CP
Module number	Module title	Module ID						
1005	Applied Biotechnology	ABI	0	2	0	2	0	5
1029	Machine Vision	BIL	2	1	0	1	0	5
1036	Biotechnological Detection Systems	BDS	0	2	1	1	0	5
1208	Practical Project / Internship	PRP	0	0	0	2	0	5
1211	Product Purification	PDA	0	2	1	1	0	5
9020	Elective Module: Apparative Biotechnology	WM				0		5
							Total CP:	30
Sixth semester			L	ST	E	P/S	SSS	CP
Module number	Module title	Module ID						
1004	Analytics and Process Control	APK	0	2	1	1	0	5
1291	Bachelor Thesis	BA	0	0	0	0	0	12
1290	Colloquium	KOL	0	0	0	0	0	3
9020	Elective Module: Apparative Biotechnology	WM				0		5
9020	Elective Module: Apparative Biotechnology	WM				0		5
							Total CP:	30

Abbreviations of the teaching forms: L = lecture, ST = tuition in seminars, E = exercise, S = seminar, P = practical, SSS = supervised self-study (all data in semester credit hours); CP = credit points
W/S = winter/summer semester

The practical project can optionally be replaced by a semester abroad.

Elective Modules Apparative Biotechnology									
Module number	Module title	Module ID	W/S	L	ST	E	P/S	SSS	CP
1032	Biogas and Biorefineries	BIO	W	2	2	0	0	0	5
3135	Gender and Diversity: Success Factors for Companies	GUD	W	2	2	0	0	0	5
1232	Integrated Product Development	IP	S	2	2	0	0	0	5
1309	Photonics	PHO	S	2	0	1	1	0	5
1229	Quality Management	QM	S	2	2	0	0	0	5
1240	Robotics	ROB	W	2	1	0	1	0	5
6004	Textile Technologies	TEX	S	2	2	0	0	0	5

Appendix B: Course Schedule

for the study programme Apparative Biotechnology B.Sc.
(seven semesters)

First semester			L	ST	E	P/S	SSS	CP
Module number	Module title	Module ID						
1039	Chemistry	CH	2	1	0	1	0	5
1073	Electrical Engineering 1	ET1	2	1	0	1	0	5
1106	Computer Science 1 – Imperative Programming	IN1	2	1	0	1	0	5
1129	Construction Basics	KG	2	1	0	1	0	5
1149	Mathematics 1	MA1	2	2	0	0	0	5
1177	Molecular Biology of the Cell	MBZ	0	2	2	0	0	5
							Total CP:	30
Second semester			L	ST	E	P/S	SSS	CP
Module number	Module title	Module ID						
1033	Biotechnology 1	BT1	0	2	2	0	0	5
1063	Electronics	EL	2	1	0	1	0	5
1110	Computer Science 2 – Object-Oriented Programming	IN2	2	1	0	1	0	5
1155	Mathematics 2	MA2	2	2	0	0	0	5
1319	Physics	PHY	2	1	0	1	0	5
1204	Practical Course Biotechnology 1	PB1	0	0	0	4	0	5
							Total CP:	30
Third semester			L	ST	E	P/S	SSS	CP
Module number	Module title	Module ID						
1034	Biotechnology 2	BT2	0	2	2	0	0	5
1326	Chemistry 2	CH2	0	2	1	1	0	5
1160	Mathematics 3	MA3	2	2	0	0	0	5
1168	Metrology	MT	2	1	0	1	0	5
1205	Practical Course Biotechnology 2	PB2	0	0	0	4	0	5
1216	Project	PR	0	0	0	2	0	5
							Total CP:	30
Fourth semester			L	ST	E	P/S	SSS	CP
Module number	Module title	Module ID						
1027	Business Administration	BWL	3	1	0	0	0	5
1035	Biotechnology 3	BT3	0	2	2	0	0	5
1206	Practical Course Biotechnology 3	PB3	0	0	0	4	0	5
1234	Automatic Control Engineering	RT	2	1	0	1	0	5
1263	Technical English	TEN	0	4	0	0	0	5

9020	Elective Module: Apparative Biotechnology	WM				0		5
							Total CP:	30
Fifth semester			L	ST	E	P/S	SSS	CP
Module number	Module title	Module ID						
1005	Applied Biotechnology	ABI	0	2	0	2	0	5
1029	Machine Vision	BIL	2	1	0	1	0	5
1036	Biotechnological Detection Systems	BDS	0	2	1	1	0	5
1208	Practical Project / Internship	PRP	0	0	0	2	0	5
1211	Product Purification	PDA	0	2	1	1	0	5
9020	Elective Module: Apparative Biotechnology	WM				0		5
							Total CP:	30
Sixth semester			L	ST	E	P/S	SSS	CP
Module number	Module title	Module ID						
1004	Analytics and Process Control	APK	0	2	1	1	0	5
1305	Practical Project / Internship	PRA	0	0	0	0	0	15
9020	Elective Module: Apparative Biotechnology	WM				0		5
9020	Elective Module: Apparative Biotechnology	WM				0		5
							Total CP:	30
Seventh semester			L	ST	E	P/S	SSS	CP
Module number	Module title	Module ID						
1291	Bachelor Thesis	BA	0	0	0	0	0	12
1290	Colloquium	KOL	0	0	0	0	0	3
1305	Practical Project / Internship	PRA	0	0	0	0	0	15
							Total CP:	30
Eighth semester			L	ST	E	P/S	SSS	CP
Module number	Module title	Module ID						
						0		
							Total CP:	0
Ninth semester			L	ST	E	P/S	SSS	CP
Module number	Module title	Module ID						
						0		
							Total CP:	0

Abbreviations of the teaching forms: L = lecture, ST = tuition in seminars, E = exercise, S = seminar, P = practical, SSS = supervised self-study (all data in semester credit hours); CP = credit points
W/S = winter/summer semester

The practical project can optionally be replaced by a semester abroad.

Elective Modules Apparative Biotechnology									
Module number	Module title	Module ID	W/S	L	ST	E	P/S	SSS	CP
1032	Biogas and Biorefineries	BIO	W	2	2	0	0	0	5
3135	Gender and Diversity: Success Factors for Companies	GUD	W	2	2	0	0	0	5
1232	Integrated Product Development	IP	S	2	2	0	0	0	5
1309	Photonics	PHO	S	2	0	1	1	0	5
1229	Quality Management	QM	S	2	2	0	0	0	5
1240	Robotics	ROB	W	2	1	0	1	0	5
6004	Textile Technologies	TEX	S	2	2	0	0	0	5

Appendix C: Module catalogue

for the study programme Apparative Biotechnology B.Sc.

*Translations of these module descriptions are currently not available.

Bachelor Thesis					BA
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1291	360 h	12	6th or 7th semester	each semester	12 weeks

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: With the bachelor thesis, each candidate demonstrates that he/she is able to complete a practice-oriented task from his/her special subject area within a specified period of time, both in its subject-specific details and in the interdisciplinary contexts, working independently and according to scientific methods.
3	Contents: The bachelor thesis is usually an independent investigation with an engineering science or engineering technology task. It should deal with the topic in detailed descriptions and explanations and be prepared as a written paper.
4	Forms of teaching:
5	Participation requirements:
	Formal: None
	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) Apparative Biotechnology B.Sc., Electrical Engineering B.Eng., Engineering Computer Sciences B.Eng., Mechanical Engineering B.Eng., Mechatronics B.Sc., Renewable Energies B.Eng. and Industrial Engineering and Management B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Anton Klar
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Business Administration					BWL
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1027	150 h	5	2nd or 4th semester	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time /classroom teaching		Self-study	
	Lecture	60 students	3	SCH	45	h	67.5	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	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:

The students know the basic organisational and legal structures of companies and are familiar with the optimisation tasks in selected entrepreneurial functional areas as well as with the basic principles and success criteria of economic action in order to be able to classify their engineering activities in a business management context and to evaluate the economic consequences of their activities. The students master methods and tools for problem solving in selected corporate functional areas. They can apply business management instruments and calculation methods in a target-oriented manner and assess their effects.

3 Contents:

- Classification, development and basic concepts of business administration
- Basic concepts of business administration / basic principles of economic action
- Overview of the entrepreneurial functional areas of the goods economy, financial and information level
- Corporate goals and corporate key figures / key figure systems
- Basic concepts of private and commercial law
- Corporate legal forms

4 Forms of teaching:

Lecture, seminar-based teaching with case studies and examples

5 Participation requirements:

Formal:	None
Content:	None

6 Forms of assessment:

Written examination, combination examination, performance examination or oral examination

7 Prerequisite for the award of credit points:

Module examination pass

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

Apparative Biotechnology B.Sc. and Mechatronics B.Sc.

9 Importance of the grade for the final grade:

according to BRPO

10 Module coordinator:

Prof. Dr. rer. pol. Hubertus Wameling

11 Other information:

Literature will be announced at the beginning of the course.

12 Language:

German

Machine Vision					BIL
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1029	150 h	5	5th semester	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	22.5	h
	Supervised self-study	60 students	0	SCH	0	h	0	h

2	Learning outcomes/competences: Name and explain the basic concepts, elementary connections and laws of machine vision. Demonstrate and apply the basic descriptive tools and analysis methods of machine vision. Name the current areas of application. Grasp and interpret the practical significance of machine vision. Be able to develop independent solutions in simple areas of application of machine vision.
3	Contents: Historical overview and current developments in machine vision, sensor systems for image data acquisition, basics of technical optics for the acquisition of scenes, illumination and object positioning, programming systems, handling machine vision programs, LUT and grey value programming, contour analysis and edge detection, filters in the spatial and frequency range, morphology, template matching, colour image processing, applications of machine vision as a quality assurance tool, biotechnological and medical applications, designing vision systems for process monitoring.
4	Forms of teaching: Lecture, practicals and exercises
5	Participation requirements: Formal: None Content: None
6	Forms of assessment: Written examination, combination examination, performance examination 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) Apparative Biotechnology B.Sc., Electrical Engineering B.Eng., Mechatronics B.Sc. and Industrial Engineering and Management B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Reinhard Kaschuba
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Electronics					EL
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1063	150 h	5	2nd semester	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	22.5	h
	Supervised self-study	60 students	0	SCH	0	h	0	h

2 Learning outcomes/competences:

In relation to the contents listed below, the students use the elementary methods of electronics and interpret the correlations. They use the most important components and basic circuits used in electronics. They can analyse, design and evaluate basic electronic circuits.
As future mechatronics engineers and biotechnologists, they identify the importance of electronics in these fields. Furthermore, they can classify essential aspects of the development and production of electronic systems and assemblies.

3 Contents:

- Passive components
- Fundamentals of semiconductor physics
- Semiconductor components, in particular diodes and transistors and their basic circuits
- Operational amplifiers and their applications
- Basics of digital and analogue circuits
- Integrated Circuits/Microelectronics
- Electronics development and manufacturing

4 Forms of teaching:

Lecture, seminar-based teaching with exercises, practical course

5 Participation requirements:

Formal:	None
Content:	Electrical Engineering 1 (1073)

6 Forms of assessment:

Written examination 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)

Apparative Biotechnology B.Sc. and Mechatronics B.Sc.

9 Importance of the grade for the final grade:

according to BRPO

10 Module coordinator:

Prof. Dr.-Ing. Andreas Bünte

11 Other information:

Literature will be announced at the beginning of the course.

12 Language:

German

Electrical Engineering 1					ET1
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1073	150 h	5	1st semester	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	22.5	h
	Supervised self-study	60 students	0	SCH	0	h	0	h

2	Learning outcomes/competences: In relation to the contents listed below, the students use and apply the elementary electrotechnical correlations and laws in technical systems. They can analyse, design and evaluate DC networks. They can examine given set-ups and dimension simple circuits appropriately. Students will be able to identify, design and implement basic electrotechnical boundary conditions for applications typical of the course of study and to assess them.
3	Contents: - Basic knowledge - Charge, current and voltage, electric field, Coulomb force, capacities - Resistance and resistance behaviour, Ohm's law - Energy and power - DC circuits, counting arrow systems, Kirchhoff's theorems, ideal and real sources - Series, parallel and bridge circuit, voltage and current divider - Network calculation - Magnetic field, law of induction, inductance, force effect in the magnetic field, Lorentz force - Static and dynamic processes, sinusoidal excitation, impedance
4	Forms of teaching: Lectures, exercises, practicals
5	Participation requirements: Formal: None Content: None
6	Forms of assessment: Written examination 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) Apparative Biotechnology B.Sc. and Mechatronics B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Andreas Bünte

11	Other information: Literature will be announced at the beginning of the course. see ILIAS
12	Language: German

Gender and Diversity: Success Factors for Companies					GUD
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
3135	150 h	5	5th semester	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	2	SCH	30	h	45	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:

The students ..

- know the terms, history and differences of gender/ gender mainstreaming and diversity/ diversity management.
- know legal principles in the context of gender and diversity (e.g. EU Anti-Discrimination Directive, General Equal Treatment Act)
- are sensitised to human heterogeneity in the corporate context.
- independently recognise stereotyping and can develop ideas for possible changes in the business environment.
- are able to independently collect relevant information on established concepts such as gender mainstreaming and diversity management and to assess their relevance for professional practice.
- are familiar with selected theories and approaches in the current discourse on diversity management and, building on this, are able to develop conceptual ideas for the implementation of holistic diversity management in a corporate context.

3 Contents:

- Definitions and delimitation of gender and diversity Concepts and approaches to equal opportunities (e.g. diversity management, gender mainstreaming)
- Legal bases and political influences (e.g. EU Anti-Discrimination Directive). General Equal Treatment Act (*German* abbreviation: AGG))
- Subjective and social values, attitudes and prejudices in the context of diversity
- Possible approaches for taking diversity characteristics (e.g. gender and age) into account in selected areas of business (marketing, product development, human resources)
- Concept for the sustainable introduction of holistic diversity management
- Case studies and application examples from business practice

4 Forms of teaching:

Lecture, seminar-based teaching, presentation, group work, presentation of seminar paper

5 Participation requirements:

Formal:	
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) Applied Mathematics B.Sc., Apparative Biotechnology B.Sc., Electrical Engineering B.Eng., Engineering Computer Sciences B.Eng., Mechanical Engineering B.Eng., Mechatronics B.Sc., Renewable Energies B.Eng. and Industrial Engineering and Management B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Andrea Kaimann
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Computer Science 1 – Imperative Programming					IN1
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1106	150 h	5	1st semester	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	22.5	h
	Supervised self-study	60 students	0	SCH	0	h	0	h

2	Learning outcomes/competences: The students are able to present algorithms independently of the programming language. They can independently create small programmes using the C programming language. They are able to understand C programmes written by others. The students know the basic elements of imperative programming and can apply them in programming. Students are familiar with the basic data types of imperative programming languages and are able to define composite data types.
3	Contents: Teaching content: – Formal basics of computer science (set theory, Boolean algebra, logic of statements, Turing machine, decidability, von Neumann architecture) – Algorithms and representation of algorithms – The programming language C and its standard libraries – Basic data types, composite data types and operators – Expression and instruction – Control structures of imperative programming (blocks, loops, conditional statement) – Functions, scopes and recursions – Efficiency of algorithms
4	Forms of teaching: Lecture, seminar-based teaching with exercises, practical course
5	Participation requirements: Formal: None Content: None
6	Forms of assessment: Written examination, combination examination, performance examination 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) Apparative Biotechnology B.Sc. and Mechatronics B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr. rer. nat. Martin Hülse
11	Other information: Literature and other sources will be announced at the beginning of the course.
12	Language:

	German

Computer Science 2 – Object-Oriented Programming					IN2
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1110	150 h	5	2nd semester	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	22.5	h
	Supervised self-study	60 students	0	SCH	0	h	0	h

2 Learning outcomes/competences:

The students are able to analyse, abstract and model tasks in the field of digital data processing and to implement and test them programmatically. Independently of a concrete programming language, they are able to apply the concepts of object-oriented programming in software development. The students are able to efficiently implement small software projects using the object-oriented programming paradigm with the programming language C++. They will be able to apply standard algorithms and data structures to concrete problems in software development and will be in a position to assess the efficiency of the programmes they have developed.

3 Contents:

Teaching content:

- Abstract data type
- Concepts of object-oriented programming (abstraction, data encapsulation, polymorphism, inheritance)
- Modelling language UML
- Unit tests and test-driven SW development
- Brief introduction to SW engineering (idioms, design patterns, architectures)
- Algorithms and data structures

4 Forms of teaching:

Lecture, seminar-based teaching with exercises, practical course

5 Participation requirements:

Formal:	None
Content:	Computer Science 1

6 Forms of assessment:

Written examination, combination examination, performance examination 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)

Apparative Biotechnology B.Sc. and Mechatronics B.Sc.

9 Importance of the grade for the final grade:

according to BRPO

10 Module coordinator:

Prof. Dr. rer. nat. Martin Hülse

11 Other information:

Literature and other sources will be announced at the beginning of the course.

12	Language: German

Integrated Product Development					IP
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1232	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	30	h	45	h
	Tuition in seminars	30 students	2	SCH	30	h	45	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: The students distinguish between different product development processes and know different development methods and tools. They can select and apply these methods in a targeted manner. They are able to solve a technical problem in a methodical, systematic, goal-oriented way and apply guiding rules for methodical development.
3	Contents: Methodical development of products (based on VDI 2206, 2221, 2222, among others) Planning, tasks, specifications/requirements list, development structuring -> Overall function, sub-functions, functional structure, Idea generation/creativity process -> Method overview, discursive and intuitive methods, evaluation of alternative solutions, evaluation procedures. Selected development guidelines (e.g. cost-conscious development, design in accordance with stresses)
4	Forms of teaching: Lecture, seminar-based teaching, practical exercises
5	Participation requirements: Formal: None Content: None
6	Forms of assessment: Written examination, combination examination, performance examination or oral examination
7	Prerequisite for the award of credit points: Module examination pass
8	Application of the module (in the following study programmes) Apparative Biotechnology B.Sc., Engineering Computer Sciences B.Eng., Mechanical Engineering B.Eng. and Mechatronics B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Klaus Dürkopp
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Colloquium					KOL
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1290	90 h	3	6th or 7th semester	each 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: The colloquium is to be assessed as an independent examination. It serves to determine whether the candidate is capable of orally presenting and independently justifying the scientific topic of the bachelor thesis, its subject-related foundations, its interdisciplinary connections and its non-subject-related references, as well as assessing its significance for practice.
3	Contents: - Content of the thesis according to the topic - Disputation on the procedure in the preparation of the thesis and the questions that arose in the context of the thesis
4	Forms of teaching: Oral examination for the bachelor thesis
5	Participation requirements: Formal: None 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) Applied Mathematics B.Sc., Apparative Biotechnology B.Sc., Electrical Engineering B.Eng., Engineering Computer Sciences B.Eng., Mechanical Engineering B.Eng., Mechatronics B.Sc., Renewable Energies B.Eng. and Industrial Engineering and Management B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Anton Klar
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Construction Basics					KG
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1129	150 h	5	1st semester	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	22.5	h
	Supervised self-study	60 students	0	SCH	0	h	0	h

2	Learning outcomes/competences: The students have a basic knowledge of materials science as well as knowledge of technical representation methods, know the basics of standardisation, dimensioning and tolerancing and can independently create simple constructions and represent them in accordance with standards. The students master the use of a 3D CAD system and can independently create solids and assemblies as well as derive 2D drawings. They understand technical drawings and know different possibilities of construction analysis with the CAD system. Students can structure complex constructions independently and have mastered the basics of creating design documentation
3	Contents: Standardisation. Drawing reading. Dimensional, shape and positional tolerances. Fits. Technical surfaces. Fundamentals of Materials Science. Structure and functioning of CAD systems. Input and processing of geometric data. Application of CAD systems, documentation of designs. Methods of design analysis
4	Forms of teaching: Lecture, exercise, practical course
5	Participation requirements: Formal: None Content: None
6	Forms of assessment: Written examination, performance examination 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) Apparative Biotechnology B.Sc. and Mechatronics B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Herbert Funke
11	Other information: Literature: Hoischen: Technisches Zeichnen; Labisch: Technisches Zeichnen, various DIN standards Further literature will be announced at the beginning of the course.

12	Language: German

Mathematics 1					MA1
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1149	150 h	5	1st semester	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	2	SCH	30	h	45	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 are familiar with the mathematical way of working. Simple to moderately difficult mathematical problems can be solved independently. Students are able to apply the methods and procedures they have learned and their mathematical correlations to technical problems and to work out solutions to these problems.
3	Contents: - Number systems and algebraic equations, amount equations - Definition of functions and curves, basic terms - Limit value and continuity - Important functional classes - Complex numbers and their application - Differentiating a function and its rules, curve discussion - Integration - Application to technical issues
4	Forms of teaching: Lecture, seminar-based teaching with exercises
5	Participation requirements: Formal: None Content: Knowledge of school mathematics
6	Forms of assessment: Written examination, combination examination or oral examination
7	Prerequisite for the award of credit points: Module examination pass
8	Application of the module (in the following study programmes) Apparative Biotechnology B.Sc. and Mechatronics B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Rolf Naumann
11	Other information: Literature will be announced at the beginning of the course. Papula, Mathematik für Ingenieure und Naturwissenschaftler, Bd. 1und Bd. 2
12	Language: German

Mathematics 2					MA2
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1155	150 h	5	2nd semester	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	2	SCH	30	h	45	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:

Based on the knowledge acquired in Mathematics 1, the students can describe and solve complex multidimensional problems from technology and natural sciences using mathematical methods.
The ability to think abstractly and the competence to find solutions are further developed.

3 Contents:

- Basic concepts of vector algebra and applications in geometry
- Linear algebra: Calculator operation with vectors and matrices
- Linear systems of equations and eigenvalue problems
- Multidimensional differential calculus with applications
- Integration of rotationally symmetrical bodies, arc lengths,

4 Forms of teaching:

Lecture, seminar-based teaching with exercises

5 Participation requirements:

Formal:	None
Content:	Event Mathematics 1 (1149)

6 Forms of assessment:

Written examination, combination examination or oral examination

7 Prerequisite for the award of credit points:

Module examination pass

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

Apparative Biotechnology B.Sc. and Mechatronics B.Sc.

9 Importance of the grade for the final grade:

according to BRPO

10 Module coordinator:

Prof. Dr.-Ing. Rolf Naumann

11 Other information:

Literature will be announced at the beginning of the course. Papula, Lothar, Mathematik für Ingenieure und Naturwissenschaftler, Bd. 1und Bd. 2

12 Language:

German

Mathematics 3					MA3
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1160	150 h	5	3rd semester	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	2	SCH	30	h	45	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:

The students are able to apply ordinary differential equations and their mathematical correlations to technical problems and to work out solutions using various methods.

3 Contents:

- Description of ordinary differential equations of 1st order and their solutions
- Linear differential equations of 2nd order with constant coefficients
- Example from mechanics and electrical engineering
- Systems of linear differential equations with constant coefficient
- Solution with the help of eigenvalues and eigenvectors
- Numerical solution methods for non-linear differential equations
- Description of functions and DGL in the Laplace domain
- Introduction to Vector Analysis

4 Forms of teaching:

Lecture, seminar-based teaching with exercises

5 Participation requirements:

Formal:	None
Content:	Module Mathematics 2 (1155)

6 Forms of assessment:

Written examination, combination examination or oral examination

7 Prerequisite for the award of credit points:

Module examination pass

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

Apparative Biotechnology B.Sc. and Mechatronics B.Sc.

9 Importance of the grade for the final grade:

according to BRPO

10 Module coordinator:

Prof. Dr.-Ing. Rolf Naumann

11 Other information:

Literature will be announced at the beginning of the course.
Papula, Lothar, Mathematik für Ingenieure und Naturwissenschaftler, Bd. 2 und Bd. 3

12 Language:

German

Measuring Technology					MT
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1168	150 h	5	3rd semester	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	22.5	h
	Supervised self-study	60 students	0	SCH	0	h	0	h

2	Learning outcomes/competences: Describe the basic design of measuring equipment and frequently used measuring methods or sensors; select the measuring method suitable for the respective application conditions; determine measuring uncertainties; determine possible disturbance variables and select precautions to reduce them; basic features of the development of a computer-aided measuring system for value processing.
3	Contents: Principle of measurement, SI units, structure of technical measuring equipment, measurement errors, measurement uncertainties, disturbance variables and their reduction, analogue and digital signals, general aspects for the selection and use of transducers, time and frequency measurement, current, voltage and power measurement, length, angle and strain measurement, force, torque, temperature and pressure measurement methods, computer-assisted measurement for value processing.
4	Forms of teaching: Lecture, seminar-based teaching with exercises and project tasks, practical course
5	Participation requirements: Formal: None Content: None
6	Forms of assessment: Written examination, combination examination, performance examination 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) Apparative Biotechnology B.Sc., Mechatronics B.Sc. and Industrial Engineering and Management B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr. Dr. Andrea Ehrmann
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Photonics					PHO
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1309	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	30	h	45	h
	Tuition in seminars	30 students	0	SCH	0	h	0	h
	Exercise	20 students	1	SCH	15	h	30	h
	Practical or seminar	15 students	1	SCH	15	h	15	h
	Supervised self-study	60 students	0	SCH	0	h	0	h

2	Learning outcomes/competences: Name and explain the basic concepts, elementary relationships and laws of photonics. Demonstrate and apply the basic means of description and methods of analysis, especially in light technology, laser technology and technical optics. Name the most important areas of application. Understanding the practical significance of photonics and developments driven by photonics. Identify, interpret and design interacting light-generating and light-directing components. Enable the development of independent solutions in application areas of photonics.
3	Contents: Historical overview and current developments in optics, definitions of terms, quantities, units, laws and standards. Spectral eye sensitivity and photometric radiation equivalent, geometric optics, wave optics, photometry, laser effect, holography and interferometry, simulation of optical beam paths, handling of optical laboratory systems. Applications in metrology, production technology, materials processing, biotechnology and medical technology.
4	Forms of teaching: Lecture, exercise and practical course
5	Participation requirements: Formal: Content:
6	Forms of assessment: Written examination, combination examination, performance 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) Apparative Biotechnology B.Sc. and Mechatronics B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Reinhard Kaschuba
11	Other information: The course material is summarised in a lecture-accompanying script, an exercise catalogue, a collection of pictures and a collection of formulas. An up-to-date literature review will be presented in the first lecture hour.

12	Language: German

Physics					PHY
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1319	150 h	5	2nd semester	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	30	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	15	h
	Supervised self-study	60 students	0	SCH	0	h	0	h

2	Learning outcomes/competences: Explain basic physical processes and laws in the fields of mechanics, fluid mechanics, thermodynamics, vibrations, optics and acoustics. Scientific performance and analysis of experiments to verify theoretical facts.
3	Contents: Mechanics (kinematics: one and three-dimensional translation; dynamics: Newton's axioms, different forces, work, energy, power, momentum. Fluid mechanics (hydrostatics: pressure, buoyancy; hydrodynamics: continuity equation, Bernoulli equation, laminar and turbulent flow, friction). Thermodynamics (temperature, heat, thermal expansion, gas laws, internal energy, entropy, circular processes, phase transitions). Oscillations and waves (free damped and undamped oscillations, forced oscillations, superposition of oscillations, harmonic waves, Doppler effect, interference, diffraction). Optics (geometric: reflection, refraction, lenses; wave optics: interference, diffraction). Acoustics (sound wave, sound level, sound spectra, sound propagation).
4	Forms of teaching: Lecture, seminar-based teaching with exercises and project tasks, practical course
5	Participation requirements: Formal: Content:
6	Forms of assessment: Written examination 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) Apparative Biotechnology B.Sc. and Mechatronics B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr. Dr. Andrea Ehrmann

11	Other information:
12	Language: German

Practical Project / Internship					PRA
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1305	900 h	30	7th semester	each semester	20 weeks

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	0	SCH	0	h	900	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 practical project, the activities and learning outcomes imparted in the course of study are to be applied in a practice-oriented manner. To this end, students should work independently on engineering projects and develop suitable solution strategies. The main aim is to teach and expand integration, analysis, problem-solving, presentation and communication skills.
3	Contents: The contents result from the field of activity of the chosen company or enterprise and should include an engineering task. At the end of the practical project, the supervising company is to prepare a record of activities and the students a final report. During the practical project, the students are to be individually and professionally advised by the supervising university lecturers.
4	Forms of teaching: Seminar-based teaching with exercises as accompanying guidance
5	Participation requirements:
	Formal: None
	Content: None
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) Apparative Biotechnology B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Anton Klar
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Quality Management					QM
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1229	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	30	h	45	h
	Tuition in seminars	30 students	2	SCH	30	h	45	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: Name and explain the basic terms, elementary connections and laws of quality management. Know, explain and apply the instruments and tools to design, maintain, evaluate and improve quality management. Apply these tools along the entrepreneurial value chain. Optimising business processes in terms of quality-oriented and cost-minimising corporate management. Acquire the ability to independently perform management tasks in quality management. Understand and apply quality management as an integrative thinking approach and as a fundamental corporate and management tool.
3	Contents: History of the QM concept, overview of the current quality management standards, evaluation of the eight principles of QM, development of the essential contents of the ISO 9000 family (especially for the areas of procurement, incoming goods, production and sales), process orientation, project management, measures/programmes for continuous improvement (CIP, Six Sigma, idea management), quality objectives and key figures (balanced scorecard), quality costs, customer satisfaction analyses, benchmarking, customer and supplier relations (supplier audit), legal aspects.
4	Forms of teaching: Lecture, practicals and exercises
5	Participation requirements:
	Formal: None
	Content: None
6	Forms of assessment: Written examination, combination examination, performance examination or oral examination
7	Prerequisite for the award of credit points: Module examination pass
8	Application of the module (in the following study programmes) Apparative Biotechnology B.Sc., Engineering Computer Sciences B.Eng. and Mechatronics B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Reinhard Kaschuba

11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Automatic Control Engineering					RT
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1234	150 h	5	4th semester	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	22.5	h
	Supervised self-study	60 students	0	SCH	0	h	0	h

2	Learning outcomes/competences: Name and explain the elementary relationships, basic concepts and laws of control engineering. Recognise and describe the elementary relationships in the structure of control engineering solutions. Grasp the practical significance of control engineering. Describe and apply the basic means of describing and analysing technical processes. Understand the practical significance of control technology. Enable the development of independent solutions in simple and the system is suitable for a wide range of control engineering applications.
3	Contents: Fundamentals of control engineering, components of control engineering, amplifiers, system description, transfer elements, normalisation and linearisation, time behaviour of transfer elements, frequency behaviour of transfer elements, locus curves, Bode diagram, Laplace transform, analysis and synthesis of analogue and digital control loop elements, simulation of control loops, stability, discontinuous controllers, digital controllers, fuzzy controllers, state controllers.
4	Forms of teaching: Lecture, practicals and exercises
5	Participation requirements: Formal: None Content: None
6	Forms of assessment: Written examination, combination examination, performance examination 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) Apparative Biotechnology B.Sc. and Mechatronics B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr.-Ing. Reinhard Kaschuba
11	Other information: Literature will be announced at the beginning of the course.
12	Language: German

Robotics					ROB
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1240	150 h	5	5th semester	Annual (Winter)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	2	SCH	30	h	45	h
	Tuition in seminars	30 students	1	SCH	15	h	22.5	h
	Exercise	20 students	0	SCH	0	h	0	h
	Practical or seminar	15 students	1	SCH	15	h	22.5	h
	Supervised self-study	60 students	0	SCH	0	h	0	h

2	Learning outcomes/competences: The students know the elementary concepts and basics of standard manipulators. Students master the basic descriptive tools and methods for modelling and calculating the forward kinematics of a kinematic chain. Through the presentation and discussion of current robot systems (incl. mobile robot systems and multimodal sensor systems), the students can grasp both the practical significance of robotics and different approaches to robot development. This will encourage them to think and work independently in the field of robotics and related applications.
3	Contents: Teaching content: - Manipulators - Robot kinematics (incl. mathematical foundations) - Forward and inverse kinematics - Mobile robots - Sensors for mobile robots - Artificial intelligence and robotics - Behaviour-based robotics - Learning robots
4	Forms of teaching: Lecture, seminar-based teaching with exercises, practical course
5	Participation requirements: Formal: None Content: Mathematics 1 and 2, Computer Science, Engineering Mechanics, Electrical Engineering 1 and 2, Physics
6	Forms of assessment: Written examination, combination examination, performance examination 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) Apparative Biotechnology B.Sc., Electrical Engineering B.Eng., Engineering Computer Sciences B.Eng., Mechatronics B.Sc. and Industrial Engineering and Management B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr. rer. nat. Martin Hülse

11	Other information: Literature and other sources will be announced at the beginning of the course.
12	Language: German

Technical English					TEN
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
1263	150 h	5	4th semester	Annual (Summer)	1 semester

1	Course:	Planned group sizes	Scope		Actual contact time / classroom teaching		Self-study	
	Lecture	60 students	0	SCH	0	h	0	h
	Tuition in seminars	30 students	4	SCH	60	h	90	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:

- 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: B1.2 (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) Apparative Biotechnology B.Sc. and Mechatronics B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: OStR Cornelia Biegler-König
11	Other information: Literature will be announced at the beginning of the course. Textbook, additional materials, intranet self-study courses
12	Language: English

Textile Technologies					TEX
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
6004	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	30	h	45	h
	Tuition in seminars	30 students	2	SCH	30	h	45	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: Describing the textile chain, comparing different textile fabrics and materials, indicating the most important textile testing procedures and recent research topics. Students describe, analyse and assess a topic from the textile chain independently.
3	Contents: Textile chain: primary spinning, secondary spinning, weaving, warp and weft knitting, braiding, narrow textiles, finishing, manufacture; textile machines; sustainability in the textile chain; intelligent/functional textiles; physical and other properties of textiles; standards; textile testing instruments. Recent research topics along the textile chain.
4	Forms of teaching: Lecture, hands-on seminar
5	Participation requirements: Formal: Content:
6	Forms of assessment: Project work
7	Prerequisite for the award of credit points: Module examination pass
8	Application of the module (in the following study programmes) Apparative Biotechnology B.Sc., Mechatronics B.Sc., Renewable Energies B.Eng. and Industrial Engineering and Management B.Sc.
9	Importance of the grade for the final grade: according to BRPO
10	Module coordinator: Prof. Dr. Dr. Andrea Ehrmann
11	Other information:
12	Language: English

Elective Module: Apparative Biotechnology					WM
Identification number:	Workload:	Credits:	Study semester:	Frequency of the offer	Duration:
9020	150 h	5	4th/5th/6th semester	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) Apparative Biotechnology B.Sc.	
9	Importance of the grade for the final grade:	
10	Module coordinator: Prof. Dr. rer. pol. Hildegard Manz-Schumacher	
11	Other information:	
12	Language: German	