English translation of the module descriptions for the study program
Bachelor "*Biowissenschaften*" (Biosciences)
University of Potsdam
Version 2014

Title **(BBW 2010 – 1.01)**	Common compulsory module **Mathematics 1**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Prof. Dr. Holschneider None 5 · Lecture (2 hours/week) · Seminar (2 hours/week)
Modalities of the examination	
Pre-examination requirements: Examination:	Solving exercises Written exam (Duration: 2 hours)
Workload	
	· 45 hours attendance time · 105 hours self-study
Course content and learning goals	
The mathematical skills necessary for the studies as well as the later use are obtained. Among other things, the following topics are covered: quantities, elementary functions, sequences and series, limiting values, continuity of functions, differential and integral calculus, Taylor rows, basic principles of linear algebra. After successful completion, the student should be able to master and apply reliably basic mathematical methods. Imparted professional qualifications: This module teaches basic mathematical skills. Students should be enabled to work independently on simple mathematical problems that arise at work. Imparted key qualifications: Application of mathematical methods for the description of biological processes, in particular by way of tables, graphics and functions. Recording quantitative relationships by use of mathematical concepts	

Title **(BBW 2010 – 1.02)**	Common compulsory module **Physics 1**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Prof. Dr. Beta None 6 · Lecture Physics 1 (2 hours/week) · Seminar Physics 1 (2 hours/week) · Practical course in the laboratoy (1 week in February/March)
Modalities of the examination	
Pre-examination requirements: Examination:	Lab reports and oral tests Written exam (Duration: 2 hours)
Workload	
	· 75 hours attendance time · 105 hours self-study
Course content and learning goals	
The module teaches the principles and basic concepts of physics: kinematics of point mass; dynamics of point mass; concept of force in physics; work and energy; dynamics of point mass systems; statics of the rigid body; dynamics of the rigid body; mechanical vibrations; superposition of vibrations; oscillations and waves; phenomenological thermodynamics. The practical course serves to learn basic physical measurement methods and the experimental and the experimental examination of physical facts. It includes the b asic knowledge of the evaluation of measurement uncertainties, an introduction to the computer-aided acquisition and evaluation of measurement data as well as 5 laboratory exercises on the topics of mechanics (2) and thermodynamics (3). Imparted professional qualifications: The students are introduced to the abstract and quantitative modelling of natural science. The analytical and quantitative handling of physical models is learned in the seminar. The module conveys basic skills and knowledge and is independent of the later choice of a specialization and professional orientation. Imparted key qualifications: Interaction and cooperation in the laboratory group (ability to work in a team); documentation and presentation of scientific facts; self-organisation.	

Title **(BBW 2010 – 1.03)**	Common compulsory module **Physics 2**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Prof. Dr. Beta None 6 · Lecture Physics 2 (2 hours/week) · Seminar Physics 2 (2 hours/week) · Practical course in the laboratoy (1 week in September)
Modalities of the examination	
Pre-examination requirements: Examination:	Lab reports and oral tests Written exam (Duration: 2 hours)
Workload	
	· 75 hours attendance time · 105 hours self-study
Course content and learning goals	
The module teaches principles and basic concepts of physics: electrodynamics, optics, introduction to quantum physics, atomic, molecular and nuclear physics, and introduction to the physics of solids. The practical course serves to learn basic physical measurement methods and the experimental examination of physical facts. It includes the basic knowledge of the evaluation of measurement uncertainties, an introduction to the computer-assisted acquisition and evaluation of measurement data as well as 5 laboratory exercises on electricity (1), optics (2), atomic physics (1) and nuclear physics (1). Imparted professional qualifications: The students are introduced to the abstract and quantitative modelling of the natural sciences. The analytical and quantitative handling of physical physical models is learned in the exercises. The module imparts basic skills and knowledge and is independent of the later choice of a specialisation direction and professional orientation. Imparted key qualifications: Interaction and cooperation in the laboratory group (ability to work in a team); documentation and presentation of scientific facts; self-organisation.	

Title **(BBW 2010 – 1.04)**	Common compulsory module **General and Inorganic Chemistry**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Prof. Dr. Holdt None 8 · Lecture (4 hours/week) · Seminar (2 hours/week) · Practical course in the laboratory (2 hours/week)
Modalities of the examination	
Pre-examination requirements: Examination:	Lab reports; ungraded written and oral examinations for practice Written exam (Duration: 2 hours)
Workload	
	· 90 hours attendance time · 150 hours self-study
Course content and learning goals	
The module deals with basic principles and general laws of chemistry. These include: atomic structure and periodic table of the elements, chemical bonding, material and energy balance of chemical reactions, types of reactions, acid/base reaction, redox reactions, dissolution/precipitation reactions and complex reactions as well as selected main group elements and their compounds. The lecture imparts basic knowledge of the technical systematics in chemistry. The seminar serves to repeat and consolidate the lecture material. In the practical course, the acquired knowledge is applied in the laboratory. Imparted professional qualifications: The module provides a basic understanding of general and inorganic chemistry. The students are enabled to establish connections between structure, properties and applications of substances. This includes the confident use of chemical sign language, setting up reaction equations and chemical calculation (stoichiometry). The practical course serves to get to know important basic operations of practical work in chemistry. The students can apply separation operations and apply simple preparative methods. In quantitative inorganic analytics, the students acquire the skills in carrying out basic chemical reactions. The students are enabled to provide transferable basic chemical knowledge, apply their knowledge of chemistry to substances and reactions, understand chemistry as a practical natural science and to assess issues from a chemical perspective. Imparted key qualifications: Scientific thinking (recognizing connections and conclusions); verifying hypotheses through experiments; ability to judge; interaction and cooperation in the laboratory group (self-assessment, ability to work in a team); documentation and presentation of scientific facts; skills and abilities in practical laboratory work.	

Title **(BBW 2010 – 1.05)**	Common compulsory module **Organic Chemistry 1**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Prof. Dr. Bernd Schmidt Successful completion of the module “General and inorganic chemistry” 8 · lecture (3 hours/week) · Seminars (2 hours/week) · Practical course in the laboratory (1 week in September)
Modalities of the examination	
Pre-examination requirements:	a) Successfully completion of the practical course · Successful execution of 5 experiments from the published canon · Timely submission of all reports · Attendance at the integrated seminar b) Successful completion of exercises · Evaluation of six homework sheets (paper or electronic form) distributed over the lecture period · For admission to the exam, 50% of the maximum achievable points of the homework sheets are required
Examination:	Written exam (1.5 hours)
Workload	
	· 96 hours attendance time · 144 hours self-study
Course content and learning goals	
Lecture: Basic knowledge of organic chemistry (binding principles of organic Compounds, fundamental aspects of stereochemistry, knowledge of alkanes, alkenes, alkines, aromatics, organohalogen compounds, amines, nitro compounds, alcohols, ethers, aldehydes and ketones, carboxylic acids and their derivatives, carbohydrates, nucleic acids, peptides, lipids. Seminar: Repetition and application of the lecture contents by solving a variety of exercises. Practical course: Performing selected basic operations of practical work in organic chemistry; learning selected preparative organic methods Imparted professional qualifications: The students: - know the basic principles of organic compound formation and hybridization - have an idea about the spatial structure of organic compounds and understand the formula language - have an overview of the most important substance classes in organic chemistry - are familiar with the nomenclature of organic substance classes. - know the most important reaction types of organic compounds and methods for their production - have basic knowledge about the use of organic compounds and the sources of raw materials - know the fundamental importance of the most important classes of biomolecules and are able to identify functional groups in polyfunctional biomolecules Imparted methodical competences: The students: - are able to use their technical knowledge to translate names and designations of organic compounds and substance classes into structural formulas and vice versa, - are able to predict basic chemical reactions for specific substances from their knowledge of general chemical properties of a substance class, - master the basic experimental methods of organic synthesis chemistry and can experimentally conduct general and simple special paths to given organic compounds, - are able to compare different reaction and synthesis pathways and to make predictions about preferred or disadvantaged paths, - are able to discover and discuss analogies between organic-chemical facts through connection of theoretical knowledge and its application in experiments that are conducted and recorded by themselves, - are able to establish substance- and class-related correlations and to derive from this fundamental general principles of organic chemistry, - are able to apply their acquired knowledge to solve given problems. Imparted key qualifications: Practical course: The students: - are proficient in effective time and resource management by planning work processes independently and implementing them within a defined time frame, - have the necessary ability for self-organization, which enables the parallel realization of several experiments, - have the ability to plan work steps independently and assess the conclusiveness of their concept,	

- are able to create laboratory reports independently and in due time and to use them for further student research projects,
- are able to discuss factual aspects with their fellow students and are able to critically question and evaluate results.

Seminars: The students:
- are able to suggest and discuss solutions for given chemical problems in the study group, to find the solution together and to determine a form of presentation.
- are able to develop a logically structured presentation of scientific facts and to explain them linguistically comprehensible and technically correct on the blackboard.

Share of key qualifications in the exercises: approx. 30 h, corresponding to 1.0 LP.
Total share of key qualifications in the module: 2.0 LP

Title **(BBW 2010 – 1.06)**	Common compulsory module **Basics of Biology**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	PD Dr. Heinken None 9 · Lecture General Botany (2 hours/week) · Lecture General Zoology (2 hours/week) · Seminar General Botany (2 hours/week) · Seminar General Zoology (2 hours/week)
Modalities of the examination	
Pre-examination requirements: Examination:	Laboratory reports and examinations Written exam (2 hours)
Workload	
	· 90 hours attendance time · 180 hours self-study
Course content and learning goals	
The module teaches basic knowledge in Botany and Zoology. In the courses of General Botany and General Zoology, an overview of the construction, function, reproduction and evolution of plants and animals is given. In the practical part, basic knowledge of the macroscopic and microscopic structure of plants and animals is acquired by means of samples. Imparted professional qualifications: The module provides a basic understanding of organismic biology and is independent of the later choice of a specialization and professional orientation. Participants learn the connection between structure and function and get an overview of the functional organization of tissues, organs and organ systems. Imparted key qualifications: Introduction to scientific thinking and working methods; learning of complex scientific issues; manual skills for laboratory practice (especially handling the microscope); identification and documentation of morphological and anatomical structures	

Title **(BBW 2010 – 1.07)**	Common compulsory module **Basics in Biochemistry and Cell Biology**
<u>General information</u>	
Responsible lecturer	Prof. Dr. Gräf
Prerequisites:	Basic knowledge in biology and and chemistry (Modules *Basics of biology* and G*eneral and inorganic chemistry*)
ECTS:	5
Parts of the module:	· Lecture biochemistry (2 hours/week) · Lecture General cell biology (1 hour/week)
<u>Modalities of the examination</u>	
Pre-examination requirements:	None
Examination:	Written exam (1.5 hours)
<u>Workload</u>	
	· 34 hours attendance time · 116 hours self-study
<u>Course content and learning goals</u>	
The biochemistry part of the lecture presents fundamental aspects of the structure, properties and biological function of biopolymers (proteins, carbohydrates and lipids), as well as the principles and regulation of the most important catabolic and anabolic processes. In the field of General Cell Biology, basic knowledge of the structure and function of the cell and its substructures is taught. <u>Imparted professional qualifications</u>: The module provides basic theoretical knowledge about the universal principles of biochemical processes and the structures and functions of pro- and eukaryotic cells. It comprises essential knowledge for all further biochemical studies and lectures in molecular biology and cell biology. By imparting basic knowledge, the students should acquire a scientific way of thinking, which will enable them to develop subject-specific explanations for a specific problem and to derive experimental strategies in the advanced courses (especially in the practical courses). <u>Imparted key qualifications</u>: The lecture material provided in advance enables and requires active participation of the students in the lecture and thus develops the ability to discuss scientific issues.	

Title **(BBW 2010 – 1.08)**	Common compulsory module **Basics of Molecular Biology**
General information	
Responsible lecturer	Prof. Dr. Lenhard
Prerequisites:	Basic knowledge in biology and and chemistry (Modules *Basics of Biology* and G*eneral and Inorganic Chemistry*)
ECTS:	5
Parts of the module:	· Lecture Genetics (2 hours/week) · Lecture Molecular Biology (1 hour/week)
Modalities of the examination	
Pre-examination requirements:	None
Examination:	Written exam (1.5 hours)
Workload	
	· 34 hours attendance time · 116 hours self-study
Course content and learning goals	
In the field of Genetics, basic knowledge about principles and mechanisms of storage, transmission and alteration of biological genetic information is taught. The processes that lead to the implementation of this information are explained. Special attention is given to methods of genetic analysis of biological processes. The lectures of Molecular Biology teach knowledge of the molecular structure of genes, their expression and expression control, and the biosynthesis of proteins. Methods of genetic engineering are part of the lecture. Imparted professional qualifications: The module provides basic theoretical knowledge about the universal principles of molecular biological and genetic processes in prokaryotic and eukaryotic cells and gives essential knowledge for all further biochemical, molecular biological and cell biological courses. By imparting basic knowledge, the students should acquire a scientific way of thinking, which enables them to develop subject-specific explanations in a specific situation and to derive experimental strategies in the advanced courses (especially in the practical courses). Imparted key qualifications: Ability to organize yourself, problem-solving thinking	

Title **(BBW 2010 – 1.09)**	Common compulsory module **Methods of Biochemistry and Molecular Biology**
General information	
Responsible lecturer	Prof. Dr. Seckler
Prerequisites:	Admission only after successful completion of the module *Basics in Biochemistry and Cell Biology (1.07)*. The knowledge and skills imparted in the modules of the 1st academic year (1.01-1.08) are required. Basic knowledge in biology and and chemistry (Modules *Basics of Biology* and G*eneral and Inorganic Chemistry*)
ECTS:	8
Parts of the module:	· Lecture Principles and Methods in Biochemistry and Molecular Biology (2 hours/week) · Seminar (1 hour/week) · Practical laboratory course (4 hours/week)
Modalities of the examination	
Pre-examination requirements:	Laboratory reports and oral examinations; ungraded written exam during the seminar
Examination:	Written exam (1.5 hours)
Workload	
	· 80 hours attendance time · 160 hours self-study
Course content and learning goals	
The subject of the module are the basic working methods in biochemistry and cell and molecular biology. In the lecture, the theoretical basics of the different techniques are taught. The seminars serve as an introduction to the evaluation of the measurement methods discussed. In the practical part, the students perform exemplary experiments on individual procedures for the cell biological and biochemical characterization of cells and tissues as well as the elementary biochemical and molecular biological analysis and purification procedures. Imparted professional qualifications: The module provides a basic understanding of biochemical, molecular and cell biological techniques. Students are introduced to scientific thinking and the experimental approach of molecular life sciences. The module imparts basic skills and knowledge and is independent of the later choice of a specialization and professional orientation. Imparted key qualifications: Interaction and cooperation in the laboratory group (ability to work in a team); documentation and presentation of scientific facts; self-organisation and manual skills for laboratory practice.	

Title **(BBW 2010 – 1.10)**	Common compulsory module **Mathematics 2: Differential equations and graph theory**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Prof. Dr. W. Huisinga Succesful completion of the module *Mathematics 1* 4 · Lecture Mathematics 2 (2 hours/week) · Seminar Mathematics 2 (2 hours/week)
Modalities of the examination	
Pre-examination requirements: Examination:	Solving exercises Written exam (2 hours)
Workload	
	· 60 hours attendance time · 60 hours self-study
Course content and learning goals	
The first part of the module provides an introduction to the theory and application of basic differential equations and basic differential equation systems for the description of biological processes (e.g. population growth, predator-prey cycles). The second part introduces graphs and networks (e.g. protein interaction graphs, gene regulatory/transcription factor networks), deals with dynamics on networks (e.g. Boolean networks) and methods for network analysis (network motifs, such as feedback loops). After passing the module, the student is able to mathematically treat and evaluate differential equations, graphs and networks. Imparted professional qualifications: The module teaches skills in using differential equations to describe biological processes. Imparted key qualifications: Self-organization; ability to solve complex problems in a team (exercises).	

Title **(BBW 2010 – 1.11)**	Common compulsory module **Statistics**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	apl. Prof. Dr. H. Liero Successful completion of the module *Mathematics 1* 4 · Lecture in Statistics (2 hours/week) · Seminar in Statistics (2 hours/week)
Modalities of the examination	
Pre-examination requirements: Examination:	Successful completion of exercises Written exam (1.5 hours)
Workload	
	· 60 hours attendance time · 90 hours self-study
Course content and learning goals	
Starting with methods of descriptive statistics for the graphical representation of frequency distributions and for the determination of statistical ratios, basic concepts of probability theory are introduced and important distributions are treated. Based on this, basic ideas of statistical estimation and testing are explained and applied to important problems. This includes: Point and confidence estimates, t-tests, tests of probabilities, tests in contingency tables and statistical inference in simple models of linear regression and analysis of variance. In the seminar, the procedures covered in the lecture are realized on the computer in the programs EXCEL and R. Imparted professional qualifications: The module enables the student to independently apply simple statistical procedures, interpret results obtained by software programs and evaluate statistical analyses in the literature. Imparted key qualifications: Understanding of basic principles of statistical thinking, independent handling of simple statistical procedures.	

Title **(BBW 2010 – 1.12)**	Common compulsory module **Microbiology and Genetics**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Prof. Dr. Dittmann Successful completion of the module *Basics of Molecular Biology (1.08)* 7 · Lecture Microbiology (2 hours/week) · Microbiological-genetical practical laboratory course (4 hours/week)
Modalities of the examination	
Pre-examination requirements: Examination:	Successful completion of the practical course (laboratory reports) Written exam (1.5 hours)
Workload	
	· 68 hours attendance time · 142 hours self-study
Course content and learning goals	
Theoretical and practical basic knowledge of microbiology as well as classical genetics of pro- and eukaryotes is taught. The lecture gives an overview of important groups of microorganisms. Especially bacteria, fungi and viruses as microbiological objects are discussed. In addition to the general building principle, the following areas are discussed: the basics of taxonomy, the physiology of growth, principles of growth inhibition, biochemical performance, basics of bacterial genetics and aspects of the microbial ecology (cycles of substances, interactions between microbe and human) as well as means of chemotherapy. In the practical course, the students perform basic and modern techniques of microbiology and molecular genetics (inoculation techniques, production of pure cultures, anaerobic techniques, staining methods for the detection of microorganisms, growth curves, molecular identification of bacteria, DNA isolation and sequence analysis, linkage analysis, transformation experiments, herbicide degradation experiments, etc.) Imparted professional qualifications: The module provides a basic understanding of microbiological, genetic and molecular biological techniques. Students are introduced to scientific thinking and experimental approaches in microbiology and genetics. The module imparts basic skills and knowledge and is independent of the later choice of a specialization and professional orientation. Imparted key qualifications: Interaction and cooperation in the laboratory group (ability to work in a team); documentation and presentation of scientific facts; self-organization and manual skills for laboratory practice.	

Title **(BBW 2010 – 1.13)**	Common compulsory module **Physiology**
General information	
Responsible lecturer	apl. Prof. Dr. Baumann
Prerequisites:	Basic knowledge of physics, chemistry, biochemistry, cell biology and molecular biology
ECTS:	12
Parts of the module:	· lecture Animal Physiology (3 hours/week) · lecture Plant Physiology (3 hours/week) · laboratory course in either Animal or Plant Physiology (3 hours/week)
Modalities of the examination	
Examination:	At the end of the lectures (of the winter term) there will be held a written examination (duration: 2 h) on the topics covered in the lectures of Animal and Plant Physiology. After successful completion of the practical course (in the summer term), the grade of the written examination will be communicated to the examination office. The written exam has to be passed before the practical course in the summer term. The practical course is not graded. The practical course is considered to be passed after completion of the following tasks: - successful completion of 8 (out of 9) practical experiments - successful completion of the reports for those 8 experiments - timely submission of the reports for these 8 experiments
Workload	
	· 135 hours attendance time · 225 hours self-study
Course content and learning goals	
In animal physiology, the lecture focuses on cellular, sensory, neuro-, movement, hormone, heart, respiratory and digestive physiology. In plant physiology, basic knowledge of cell, metabolic, developmental and movement physiology is taught. The practical course in animal physiology imparts methodical and conceptual-experimental experiences on the basis of exemplary tasks and thus deepens the lecture topics. The practical tasks usually come from the areas of cell, sensory, neuro-, hormone, muscle, heart and respiratory physiology. The practical course in plant physiology includes tasks that cover a broad spectrum of plant physiology. Thus the practical course complements and deepens the lecture material. Special emphasis is placed on the teaching of modern quantitative analysis methods. Imparted professional qualifications: Students acquire an overview of modern methods of physiology, especially quantitative methods. In this module, students are familiarized with the independent collection and analysis of experimental data; this includes error analysis and the statistical treatment of experimental data. Imparted key qualifications: Organizing experimental work in small groups; structuring experimental work into meaningful individual steps; documenting scientific results and discussing them on the basis of current textbooks knowledge; using modern laboratory equipment	

Title **(BBW 2010 – 1.14)**	**Key Qualifications**
General information	
Responsible lecturer	Prof. Dr. Gräf
Prerequisites:	None
ECTS:	8
Parts of the module:	Freely selectable courses from the "*Studium-Plus*" program at the University of Potsdam, which can be assigned to the following areas: 1. international and intercultural competences 2. languages and media 3. computer and presentation techniques 4. law, politics and economy 5. general educational content on nature, culture, history and society. Examination achievements achieved during studies abroad, or those achieved at university level at non-university research institutions or other universities, can be credited after consultation with the examination board. Programs that have been completed before the beginning of the study program cannot be accepted in general.
Modalities of the examination	
Pre-examination requirements:	None
Examination:	Proof of successful participation according to the requirements of the respective course. All modules must be graded, with the exception of internships. At least one module part must be graded. In the case of several graded module parts, the module grade is calculated by averaging the individual performances taking into account the respective number of credit points.
Course content and learning goals	
The module is intended to provide you with so-called key qualifications for later professional life. These are for example media competence, learning and presentation techniques or the ability to use knowledge, condense and structure information. It is also becoming increasingly important to acquire a general knowledge of legal, economic and social contexts. In addition, skills such as network thinking, team and social competence are required, communication skills, organizational and transfer skills or language skills (keyword: internationalization) and IT knowledge. Depending on your specialization, it can for example make sense to acquire additional knowledge in the following areas: Applied mathematics, statistics, data analysis and modeling, environmental and nature conservation, law or administration, geoecology, climatology, environmental analysis, languages, data processing/computer science, presentation techniques, entrepreneurship, technology and innovation management.	

Title **(BBW 2010 – 2.01)**	Compulsory elective module **Physical Chemistry**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Prof. Dr. Ilko Bald Successful completion of the modules *General and inorganic chemistry* and *Mathematics 1* 9 · lecture (4 hours/week) · Seminar (2 hours/week) · practical laboratory course (3 hours/week)
Modalities of the examination	
Pre-examination requirements: Examination:	Laboratory reports and oral examinations during the practical course Written exam (1.5 hours)
Workload	
	· 102 hours attendance time · 168 hours self-study
Course content and learning goals	
The lecture provides an introduction to selected areas of physical chemistry. It covers the basics of chemical thermodynamics, reaction kinetics and electrochemistry. The central subject of the basic practical course in physical chemistry is the application of basic working techniques in the experimental determination of physical-chemical quantities, which are the subject of the lecture. In the seminar, the students apply the topics covered in the lecture by solving exercises. The seminar also serves to consolidate important basic concepts of physical chemistry. Imparted professional qualifications: The module provides basic knowledge of physical chemistry. Students are introduced to the way of thinking and working in this scientific discipline. In the basic practical course, basic abilities and skills in experimental work are developed and consolidated. These are professional qualifications that are important for all specializations in life science and are indispensable for the preparation for a scientific profession. Imparted key qualifications: Cooperation in a team (laboratory group), planning of scientific experiments, evaluation and presentation of scientific results (lab reports).	

Title **(BBW 2010 – 2.02)**	Compulsory module **Basics of Ecological Work**
General information	
Target group of students Responsible lecturer Prerequisites: ECTS: Parts of the module:	Specialization Organismic Biology, 2nd-3rd or 3rd-4th semester Dr. Ewald Weber Basic knowledge in mathematics and chemistry are required. 9 · Lecture General Physical Geography (4 hours/week) · Seminar and exercises Basics of ecological work (5 hours/week)
Modalities of the examination	
Pre-examination requirements: Examination:	Regular active participation in the lecture series Graded course protocol
Workload	
	· 100 hours attendance time · 80 hours self-study
Course content and learning goals	
Imparted professional qualifications: The module imparts geological, geomorphological, climatological, hydrological, vegetation-geographical and pedological basic knowledge, as well as important methods of applied ecology in soil science, vegetation analysis, ecophysiology, zoology. The graduates know basic working methods in ecology: planning and carrying out scientific experiments, data collection and statistical analysis. Imparted key qualifications: Written and oral presentation of scientific results. Ability to work in a team and self-organization skills.	

Title **(BBW 2010 – 2.03)**	Compulsory module **Special Zoology and Botany**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Prof. Dr. Hofreiter Basic knowledge of general biology (Module *Basics of Biology*) 11 · lecture in Special Botany (2 hours/week) · lecture in Special Zoology (2 hours/week) · Botanical taxonomy course (2 hours/week) · Zoological taxonomycourse (2 hours/week)
Modalities of the examination	
Pre-examination requirements: Examination:	Oral exam in botanical taxonomy (1.5 hours) Oral exam in zoological taxonomy (1.5 hours) Written exam (1.5 hours)
Workload	
	· 90 hours attendance time · 240 hours self-study
Course content and learning goals	
The courses of special botany and special zoology provide an overview on the plant kingdom and the animal kingdom on a phylogenetic basis. The treatment of essential systematic groups is based on characteristic types, which demonstrate the diversity and variety and their development. In special exercises, selected representatives of the plant and animal kingdom are systematically classified and the species determined. In field exercises and excursions, the systematic knowledge of native plant and animal species is consolidated and extended under consideration of ecological aspects. Imparted professional qualifications: Basic knowledge of biology, systematics and phylogeny of plants and animals, knowledge of species of the native fauna and flora. Imparted key qualifications: Basic knowledge in experimental design and statistical analysis	

Title **(BBW 2010 – 2.04)**	Compulsory module **Concepts of Ecology**
General information	
Responsible lecturer	PD Dr. Blaum
Prerequisites:	Knowledge imparted by the modules of the first year of study (especially the modules *Basics of biology* and *Mathematics 1*)
ECTS:	5
Parts of the module:	· Lecture in Ecology (4 hours/week)
Modalities of the examination	
Pre-examination requirements:	None
Examination:	Written exam (2 hours)
Workload	
	· 45 hours attendance time · 105 hours self-study
Course content and learning goals	
This module teaches knowledge about the relationships of organisms to their environment and the complex interactions of abiotic and biotic factors in ecosystems. Imparted professional qualifications: Basic knowledge in ecology, with a focus on auto-ecology and population ecology. Introduction to skills for interpreting simple models and calculations. Imparted key qualifications: Abilities to apply basic ecological concepts, acquire additional knowledge by using up-to-date textbooks.	

Title **(BBW 2010 – 2.04)**	Compulsory module **Concepts of Ecology**
General information	
Responsible lecturer	PD Dr. Blaum
Prerequisites:	Knowledge imparted by the modules of the first year of study (especially the modules *Basics of biology* and *Mathematics 1*)
ECTS:	5
Parts of the module:	· Lecture in Ecology (4 hours/week)
Modalities of the examination	
Pre-examination requirements:	None
Examination:	Written exam (2 hours)
Workload	
	· 45 hours attendance time · 105 hours self-study
Course content and learning goals	
This module teaches knowledge about the relationships of organisms to their environment and the complex interactions of abiotic and biotic factors in ecosystems. Imparted professional qualifications: Basic knowledge in ecology, with a focus on auto-ecology and population ecology. Introduction to skills for interpreting simple models and calculations. Imparted key qualifications: Abilities to apply basic ecological concepts, acquire additional knowledge by using up-to-date textbooks.	

Title **(BBW 2010 – 2.05)**	Compulsory module **Fundamentals of Organismic Biology**
General information	
Target group of students	Specialization Organismic Biology, 4th semester
Responsible lecturer	Prof. Dr. Eccard
Prerequisites:	The knowledge acquired through the modules of the previous semesters and especially *Basics of Biology A and B* and *Ecology A* are assumed.
ECTS:	12
Parts of the module:	- Lecture in Evolutionary Biology (2 hours/week) - Lecture in Scientific Fundamentals of Nature Protection (2 hours/week) - Lecture Behavioral Biology (2 hours/week) - Lecture series Current Research in Organismic Biology (2 hours/week) - Botanical field exercises (1 week in summer term) - Zoological field exercises (1 week in summer term)
Modalities of the examination	
Pre-examination requirements:	Herbarium; Oral exam on field exercises in botany (duration: 15min); Protocol on field exercises in zoology Attendance at the Lecture series
Examination:	Written exam (2 hours)
Workload	
	· 150 hours attendance time · 210 hours self-study
Course content and learning goals	
Lecture Evolutionary Biology: the historical development to the synthetic theory of evolution as well as the basic mechanisms of evolution are introduced. Micro- and macroevolutionary processes are explained and illustrated by examples. Emphasis is placed on interactions between genotype and phenotype and molecular evolutionary processes. Scientific Fundamentals of Nature Protection covers the topics methods, basics and goals of a scientifically based, modern nature protection. The lecture Behavioral Biology presents the importance of information processing and behavioural control for the individual and the population. In field exercises and excursions, the systematic knowledge of native plant and animal species is consolidated and expanded, taking into account ecological aspects. The lecture series offers an overview of modern research areas in the above-mentioned disciplines. Imparted Professional Qualifications: basic knowledge in evolutionary biology, the Scientific Fundamentals of Nature Protection, and in Behavioural Biology. Consolidation of taxonomic knowledge. Imparted key qualifications: Skills for understanding the essential content of the presented subjects and to acquire additional knowledge by working with modern textbooks. Among other things, the lecture series is intended to enable students to decide whether they should apply for a master's degree in organismic biology.	

Title **(BBW 2010 – 2.06)**	Compulsory module **Systems Ecology**
General information	
Responsible lecturer	Prof. Dr. Gaedke
Prerequisites:	Successful completion of the modules *Ecology A*, *Mathematics 2*, and of all modules of the 1st and 2nd semester
ECTS:	9
Parts of the module:	- Lecture Ecology II (2 hours/week) - Practical course Ecology II (2 hours/week) - Seminar Ecology (2 hours/week) - Instructions for scientific work (2 hours/week)
Modalities of the examination	
Pre-examination requirements:	Seminar contributions, regular attendance of the seminar and the Instructions for scientific work
Examination:	graded protocols and written exam (2 hours)
Workload	
	· 130 hours attendance time · 140 hours self-study
Course content and learning goals	

This module covers the compulsory courses in part II of the bachelor degree program with a focus on ecology. In the lecture 'Systems Ecology' (Ecology II) are taught in depth the functions and properties of natural and anthropogenically influenced ecosystems. Emphasis is placed on biotic communities and diversity, material and energy fluxes in ecosystems, the regulation of food webs and human ecology. In the Practical course, simulations and experiments are performed by use of learning software, to illustrate the theoretical principles taught in the lectures. In addition, the students learn how to document the results in an appropriate form. In the literature seminar the reading and and presentation of original publications in English language will be practiced, and knowldge on general concepts in ecology and in individual disciplines will be deepened. The seminar imparts knowledge and skills for the conception of research projects, editing and presenting scientific literature, and scientific writing. The module grade consists of 60% of the exam grade and 40% of the grade for the practical course.

Imparted Professional Qualifications: a basic understanding of current concepts in ecology, which will be consolidated by practical application during the practical course and seminar and applied to specific ecosystems.

The imparted key qualifications take up a particularly broad area in this module and include the practice of the following skills: independent performance and documentation of simulation experiments using different software packages, different techniques for researching original literature, independent exploration of the latest research results by reading and presenting selected publications in international journals, techniques for preparing scientific publications and poster presentations according to current international standards.

Title **(BBW 2010 – 2.07)**	Compulsory elective module **Organismic Biology**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Dr. Rüdiger Knösche See prerequisites for participation in the individual courses 23 Freely selectable courses from the range of courses offered by the Institute of Biochemistry and Biology with a meaningful relation to the to the intended bachelor thesis and to deepen the knowledge about the structure, functioning and regulation of populations, communities and ecosystems in different habitats, and with the aim of preparing for the bachelor thesis. Deviations from this regulation are possible, but always require the prior approval of the module coordinator.
Modalities of the examination	
Pre-examination requirements Examination:	Completion of all courses in the total amount of 23 ECTS, of which at least 8 ECTS are in the form of lectures, 6 ECTS the form of practical courses and 5 days (1 ECTS) in the form of excursions (Note: The excursions do not necessarily have to be taken be completed within the framework of the elective module). Accounting of the performances after prior registration for the examination in PULS
Workload	
	· 690 hours
Course content and learning goals	
In the courses of this module, special knowledge and methodological skills can be acquired at the student's own choice, which on the one hand serve the preparation for the bachelor thesis and on the other hand are already oriented towards a future specialization during the studies. Imparted key qualifications: Literature research, project work, teamwork, laboratory techniques, computer-aided data processing, presentation techniques	

Title **(BBW 2010 – 2.11)**	Compulsory module **Molecular Biology 2**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Prof. Dr. Müller-Röber Successful completion of the module *Basics of Molecular Biology* and the knowledge taught in the other modules of the semesters 1-3 11 · Lecture in molecular biology (2 hours/week) · Internship (3 weeks full-time) · A compact seminar on practical molecular biology (2 days) · One of the following lectures: ◦ Lecture in evolutionary biology (2 hours/week) ◦ Lecture and seminar in protein structural biology (2 hours/week)
Modalities of the examination	
Pre-examination requirements: Examination:	Presentation in the seminar and protocol of the internship Written exam in molecular biology (45 minutes) + one of the following exams: · Written exam in evolutionary biology (45 minutes) · Oral exam in protein structural biology (20 minutes)
Workload	
	· 160 hours attendance time · 170 hours self-study
Course content and learning goals	
The lecture Molecular Biology deals with central aspects of molecular biology and genome research (gene regulation in pro- and eukaryotes, operons, regulons, cis-elements, transcription factors, DNA-protein interactions, processing of RNA, non-coding RNAs, retroviruses) and important molecular biological techniques (DNA sequencing, cDNA and genomic libraries, cloning techniques (heterologous screening, functional cloning, differential screening, identification of genes of inherited diseases, etc.). In the lectures of Evolutionary Biology, the historical development towards the synthetic theory of evolution and basic evolutionary mechanisms are presented, and micro- and macroevolutionary processes are explained and illustrated by examples. Thereby the focus is on interactions between genotype and phenotype and molecular evolutionary processes. In addition, applications of molecular biological techniques in evolutionary biology are presented. Main topics of the lectures and seminars in protein structural biology are the principles of polypeptide structure, the three-dimensional structure, stability and function of proteins, protein structure databases, as well as techniques and programs for visualization and analysis of 3-D protein structures. In the research internship, students gain their first practical experience in the application of molecular biological methods for a research project in molecular biology. They present the project and their results in a seminar. Imparted professional qualifications: The students know essential mechanisms of gene regulation and the role and function of nucleic acids. They are familiar with the principles of the most important techniques of genome research and have gained first practical experience in a research group. After successful completion of the module variant Molecular Biology/Evolution Biology, they know essential evolutionary mechanisms and processes and independently find experimental approaches to answer questions in the field of molecular evolutionary biology. After completion of the module variant molecular biology/protein structural biology, they are familiar with the structural principles of proteins and nucleic acids and can understand protein:nucleic acid recognition mechanisms using current software based on 3D- structural data illustrate. Imparted key qualifications: Ability to work independently and in depth on scientific issues using textbooks and scientific publications. Ability to use databases and programs. Ability to present scientific facts. Ability to work in a team of a research group.	

Title **(BBW 2010 – 2.12)**	Compulsory module **Immunology and Biotechnology**
General information	
Responsible lecturer	Prof. Dr. Arndt
Prerequisites:	The knowledge and competencies acquired in the modules of the first three semesters
ECTS:	6
Parts of the module:	· Lecture in Immunology (2 hours/week) · Lecture in Biotechnology (2 hours/week)
Modalities of the examination	
Pre-examination requirements:	None
Examination:	Written exam (2 hours)
Workload	
	· 45 hours attendance time · 135 hours self-study
Course content and learning goals	
Subject of the module is the introduction to immunology and biotechnology. This includes for immunology: characteristics of innate and acquired immunity; organs, cells and molecules of the immune system; mechanisms of induction of immune defense; effector mechanisms of immune defense; genetic and molecular aspects of antibody and T-cell-receptor variability; evolution of adaptive immune defense, regulation of immune response. For biotechnology, this includes: Organisms used in biotechnology; selection of high producers; basics of biotechnological production (substrates, fermenter technology, purification of biotechnological products); enzyme technology; cell cultures; animal experiments. Imparted professional qualifications: The module imparts the basics of immunology and biotechnology and deals especially with current and not yet clarified issues. The methodical and content-related aspects of these disciplines are important basics for different fields of life science. The acquired knowledge is therefore important for a biochemical or a molecular biological/physiological specialization and for a professional orientation. Imparted key qualifications: First and foremost, the understanding of the relationships between solved and unsolved problems is conveyed and the necessity of dealing with the numerous open questions is presented. Immunology as well as biotechnology are taught as disciplines with an enormous daily increase of knowledge, so that the module shows, exemplary for all life sciences, that active work requires more than knowledge of the subject.	

Title **(BBW 2010 – 2.13)**	Compulsory module **Bioinformatics**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Prof. Dr. Selbig The knowledge acquired in the modules of the first two years of study 4 · Lecture Introduction to Bioinformatics (2 hours/week) · Seminar (1 hours/week)
Modalities of the examination	
Pre-examination requirements: Examination:	None Written exam (1.5 hours)
Workload	
	· 34 hours attendance time · 86 hours self-study
Course content and learning goals	
The lecture provides an overview of important areas of bioinformatics: basics of computer use, analysis of biological sequences, analysis and prediction of protein structures and statistical bioinformatics. Practical knowledge will be acquired in the seminars. Imparted professional qualifications: Students learn about the interdisciplinary character of bioinformatics and are enabled to perform data analysis tasks independently. The module teaches basic skills for handling the Linux operating system and the statistical program R. Resources and tools freely available on the Internet are presented. Imparted key qualifications: Interaction and communication when solving exercises in groups (ability to work in a team), systematic approach to the analysis and interpretation of experimental data, documentation and presentation of results of data analysis.	

Title **(BBW 2010 – 2.14)**	Compulsory module **Cell Biology**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Prof. Dr. Gräf Successful completion of the module *Physiology* 9 · Lecture in animal cell biology (2 hours/week) · Lecture in plant cell biology (2 hours/week) · Practical laboratory course in cell biology (2 weeks)
Modalities of the examination	
Pre-examination requirements: Examination:	Oral exams during the practical course Written exam (2 hours)
Workload	
	· 125 hours attendance time · 145 hours self-study
Course content and learning goals	
The module covers current topics of molecular processes at the cellular and subcellular level in theory and practice. Imparted professional qualifications: In the lecture, the knowledge acquired in the first two years of study on cell dynamics, cell division, signal processing, topogenesis of proteins, and compartmentalization of the cell including biogenesis and evolution of organelles is deepened. In the practical part, selected modern methods of cell biology are learned. This includes biochemical methods for the isolation and characterization of subcellular functional units, subcellular localization on the microscopic level, molecular and cell biological analysis of development processes and studies on protein expression. Imparted key qualifications: Interaction and cooperation in the internship group (ability to work in a team); documentation and presentation of scientific facts; self-organisation and manual skills for laboratory practice.	

Title **(BBW 2010 – 2.15)**	Compulsory module **Elective Module in Biochemistry/Biology**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Dr. habil. Joerg Fettke None; there can be prerequisites for single modules 6 Free choice of courses from the offer of the Institute of Biochemistry and Biology or the Institute of Nutritional Sciences. The courses to be chosen should complement the other courses attended in the bachelor's program in a meaningful way and cover areas of biology and biochemistry that are relevant to the specialization "Molecular Biology/Physiology". Achievements achieved during studies abroad can be credited after consultation with the examination board.
Modalities of the examination	
Pre-examination requirements: Examination:	None Proof of successful participation according to the requirements of the respective course. At least one course must be graded. Written or other forms of exams must have been passed. The module grade is calculated as the arithmetic mean of the grades, whereby these are weighted with the assigned credit points.
Workload	
	· a total of 180 h present time and self-study (varies depending on composition of modules)
Course content and learning goals	
The module conveys knowledge in disciplines of biochemistry and biology relevant to molecular biology and physiology. Imparted professional qualifications: The module should teach knowledge that has not already been acquired in other modules of the specialization molecular biology/physiology. If possible, the chosen courses should have a meaningful content or methodological reference to the intended bachelor thesis.	

Title **(BBW 2010 – 2.21)**	Compulsory module **Organic Chemistry 2**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Prof. Dr. Linker Successful completion of module *Organic Chemistry 1* (successful completion before admission to the supplementary practical course) 5 - Lecture Organ. Experimental Chemistry 2 (2 hours/week) - Practical course Organic Chemistry 2 (1 week)
Modalities of the examination	
Pre-examination requirements: Examination:	Lab protocols and tests, quality of the preparations Written exam (1.5 hours)
Workload	
	· 63 hours attendance time · 87 hours self-study
Course content and learning goals	
The module deepens the knowledge about reaction mechanisms in organic chemistry, which play a role especially in biochemical processes. The focus is on reactions of carbonyl compounds, organometallics and photochemistry. In addition, the module deals with important classes of natural products such as carbohydrates, amino acids, peptides and nucleic acids. Experiments are presented in the lecture in order to evoke enthusiasm for organic chemistry. The main focus of the supplementary practical course is on modern preparative organic methods such as substitutions, eliminations, additions, redox reactions and reactions of carbonyl compounds. Imparted professional qualifications: Understanding of the basic principles of reaction mechanisms of carbonyl compounds and their importance for biochemical processes. Understanding of the structure of various classes of natural products such as carbohydrates, amino acids, peptides and nucleic acids and their synthesis. The module provides basic knowledge and is independent of any specialization directions and professional orientation. Imparted key qualifications: Especially in the practical course the necessity for teamwork is taught. The execution of practical work in defined time windows inevitably leads to a high degree of self-organization. The documentation of experimental and the characterization of the preparations with regard to identity and purity provide an insight into elementary scientific working methods.	

Title **(BBW 2010 – 2.22)**	Compulsory module **Molecular Biology/Protein Structure Biology**
General information	
Responsible lecturer	Prof. Dr. Müller-Röber
Prerequisites:	Successful completion of the modules *Functional Biology 2* and *Principles and Methods of Biochemistry and Molecular Biology*
ECTS:	6
Parts of the module:	- Lecture Molecular Biology (2 hours/week) - Lecture Protein Structure Biology (1 hour/week) - Tutorial Protein Structural Biology (1 hour/week)
Modalities of the examination	
Pre-examination requirements:	Solving of exercises
Examination:	2 parts: Molecular biology (written: 45 min) Protein Structural Biology (oral: 20 min)
Workload	
	· 45 hours attendance time · 135 hours self-study
Course content and learning goals	
Molecular biology: Central aspects of molecular biology and genome research, and central molecular biological techniques are explained. The lecture has following contents: Gene regulation in prokaryotes and eukaryotes, operons, regulons, cis-elements, transcription factors, DNA sequencing, DNA-protein interactions, processing and splicing of RNA, preparation of cDNA/EST and genomic libraries, cloning techniques (including heterologous screening, functional cloning, differential screening, identification of screening, identification of genes of inherited diseases), non-coding RNAs, retroviruses. Protein Structural Biology: The lecture and exercise on protein structural biology will focus on the principles of polypeptide structure, the three-dimensional structure, stability and function of stability and function of proteins, protein structure databases, and techniques and programs for visualization and analysis of three-dimensional protein structures. Imparted professional qualifications: The module provides insights into key molecular biology processes as well as aspects of the structure of peptides and proteins. Theoretical knowledge for molecular biological analyses and for the elucidation of protein structures will be imparted. Students will be introduced to scientific ways of thinking and will learn how molecular-biological and protein-biochemical questions experimentally can be answered experimentally. Imparted key qualifications: Ability to work independently and in depth on scientific issues using scientific issues based on aspects of molecular biology, genomics and protein structure analysis. Ability to use databases and programs for the analysis and visualization of the structure of peptides and proteins. Ability to present of scientific facts.	

Title **(BBW 2010 – 2.23)**	Compulsory module **Analytical Chemistry**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Prof. Dr. Kleinpeter Successful completion of the modules *General and Inorganic Chemistry* and *Organic Chemistry 1* 6 - Lecture Analytical Chemistry (3 hours/week) - Tutorial Analytical Chemistry (1 hour/week)
Modalities of the examination	
Pre-examination requirements: Examination:	Solving of exercises Written exam (1.5 h)
Workload	
	· 45 hours attendance time · 135 hours self-study
Course content and learning goals	
Subject of the module are the methods of structure elucidation in solution. Main focus: UV-VIS and infrared/Raman spectroscopy (principles, experimental aspects, analytical information, fluorescence); 1H and 13C NMR spectroscopy (effects in the magnetic field, the NMR experiment, chemical shift, coupling, linewidth, information about structure and dynamics, 1D and 2D spectroscopy, NOE, relaxation times); mass spectrometry (MS principles, experimental aspects, molecular mass/elemental composition, fragmentation, applications); combined use of the techniques for identification and structure elucidation of chemical compounds in solution. In the lecture part the theoretical basics of the methods are covered, in the exercise the evaluation of spectra with respect to structural information is learned. Imparted professional qualifications: The module teaches the fundamentals and application of UV-VIS, IR, NMR and MS for the structural elucidation of molecules. The aim is to learn a methodology and approach, to resolve the structure of molecules by the combined application of the methods of structural analysis in solution (in the order: molar mass - molecular formula - configuration - conformation). Imparted key qualifications: Documentation and presentation of structural facts. Acquisition of the ability to structurally clarify synthesis products and isolated natural structurally in solution.	

Title **(BBW 2010 – 2.24)**	Compulsory module **Biochemistry 1**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Prof. Dr. Leimkühler Successful completion of the module *Methods of Biochemistry and Molecular Biology* 8 - Lecture (2 hours/week) - Tutorial Enzymology (1 hour/week) - Practical course preparative biochemistry (6 weeks half-day)
Modalities of the examination	
Pre-examination requirements: Examination:	Submission of a lab report, seminar talk Enzymology Written exam (2 hours)
Workload	
	· 155 hours attendance time · 85 hours self-study
Course content and learning goals	
The basic knowledge of structure and function of enzymes will be deepened. The theoretical part focuses on catalytic mechanisms and their structural basis, coenzymes and their reactions, enzyme regulation by covalent modification. The practical part in a biochemical research group at the University or at a research institute usually includes the purification and characterization of an enzyme, or alternatively of a protein without enzymatic activity or of another natural natural substance. Practicum requirements, e.g.: - Purification of an enzyme via various chromatographic methods, spectroscopic characterization by UV-Vis spectroscopy, fluorescence or CD spectroscopy, identification of cofactors, determination of enzyme activity; - Alternatively, proteins without enzymatic activity can be purified, the proteins must also be must also be characterized in detail and, among other things, binding constants of substrates or other enzymes via protein-protein interactions should be determined, e.g., protein-antibody interactions. The internship should be done in the research groups for either 6 weeks half day or 3 weeks full day. The submission of a detailed internship protocol is a prerequisite for the examination. In the protocol the goals of the internship should be defined, the results should be described and be discussed in detail in connection with the available technical literature. The protocol should be reviewed and approved by the supervisor of the internship before submission. Imparted professional qualifications: The module provides a basic understanding of enzymological issues and techniques. The students will be introduced to the scientific thinking and the experimental approach of enzymology. The module provides basic skills and knowledge in biochemistry and is an important component for the Biochemistry specialization for understanding the subject. Imparted key qualifications: Interaction and cooperation in the practical group (ability to work in a team), documentation and presentation of scientific facts, self-organization and manual skills for laboratory practice, handling of scientific literature, and the ability to present scientific results in presentations.	

Title **(BBW 2010 – 2.25)**	Compulsory module **Biochemistry 2**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Prof. Dr. Seckler Successful completion of the module *Principles and Methods of Biochemistry and Molecular Biology* 11 - Lecture Physical Biochemistry (2 hours/week) - Seminar to the lecture (1 hour/week) - Practical course Biochemistry 2 (4 weeks full day in February/March)
Modalities of the examination	
Pre-examination requirements: Examination:	Solving of exercises, lab protocols and tests Oral exam (30 min)
Workload	
	· 180 hours attendance time · 150 hours self-study
Course content and learning goals	
This core module of the "specialization Biochemistry" deepens biochemical and biophysical knowledge and trains analytical and experimental skills of physical physical biochemistry and enzymology. Subject of the module are the physical and physicochemical fundamentals of biochemical processes and biomolecular interactions, as well as their quantitative analysis. Learning objective is also the understanding of important spectroscopic, hydrodynamic, kinetic, and thermodynamic methods and their practical mastery for useful application in biochemistry. In the course of the seminar, biochemical processes are analyzed quantitatively, and thermodynamic and kinetic parameters are determined. Basics and results of the two-day experiments are presented in seminar presentations by the students and discussed in the plenum with the lecturers. Imparted professional qualifications: Skills for the quantitative analysis of biochemical equilibria and time sequences (kinetics of conformational changes, association reactions, equilibrium setting, practical enzyme kinetics) on the basis of biochemical and biophysical measurement results and for the extraction of thermodynamic and kinetic quantities using linearization procedures and nonlinear regression. Ability to identify mechanisms of enzymatic and other biochemical reactions. Practical skills in the application of biophysical and biochemical techniques in complex experiments with the adjustment of measurement parameters. Imparted key qualifications: Ability to analyze complex scientific issues and to use scientific software (computer skills). Interaction and cooperation in the internship group (teamwork); ability to document and present scientific facts; self-organization and manual skills for laboratory practice.	

Title **(BBW 2010 – 2.26)**	Compulsory module **Analytical Biochemistry and Enzyme Kinetics**
General information	
Responsible lecturer Prerequisites: ECTS: Parts of the module:	Prof. Dr. Leimkühler, Prof. Dr. Wollenberger Successful completion of the modules *Functional Biology 2* and *Principles and Methods of Biochemistry and Molecular Biology* and *Molecular and Cell Biology* 6 - Lecture Enzyme Kinetics (1 hour/week) - Seminar Enzyme Kinetics (1 hour/week) - Lecture Analytical Biochemistry (2 hours/week)
Modalities of the examination	
Pre-examination requirements: Examination:	Solving of exercises in the part Enzyme Kinetics Written exam (2 hours)
Workload	
	· 45 hours attendance time · 135 hours self-study
Course content and learning goals	
The basics of the theory and methods of enzyme kinetics are taught: enzyme kinetic calculations, cooperative ligand binding, mechanism of allosteric control, bi-substrate kinetics, inhibition mechanisms. The seminar serves as an introduction to the evaluation of the enzyme kinetic models. In the part Analytical Biochemistry, concepts of bioanalysis and their applications are taught: Fundamentals and methods of enzymatic and immunochemical analysis, clinical diagnostics, environmental analysis, receptor-based pharmaceutical screening. Imparted professional qualifications: The module provides the basic understanding of enzyme kinetics and the methods of analytical biochemistry. Students will be introduced to the scientific and experimental approach of enzyme kinetics and analytical biochemistry. The module provides basic skills and knowledge in Biochemistry and is an important component for the specialization in Biochemistry for the understanding of the subject. Imparted key qualifications: Interaction and cooperation in exercise problems, independent internet research for solving problems, dealing with scientific literature and scientific literature and the ability to present scientific results in presentations.	