Please note that the following module descriptions are provided without guarantee and are not legally binding. Only the applicable German version is legally binding.

BIO-B-KM1: State of the Art in Biochemistry and Molecular Biology	Number of credit points (CP): **6**

Module type (mandatory or elective module):	Depends on study program
Content and qualification goals of module:	**Content**: Current topics in biochemistry, biotechnology, molecular biology, genetics, cell biology and physiology with emphasis on eukaryotic and prokaryotic model organisms and the scientific fields of the participating professorships **Qualification goals:** 1.) Professional competence: - Students acquire deep insights into the current state of research in selected topics in biochemistry, genetics, molecular biology, cell biology and physiology including suitable experimental approaches to solve scientific problems. 2.) Methodological competence: - Students learn to cope with specialist literature in English. 3.) Action competence (socially relevant and strategic): - Students learn to ask questions after scientific talks in English.
Module (partial) exams (number, form, scope, workload in CP):	Written exam, 120 min
Independent study time (in hours (h)):	90

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lecture series Molecular life sciences (lecture)	3 x 2	-	-	-

Frequency of the module:	winter semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-KM2: Practical Bioinformatics	Number of credit points (CP): **6**
Module type (mandatory or elective module):	Depends on study program
Content and qualification goals of module:	**Content**: Lecture and exercise convey knowledge on the structure and usage of biological data bases and about systems biological aspects of the analysis and interpretation of high-throughput data containing information on cellular molecular components such as genes, metabolites and proteins. Conveyed profession skills: The module conveys knowledge on resources on biological sequences, structures as well as metabolic pathways and ontologies freely available in the internet. Students are enabled to use the statistics tool box R and solve ambitious data analysis tasks independently with it. **Qualification goals:** 1.) Professional competence: - Students understand the application possibilities of bioinformatics tools and methods. - They know important bioinformatics resources for sequence and structure analysis. - They rule the foundations of descriptive and inferential statistics. 2.) Methodological competence: - Students understand the mathematical and computational foundations of basic bioinformatics methods. - They are able to select for a given biological problem with corresponding measurement data the appropriate data analysis and interpretations methods. 3.) Action competence (socially relevant and strategic): - Students are able to present and defend their work with appropriate presentation media to the public. - By team working during the presentation preparation students are able to work together in groups and to tackle together a scientific question
Module (partial) exams (number, form, scope, workload in CP):	Written exam, 90 min
Independent study time (in hours (h)):	120

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lecture and exercise (lecture and exercise)	2L + 2E	-	Test for midterm review	-

Frequency of the module:	Summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM1: Nanobiotechnology	Number of credit points (CP): **11**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: Basic methods of Nanobiotechnology and the scientific concept in relation to Biosensor Technology are taught. Different manipulation and detection techniques are presented and important combinations with biomolecules and sensors and their bioanalytical application are introduced. By means of practically relevant examples the development of single biosensors, their limitations and approaches of optimization are discussed. Further topics are biosensors, Biochip Technology, Molecular Diagnostics, Point of Care Testing (POCT). In the practical part methods of Nanobiotechnology are exemplarily applied and different biosensors are prepared, characterized and tested. For this purpose the students are taught different immobilization techniques for enzymes and proteins as well as different measurement techniques for the characterization of the sensor functioning. A special focus is placed on AFM techniques and optical biosensors. In the seminar current developments in the field of Nanobiotechnology are presented and discussed by the participants of the internship using specialist literature. **Qualification goals:** 1.) Professional competence: The module deals with the basics of Nanobiotechnology, Bioelectronics, Biochip Technology and Biosensor Technology and their techniques. The students are introduced to scientific ways of thinking and learn to develop experimental approaches. In the scope of the module students with a biotechnological and a biochemical orientation are taught specific knowledge in the field of Nanobiotechnology. It is independent from the specialisation chosen later and from the professional orientation. 2.) Methodological competence: - Using English technical literature - Documentation and presentation of scientific issues - Planning of scientific experiments, interpretation and documentation of results - Manual skills for laboratory practice 3.) Action competence (socially relevant and strategic): - The students are able to interact within a group and to work together in a team. - The students are able to plan, carry out and document experimental work. - The students are able to present and defend the results of the experiments in the framework of the seminar.
Module (partial) exams (number, form, scope, workload in CP):	Oral exam on seminar and lab course, 30 min Lab course protocol, approx.. 20 pages
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)	Module (partial) exam accompanying the

		For completing the module	For admission to the module exam	course (number, form, scope)
Research topics of Nanobiotechnology/ Biosensor Technology/ Bioanalytics (lecture and seminar)	2 L + 2 S	-	-	-
Lab course (6 weeks) (lab course)	Supervision: 5	-	-	-

Frequency of the module:	Winter semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM2: Cellular Signal Transduction	Number of credit points (CP): **11**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: This module gives information about theoretical and practically relevant knowledge in the field of intracellular signal transduction. The module focuses on the biochemistry of cellular animal systems, physiological processes of plants are partially included. The module covers subjects like receptors, heterotrimeric G-proteins, ion channels, intracellular second messengers, kinases, phosphatases, proteases, small GTP-binding proteins, regulation of the cell cycle, transcription factors as well as mechanisms for termination of signaling processes. Beside the theoretical basic principles the cellular signaling mechanisms are illustrated by examples from pathobiochemistry. It is intended to explain principles to improve the classification of the transfer of intracellular signals in the human body. This module is completed by attendance of the second part of the module 'Signal transduction II' in the summer semester. Here students present published articles which illustrate basic mechanisms of signal transduction by various clinical pictures. Techniques to rapidly cover the content of a publication and to transmit the take home message to an interested but also critical audience by using power point presentations and the blackboard are trained (multiplication). Additionally the assessment and critical appraisal of published data by reflection of the adequate questions, the used methods, the permitted conclusions which have been drawn from the shown data as well as the allocation of the topics into the context of the respective scientific field are practiced. **Qualification goals:** 1.) Professional competence: The students know the principles of biochemistry, molecular biology and immunology and have deepened knowledge in these fields. The students are able to reflect the relations between these different parts of scientific fields. The students are able to make scientific decisions into the frame of these fields. 2.) Methodological competence: The students are able to handle with a given scientific question by making use of scientific methods. The students know how scientific theories and models are developed and are able to recommend well-founded modifications of standard methods. The students are able to adopt a scientific publication by themselves, to crititically try to get the bottom of the published results and methods and to intelligibly illustrate the major Content to other students. 3.) Action competence (socially relevant and strategic): - The students are able to present and answer back their work to the community of the course by making use of appropriate presentation techniques. The students are able to work together in a team and to work out a problem.

Module (partial) exams (number, form, scope, workload in CP):	Written exam on lecture, 90 min; 70% Lab course protocol, approx. 20 pages, 30%
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lab course (6 weeks) (lab course)	Supervision: 5	-	-	-
Lecture and seminar (lecture and seminar)	2 L + 2 S	Presentation (20 min)	-	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM3: Evolutionary Genomics (Evolution across Scales module D)	Number of credit points (CP): **11**

Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: This course covers approaches and applications of sequence bioinformatics, including the analysis of data from next generation sequencing technologies. The course focuses on comparative analyses of sequence data but also covers approaches for small- and large-scale phylogenetic inference as well as methods and applications of evolutionary genomics research. **Qualification goals:** 1.) Professional competence: Students understand the principles of computational sequence analysis, also in an evolutionary context. 2.) Methodological competence: Students are able to computationally analyze biological sequence data using publicly available software. 3.) Action competence (socially relevant and strategic): Students are able to critically read literature written in English and put content of an article into a broader perspective.
Module (partial) exams (number, form, scope, workload in CP):	Written exam (computer exam), 90 min Written exam on lecture, 90 min
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Bioinformatics of biological sequences/evolutionary genomics (lecture and exercise)	2 L + 2 E	-	-	-
Computer lab course (2 weeks) (lab course)	2	Written report (approx. 20 pages)	-	-

Frequency of the module:	Winter semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM4: Antibody-Technologies	Number of credit points (CP): **11**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: Within the lectures of the module Antibody-technologies participants will initially learn about fundamental topics in immunology. Lectures are going to be held in English. To intensify the insight into current scientific research, teaching includes the illustration of original scientific publications. Integration of those articles will extend the knowledge from textbooks with actual topics of immunological research. The seminar addresses publications as an important part of scientific work. This includes the examination with formal structures of scientific articles as well as the academic writing. During the practical training students will learn about the generation, purification and characterization of monoclonal antibodies. Methods as affinity chromatography, culturing of eukaryotic cell lines or ELISA are used. **Qualification goals:** 1.) Professional competence: The students will be equipped with in-depth theoretical knowledge and hands-on skills in the field of immunology. Furthermore the students will be familiar with the basics of scientific writing, especially in form of scientific publications. 2.) Methodological competence: The students will be able to extrapolate fundamental Content, methods and results from scientific publications and gain basic knowledge how to author scientific publications. In addition they will be capable of using technical methods to process, document and evaluate a given interrogation. 3.) Action competence (socially relevant and strategic): The students will know how to present and defend scientific procedures and results in written form as well as verbal in front of the seminar participants. On that account they use media appropriate for presentations. The students will achieve the ability of planning, performing and analyzing experiments in immunology.
Module (partial) exams (number, form, scope, workload in CP):	Presentation on lecture and seminar, 15 min Lab course protocol, approx. 20 pages
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lab course (6 weeks) (lab course)	Supervision: 5	-	-	-

Lecture and seminar (lecture and seminar)	2 L + 2 S	-	Active participation in the discussion	-

Frequency of the module:	Winter semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM5: Novel Cloning Technologies for Future Biotechnology	Number of credit points (CP): **11**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: The module consists of lecture, seminar and practical training. Main area of interest for this module is the generation and integration of artificial biochemical pathways into organisms like bacteria and plants. As the construction of highly complex pathways is nearly impossible with standard cloning methods, the module will introduce the students to novel cloning technologies for future construction of genes and genomes. Lecture will give main basic aspects of novel cloning technologies and biological pathways. Seminar will introduce examples and show the usage of appropriate software tools. Practical training deals with design of artificial pathways and planning of needed cloning strategies. **Qualification goals:** 1.) Professional competence: Students get deepened theoretical and practical knowledge in the field of synthetic biology and biotechnology. 2.) Methodological competence: Students are able to gather the basics, methods and results of peer-reviewed publication. Students are able to design artificial biochemical pathways and cloning strategies with subject-specific software tools. 3.) Action competence (socially relevant and strategic): Students are able to present and discuss scientific approaches in written as well as orally using appropriate presenting media. Students are able to design, conduct and analyze biochemical pathways and cloning strategies self-reliantly.
Module (partial) exams (number, form, scope, workload in CP):	Presentation on lecture and seminar, 20 min, 70% Lab course protocol, approx. 20 pages, 30%
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lecture and seminar (lecture and seminar)	2 L + 2 S	-	-	-
Lab course (6 weeks) (lab course)	Supervision: 5	-	-	-

Frequency of the module:	Summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM6: Animal Models in Developmental Biology and Cell Physiology	Number of credit points (CP): **11**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: The lecture and the seminar will focus on basic topics and current research questions related to the development and physiology of different animal model organisms. There will be an emphasis on comparative aspects of development and physiology in invertebrates (e.g. *Drosophila*) and in vertebrates including the zebrafish, mouse and rat. The lecture will provide a broad overview of developmental concepts and processes that have been discovered in these animal models. There will also be an extensive theoretical introduction to the relevant methodology. In addition to classical genetic techniques, the lecture will introduce students to modern molecular and genetic tools including "OMICS" technologies, different methods of mutagenesis such as the CRISPR/Cas9 technology, transgenesis methods and genetic tools that have been developed for intravital imaging (e.g. the brainbow technology). **Qualification goals:** This module will provide students with a basic understanding of animal development and physiology and also of the methodology that is available to researchers working on these topics. Students will be introduced to the scientific background and to experimental methods relevant to animal development and physiology. This module is directed towards students with a strong interest to specialize on molecular and cellular aspects of developmental and physiological processes as part of their Masters course. The seminar will introduce students to the critical reading and assessment of primary research literature relevant to this topic. Students will present research papers to both their pears and teachers and learn to discuss and criticize the conclusion of these original works of research. The students will learn how to present their work to a scientific audience using appropriate media and to deal with questions and/or comments in a scientific discussion. These discussions will also open the possibility to review potential future research directions. The practical work will involve the cell biological and physiological analysis of animal development, with a particular emphasis on zebrafish. It will be oriented along current research questions addressed in the Seyfried group. Methods to be used will include among others genetic and phenotypic analyses of zebrafish and invertebrate models using light and fluorescence microscopy.
Module (partial) exams (number, form, scope, workload in CP):	Oral exam, 30 min, 70% Lab course protocol, approx. 20 pages, 30%
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)	Module (partial) exam accompanying the

		For completing the module	For admission to the module exam	course (number, form, scope)
Lab course (6 weeks) (lab course)	Supervision: 5	-	-	-
Animal Models in Developmental Biology and Physiology (lecture and seminar)	2 L + 2 S	-	Oral presentation	-

Frequency of the module:	Winter semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM7: Bioelectronics	Number of credit points (CP): **11**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: The course deals with the concept of biosensors. Topics are various detection and transduction techniques, coupling principles of biomolecules and sensors and their bioanalytical application. The development of biosensors, their limitations as well as solutions to the problems for optimization will be discussed for examples relevant for research and application. Further topics are bioelectrochemistry, biochip technology, molecular diagnostics, point of care testing and nanotechnology. The seminar deals with recent developments in the field of bioanalytics with special attention to nanobiotechnology, point of care diagnostics und bioelectronics. Original publications addressing individual topics will be presented by each student and critically discussed with the group. In the practical part the students will work on a one aspect of an ongoing research project in the field of biosensors- bioelectronics. **Qualification goals:** 1.) Professional competence: The students know the principles of biochemistry, molecular biology and immunology and have deepened knowledge in these fields. The students are able to reflect the relations between these different parts of scientific fields. The students are able to make scientific decisions into the frame of these fields. 2.) Methodological competence: The students are able to handle with a given scientific question by making use of scientific methods. The students know how scientific theories and models are developed and are able to recommend well-founded modifications of standard methods. The students are able to adopt a scientific publication by themselves, to critically try to get the bottom of the published results and methods and to intelligibly illustrate the major content to other students. 3.) Action competence (socially relevant and strategic): - Students can plan, carry out and document experimental work. - Students can present and defend the results of the experiments in public. - The students are able to work together in a team and to work out a problem.
Module (partial) exams (number, form, scope, workload in CP):	Oral exam on lecture and seminar (30 min) Lab course protocol, approx. 20 pages
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)	Module (partial) exam accompanying the

		For completing the module	For admission to the module exam	course (number, form, scope)
Lab course (6 weeks) (lab course)	Supervision: 5	-	-	-
Research topics in biosensor technology (lecture and seminar)	2 L + 2 S	Presentation (20min)	-	-
Frequency of the module:	Winter semester			
Requirement for participation in the module:	-			
Academic organizational unit:	Biologie/Biochemie			

BIO-B-RM8: Immunotechnology	Number of credit points (CP): **11**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: The module serves to deepen immunological and biotechnological knowledge. Particular emphasis is given to biotechnological and medical use of immunological methods. The lecture "Molecular Biotechnology" deals with the molecular aspects of tumor development, production and use of recombinant antibodies and therapeutic molecules, gene therapy, the production of transgenic animals, and gives a brief insight into biotech companies. The lecture "Special Immunology" focuses on tumor immunology, the defense of viral, bacterial and parasitic infections, and vaccination. In addition, immune deficiencies and adverse reactions of the immune system such as allergies are discussed. The module also includes participation in the seminar "Immunotechnology" that deals with the preparation, modification and use of antibodies. Each participant will give a presentation of a research article. The practical part includes modern immunotechnological and biotechnological techniques such as FACS, ELISA, affinity chromatography, cell culture techniques, and recombinant antibodies. **Qualification goals:** 1.) Professional competence: The module provides in-depth knowledge in the field of immunology and molecular biotechnology. Students will learn about the scientific way of thinking and experimental procedures of central methods such as gene therapy or protein engineering. The module covers the basics of modern antibody technologies and discusses the possibilities of the production and use of antibodies or other therapeutic agents. 2.) Methodological competence: Students will learn about modern immunotechnological and biotechnological methods and will be able to apply concepts of the above mentioned subject areas for the solution of current immunological and biotechnological questions. 3.) Action competence (socially relevant and strategic): Students can critically read a research article from the field of immunology and biotechnology and present and discuss it in front of the other participants using appropriate presentation media. Students can present the results of their experimental work in the form of a scientific paper.
Module (partial) exams (number, form, scope, workload in CP):	Oral exam, 30 min; 70% Lab course protocol, approx. 20 pages; 30%
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)	Module (partial) exam accompanying the

		For completing the module	For admission to the module exam	course (number, form, scope)
Lab course (6 weeks) (lab course)	Supervision: 5	-	-	-
Molecular Biotechnology (lecture)	2	-	-	-
Special Immunology (lecture)	2	-	-	-
Immunotechnology (seminar)	1	-	Presentation (approx. 10 min)	-

Frequency of the module:	Winter semester
Requirement for participation in the module:	Basic knowledge of immunology and biotechnology is recommended.
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM9: Synthetic Biology	Number of credit points (CP): **11**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: The module will impart comprehensive knowledge in the field of synthetic biology. The lecture “Synthetic Biology” gives an overview about the development of synthetic biology, about current topics, the iGEM (international Genetically Engineered Machine) competition and encourages the development of new projects. During the seminar, students develop their own research project and write a research proposal that they will introduce to and discuss with the group (as presentation or poster). The practical part includes the planning and execution of a project within the field of synthetic biology. Modern methods of molecular biology, protein engineering, biochemistry and/or cell biology will be applied. **Qualification goals:** 1.) Professional competence: The module provides knowledge in the field of synthetic biology and familiarizes the students with modern issues of synthetic biology and the annual iGEM (International Genetically Engineered Machine) competition. The module provides a modular way of thinking about synthetic biology "parts - devices - system" and encourages the development of own projects. 2.) Methodological competence: The students learn or improve their knowledge in the field of molecular biology, biochemistry, cellular biology and/or protein design. They develop their own project ideas and discuss them within the group. Furthermore, they will have the option to plan their own experimental work, which will be implemented in the laboratory in the practical part of the module. The practical part will deepen experimental skills in biochemistry, molecular biology, cellular biology and/or synthetic biology as well as working according to GLP. Students will learn to research literature. 3.) Action competence (socially relevant and strategic): Students can critically read a research article from the field of synthetic biology and present and discuss it in front of the other participants using appropriate presentation media. Students will be able to present and defend a project idea. Students will be able to introduce results of their experimental work as a poster or scientific presentation.
Module (partial) exams (number, form, scope, workload in CP):	Research proposal (5-10 pp.) with defense (approx. 15 min) Scientific presentation, 20 min
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)	Module (partial) exam accompanying the

		For completing the module	For admission to the module exam	course (number, form, scope)
Lab course (6 weeks) (lab course)	Supervision: 5	-	-	-
Lecture and seminar (lecture and seminar)	2 L + 2 S	-	Short presentation (5-10 min)	-

Frequency of the module:	Summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM10: Modern Methods in Light Microscopy	Number of credit points (CP): **11**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: Topics of this course are modern light-microscopic techniques as used in cell biology and physiology (e.g. confocal microscopy, live cell imaging, 3D microscopy, ion imaging), but also classical light-microscopic techniques (i.e. brightfield microscopy, darkfield microscopy, phase contrast microscopy, polarization microscopy, differential interference contrast microscopy). The lecture presents the microscopic hardware and methods the in theory. The seminar discloses possible applications and problems of selected microscopic techniques. In the practical course, the students will execute exemplary experiments in cell biology and cell physiology in order to train various microscopic techniques. **Qualification goals:** 1.) Professional competence: The students will understand the theoretic fundamentals of the various light-microscopic techniques. They will know possible applications and the limits of the various light microscopic techniques, and they will be able to assess the suitability of microscopic techniques for addressing a scientific problem. 2.) Methodological competence: The students are able to apply single-handedly various light microscopic techniques during research in life sciences. They can identify problems during application of these techniques, and provide and assess possible solutions. 3.) Action competence (socially relevant and strategic): The students are able to work in a team. They can document and present scientific research in a proper manner. They are able to critically assess the applicability of a research technique. They can handle expensive, sensitive scientific equipment in a responsible manner
Module (partial) exams (number, form, scope, workload in CP):	Oral exam, 30 min Lab course protocol, approx. 20 pages
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Modern Methods in Light Microscopy (6 weeks) (lab course)	Supervision: 5	-	-	-
Modern Methods in Light Microscopy (lecture and seminar)	2 L + 2 S	Presentation (30 min)	-	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM11: Physiology of Microorganisms	Number of credit points (CP): **11**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: The lecture Physiology of Microorganisms provides a comprehensive overview about the diversity of microbial life styles and its biochemical, physiological and molecular biological background. A special focus is given to the regulation of microbial activities and to the plethora of metabolic pathways featured by distinct bacterial groups in the different ecosystems. The lecture also includes cellular biology aspects of microorganisms. In the seminar, the students will present and scientifically discuss current microbial trends and problems using recent publications in the field (in English). The practical courses will provide basic and advanced experimental knowledge of microbiology. One course will be concerned with the adaptation of cyanobacteria to different environmental conditions and the specific role of secondary metabolites in the process using molecular biological, biochemical, and chemical analytical and microscopic techniques. . An alternative practical course will focus on microorganisms in extreme habitats and their specific role in carbon cycles using physiological, microscopic and molecular biological techniques. **Qualification goals:** 1.) Professional competence: - The students gain a basic knowledge about different microbial life styles and the diversity of biochemical pathways in microorganisms - The students gain advanced knowledge about phototrophic bacteria and extremophilic microorganisms. - The students can reflect interconnections between the different microbial subdisciplines. - The student can argue and render a judgement about current microbial problems 2.) Methodological competence: - The students are able to independently plan and conduct physiological and molecular biological experiments on microorganisms - The students can present and scientifically discuss original literature related to the physiology of microorganisms - The students are able to deduce original scientific questions related to the physiology of microorganisms and to suggest appropriate techniques to approach these problems. 3.) Action competence (socially relevant and strategic): - The student can describe their experimental work in a written protocol and discuss it related to the scientific context. - The students can present and defend original literature in front of a public audience using appropriate media tools. - The students are able to work in a team and to jointly collaborate on a given scientific question

Module (partial) exams (number, form, scope, workload in CP):	Written exam, 90 min; 70% Lab course protocol, approx. 20 pages; 30%
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Physiology of phototrophic bacteria/Physiology of extremophilic bacteria (6 weeks) (lab course)	Supervision: 5	-	-	-
Physiology of Microorganisms (lecture and seminar)	2 L + 2 S	-	Presentation (30 min)	-

Frequency of the module:	Winter semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM12: Current Aspects and Methods of Plant Cell Biology	Number of credit points (CP): **11**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	The lecture will focus on current research and methods in the cell biological analysis of plant growth and development. The topics discussed will be cellular and sub-cellular functions of plant hormone biosynthesis, transport and response pathways, membrane trafficking and recycling pathways, protein degradation pathways, control of cytoskeletal organisation and cell wall organisation during cell division, cell elongation, cell and tissue polarity establishment. Furthermore relationships between epidermal patterning/cell-fate specification pathways, cell division, cell and tissue polarity establishment will be discussed as well as inter- and intracellular communication during tissue polarity establishment. The practical work will involve the cell biological and physiological analysis of plant cell division, elongation, cell and tissue polarity. It will be oriented along current research questions addressed in the Grebe group. Methods to be used will among others include live imaging of cytoskeletal elements, cell division and cell polarity by employing fluorescent proteins and confocal laser scanning microscopy, fluorescence recovery after photobleaching and immunofluorescence localization methods. Interaction of visualized proteins will be analysed by protein-protein interaction methods and will be verified *in vivo* by phenotypic cell biological analysis of single and double mutants. The seminar will discuss in detail original scientific articles about current topics in plant cell and developmental cell biology. As such, the module will provide students with a basic understanding of current research questions and methods in plant cell biology. The students will be familiarized with the theoretical background, scientific approach and experimental methods in plant cell and developmental cell biology. The module will teach students specialized knowledge and capabilities in the cell biological analysis of biological processes; as such it forms a central part of the Masters course when intending to specialize on genetics, molecular and cellular biology. In particular: - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. - Students can discuss scientific questions in writing in a concise manner. - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	Oral exam, 30 min; 70% Lab course protocol, approx. 20 pages; 30%
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Current aspects and methods of plant cell biology (6 weeks) (lab course)	Supervision: 5	-	-	-
Current aspects and methods of plant cell biology (lecture and seminar)	2 L + 2 S	-	Presentation (30 min)	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM13: Evolutionary and Population Genetics	Number of credit points (CP): **11**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: The lecture will focus on fundamental as well as current research questions and experimental approaches in evolutionary and population genetic analysis with an emphasis on empirical studies, especially on vertebrates. It will include studies on the genetic basis of evolutionary adaptations as well as discussions about the causes and evolutionary effects of demographic changes including populations size changes, population separation and gene flow among populations. The practical work will involve DNA sequencing and/or SNP typing of vertebrate sample sets and will be guided by current research questions that are being addressed in the Hofreiter group. Methods to be used will include DNA extraction, PCR, SNP typing, next generation sequencing library construction, DNA hybridization capture, etc. The seminar will discuss in detail original scientific articles about current topics in evolutionary and population genetics. **Qualification goals:** The module will provide students with a basic understanding of current research questions and methods in evolutionary and population genetics. The students will be familiarized with the theoretical background, scientific approach and experimental methods in evolutionary and population genetics. The module will teach students specialized knowledge and capabilities in the evolutionary and population genetic analysis of biological processes; as such it forms a central part of the Masters course when intending to specialize on genetics, molecular and cellular biology. In particular: - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. - Students can discuss scientific questions in writing in a concise manner. - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	Oral exam, 30 min Lab course protocol, approx. 20 pages
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Evolutionary and Population Genetics (6 weeks) (lab course)	Supervision: 5	-	-	-

Evolutionary and Population Genetics (lecture and seminar)	2 L + 2 S	-	Presentation (30 min)	-

Frequency of the module:	Winter semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM14: Physical Methods in Live Cell Imaging	Number of credit points (CP): **11**

Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: The aim of this course is to illustrate the application of mathematical methods (e.g. fluctuation analysis, signal correlation) in the context of quantitative fluorescence microscopy of biological molecules in living cells. Such cutting-edge methods are capable of providing precise information about protein-protein interaction in complex biological systems. The lecture covers the most modern approaches in the field of quantitative fluorescence microscopy including single molecule approaches (e.g. single molecule FRET, tracking), image correlation methods (e.g. k-space microscopy) as well as super-resolution microscopy (e.g. STED, STORM). A special aim is set on introducing computer programming methods related to the analysis of imaging data (e.g. Montecarlo simulations, Fast-Fourier transformation for correlation analysis) using Matlab. The laboratory classes will provide the chance to deepen the practical knowledge of the students in a selection of the above mentioned microscopy and programming techniques. **Qualification goals:** The students will actively participate in the seminars with one presentation, which will foster their ability to critically read and present scientific literature. In the experimental courses the students will learn to apply various quantitative microscopy methods to study protein dynamics and protein-protein interactions directly in cells. The experimental part is carried out as a small, independent research project, which allows developing skills to independently design and plan scientific experiments and to work in a team.
Module (partial) exams (number, form, scope, workload in CP):	Oral exam, 30 min Lab course protocol, approx. 20 pages
Independent study time (in hours (h)):	105

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lab course, accompanying the lecture (6 weeks) (lab course)	Supervision: 5	-	-	-
Lecture and seminar (lecture and seminar)	2 L + 2 S	-	Presentation (15 min)	-

Frequency of the module:	Summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM15: Metalloproteins	Number of credit points (CP): **11**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: The course deals with metalloenzymes, their biosynthesis, mechanism of action (catalysis) and protein structure. Main parts of the lecture are general principles of the synthesis of complex metallo-cofactors, the role of the metal in these cofactors, and their relevance in the human body including associated diseases and therapies. In the practical part the students will learn the purification and characterization of metall-containing proteins. The purified proteins will be characterized by spectroscopic methods, enzyme kinetics, protein-protein interactions (BLI, ITC, SPR) and metal analyses (ICP-OES). In the seminar original literature of current topics in protein analytics will be discussed. **Qualification goals:** 1.) Professional competence: The modul deals with basics of metal-containing proteins, the role of the metal, enzyme kinetics and protein biochemistry. The students are expected to learn how to solve scientific questions and how to approach them. The students will be familiarized with the theoretical background, scientific approach and experimental methods in the studies of metalloenzymes which comprise 30% of all proteins. The module will teach students specialized knowledge and capabilities in the analysis of biological and biochemical processes; as such it forms a central part of the Masters course when intending to specialize on biochemistry. 2.) Methodological competence: - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. 3.) Action competence (socially relevant and strategic): - Students can discuss scientific questions in writing in a concise manner. - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	Oral exam, 30 min Lab course protocol, approx. 20 pages
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	

Research topics Proteinanalytics and Metalloproteins (lecture and seminar)	2 L + 2 S	-	-	-
Proteinanalytic (6 weeks) (lab course)	Supervision: 5	-	-	-

Frequency of the module:	Summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM16: Current Aspects of Plant Physiology	Number of credit points (CP): **11**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: The lecture will focus on current research questions and experimental approaches in plant physiology and plant cell biology, such as metabolite fluxes, photosynthesis, cell wall formation, cytoplasm genetics, host-symbiont interactions, abiotic stress tolerance and cellular signalling. The practical work will be guided by current research questions that are being addressed at the MPIMP, Potsdam/Golm. Methods to be used will include besides basic physiological and molecular biology methods, qRT-PCR, GC/MS, LC/MS, FTIR and fluorescence spectroscopy. The seminar will discuss in detail original scientific articles about current topics in plant physiology and plant cell biology. **Qualification goals:** 1.) Professional competence: The module will provide students with a basic understanding of current methods and challenges in modern plant physiology and plant cell biology. The students will be familiarized with the theoretical background, scientific approach and experimental methods. Current research questions will be addressed, with a specialized focus on OMICS and high-throughput technologies. 2.) Methodological competence: - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. 3.) Action competence (socially relevant and strategic): - Students can discuss scientific questions in writing in a concise manner - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	Oral exam, 30 min; 70% Lab course protocol, approx. 20 pages; 30%
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Practical Course Current Aspects of Plant Physiology and Plant Cell Biology (6 weeks) (lab course)	Supervision: 5	-	-	-

Current Aspects of Plant Physiology and Plant Cell Biology (lecture and seminar)	2 L + 2 S	-	1 Presentation (30 min)	-

Frequency of the module:	Winter semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM17: Current Problems and Modern Methods in Plant Genetics and Epigenetics	Number of credit points (CP): **11**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: The lecture will focus on current research questions and experimental approaches in the genetic analysis of plant growth and development, such as meristem function, stem cells, control of meristem and organ identity, control of flowering time, regulation of organ and tissue growth, patterning, cellular differentiation, etc. It will also include a discussion of aspects of plant epigenetics. The practical work will involve the genetic analysis of plant organ growth and long-term stress adaptation and will be guided by current research questions that are being addressed in the Bäurle and Lenhard groups. Methods to be used will include genetic mapping using molecular markers, molecular cloning, expression analysis using reporter genes and/or RT-PCR, clonal analysis, etc. The seminar will discuss in detail original scientific articles about current topics in plant genetics and epigenetics. **Qualification goals:** 1.) Professional competence: The module will provide students with a basic understanding of current research questions and methods in plant genetics and epigenetics with a focus on development. The students will be familiarized with the theoretical background, scientific approach and experimental methods in plant genetics and epigenetics. The module will teach students specialized knowledge and capabilities in the genetic analysis of biological processes; as such it forms a central part of the Masters course when intending to specialize on genetics, molecular and cellular biology. 2.) Methodological competence: - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. 3.) Action competence (socially relevant and strategic): - Students can discuss scientific questions in writing in a concise manner - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	Oral exam, 30 min; 70% Lab course protocol, approx. 20 pages; 30%
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Current Problems and Modern Methods in Plant Genetics and Epigenetics (6 weeks) (lab course)	Supervision: 5	-	-	-
Current Problems and Modern Methods in Plant Genetics and Epigenetics (lecture and seminar)	2 L + 2 S	-	Presentation (30 min)	-

Frequency of the module:	Winter semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM18: Microevolution/Conserving the Evolutionary process - (Evolution across Scales module C)	Number of credit points (CP): **11**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: Basic principles of conservation biology and genetics will be taught in an evolutionary framework, including genetic aspects such as inbreeding and drift vs. selection and adaptation. The concept of preserving "the evolutionary process" acting in taxa and ecosystems will be covered and discussed. **Qualification goals:** 1.) Professional competence: Improvement of fundamental knowledge of microevolution and species conservation, including the use of molecular markers and population genetically data analysis. 2.) Methodological competence: Students can apply molecular techniques (such as DNA/RNA isolation, PCR, gel electrophoresis, and cloning) as well as data analyses with several programs. Training in current topics based on publications. 3.) Action competence (socially relevant and strategic): Training in presentations of current topics and processing of self-made questions and results. Students are working in a team and could present results according to scientific standards orally and in writing.
Module (partial) exams (number, form, scope, workload in CP):	Oral exam, 15 min
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Conservation Genetics (lecture)	2	-	Written exam (90 min)	-
How much conservation is needed in Evolution? (seminar)	2	-	Presentation (15 min)	-
Molecular population genetics/Conservation genetics (exercise)	5	-	Protocol	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM19: The Central Role of Evolutionary Biology in Biosciences (Evolution across Scale module A)	Number of credit points (CP): **11**

Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: „Nothing makes sense in biology except in the light of evolution": This module aims at evaluating Dobzhansky's famous phrase by (1) a joint lecture series where different biological disciplines are discussed in the light of evolution, (2) a lecture series dealing with the major disputes/syntheses in evolutionary biology (Lamarckism vs. Darwinism, epigenetics, the modern synthesis, genotypic vs. phenotypic evolution) and a complementary seminar. **Qualification goals:** 1.) Professional competence: Improvement of fundamental knowledge and concepts of evolutionary biology based on current examples. 2.) Methodological competence: Training in current topics based on publications. 3.) Action competence (socially relevant and strategic): Training in presentations in current topics.
Module (partial) exams (number, form, scope, workload in CP):	Home work, approx. 15 pages Oral exam, 15 min
Independent study time (in hours (h)):	240

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
State-of-the-art Evolutionary Biology (lecture)	2	-	-	-
Nothing in biology makes sense, except in the light of Evolution (lecture)	1	-	-	-
Integrative function of Evolutionary Biology (seminar)	1	-	Presentation (15 min)	-
Main seminar Evolutionary Biology/Genetic Colloquium I (seminar)	1	-	Discussion participation	.
Main seminar Evolutionary Biology/Genetic Colloquium II (seminar)	1	-	Discussion participation	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM21: Molecular Biology and Genome Research	Number of credit points (CP): **11**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: The module provides guidance to students in molecular biology, genomics and experimental systems biology at the Science Campus Golm. The lecture provides a broader overview of the fields of modern molecular biology, genomics research and experimental systems biology. It particularly focuses on "omics" technologies and their underlying principles, advantages, limitations and application areas. Topics include: Next Generation Sequencing, ChIP-seq, RNA-Seq, multi-parallel qRT-PCR, high-throughput methods for the analysis of protein-protein interactions, directed and random mutagenesis, biochip technologies, SPOT method, SELEX, phage display, genome editing methods (e.g. ZFNs, TALENs, CRISPR-Cas9). Newly established omics technologies may be included if relevant. The literature seminar focuses on current aspects of modern molecular biology research, genomics and experimental systems biology and presents and discusses recent publications from these fields (with an emphasis on plant biology). The focus is on data collection and their evaluation as well as the appraisal of the research results for future experiments. As part of the 6-week research internship and on the basis of selected research problems students learn how to use various types of experimental methods from the fields of molecular biology, genomics and experimental systems biology. Students will perform research-driven experiments in the laboratory, document the results obtained in the form of laboratory protocols, and concisely summarize the research question, the chosen methodological approaches and the results obtained in written form. Plants and prokaryotic and eukaryotic microbes are the preferred model organisms. In conjunction with the lecture and the literature seminar, the students will learn to assess their own experimental approaches in the light of alternative methods. **Qualification goals:** 1.) Professional competence: Students - acquire an overview of modern methods of molecular biology, genomics and experimental systems biology; - get acquainted with collecting, analysing and presenting experimental data in these research areas; - learn to judge the experimental limitations and strengths of the different sub-disciplines of molecular biology and genome research to find optimal solutions for addressing scientific questions. 2.) Methodological competence: Students - acquire an overview of advanced methods of molecular biology, genomics and experimental systems biology; - gain hands-on experience on techniques of molecular biology, genomics and experimental systems biology;

	- learn how different techniques from these areas can be combined efficiently for exploring new scientific questions; - can develop experimental strategies to approach a scientific question using molecular-biological and genomics techniques. 3.) Action competence (socially relevant and strategic): Students gain the capacity - to present their research using appropriate media; - to work in a team and jointly address a scientific problem in the field of molecular and genome-oriented biology; - to plan experiments effectively and to manage time and resources autonomously in a defined time window; - to self-organize, which enables the parallel realization of experiments; - to design (small) research projects independently and to assess the consistency of the approaches used; - to independently and timely to establish experimental protocols
Module (partial) exams (number, form, scope, workload in CP):	Written exam, 90 min; 70% Lab course protocol, approx. 20 pages; 30%
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lab course (6 weeks) (lab course)	Supervision: 5	-	-	-
New Technologies in Genomics Research (lecture)	2	-	-	-
Literature seminar Plant Genomics and Systems Biology (seminar)	2	Presentation (20 min)	-	-

Frequency of the module:	Winter semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-RM22: Current Research in Biochemistry and Molecular Biology in Local Research Institutes and Biotechnology Companies	Number of credit points (CP): **11**

Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: The module is designed to familiarize students with current research in the areas of Biochemistry and Molecular Biology. For this purpose, students must attend a lecture and seminar of the modules offered under the WPM module list, and in addition they must complete a 6-week practical course in a local research institute or biotechnology company in the Potsdam and Berlin area. **Qualification goals:** - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. - Students will learn how to evaluate and present and document scientific data - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	Oral exam, 30 min; 70% Lab course protocol, approx. 20 pages; 30%
Independent study time (in hours (h)):	95

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Practical course (6 weeks) (lab course)	Supervision: 5	-	-	-
Lecture and seminar (lecture and seminar)	2 L + 2 S	-	Presentation (20 min)	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-VM: Advanced Research Practical	Number of credit points (CP): **5**
Module type (mandatory or elective module):	Mandatory module
Content and qualification goals of module:	**Content**: General introduction into scientific research and the scientific method; literature research; preparatory experiments for the Master thesis. The main qualification goals of this module is to prepare students for their Master thesis via practical work in the laboratory, training in specialized methods and theoretical preparation by literature research. This will allow students to start working on their Master thesis project without time delay. **Qualification goals:** 1.) Professional competence: General introduction into scientific research and the scientific method; literature research; preparatory experiments for the Master thesis. The main qualification goals of this module is to prepare students for their Master thesis via practical work in the laboratory, training in specialized methods and theoretical preparation by literature research. This will allow students to start working on their Master thesis project without time delay. 2.) Methodological competence: - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. - Students will learn how to plan experiments and analyze results. 3.) Action competence (socially relevant and strategic): - Students can discuss scientific questions in writing in a concise manner. - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	Research report for the master thesis (1 page), not graded
Independent study time (in hours (h)):	120

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lab course (4 weeks) (lab course)	Supervision: 4	-	-	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-WM1: Biochemistry A	Number of credit points (CP): **8**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: This lecture focuses on current research questions and experimental approaches in the biochemical analysis of biological processes, such as cell biochemistry, metal-containing proteins, protein-protein and protein-lipid interactions and antibody production and use, etc. Applied aspects of modern biochemistry will be discussed. The practical work will include the biochemical analysis of the different processes and will be guided by current research questions, which will be addressed in the respective research groups organizing the lab course. The methods include protein expression and purification, isolation and analysis of oligosaccharides from glycoproteins, isolation of bacterial glycans, glycobiology, characterization of proteins by spectroscopic methods, measurements of enzyme kinetics, protein-protein and protein-glycan interactions (BLI, ITC, SPR), protein stability and protein conformation or structure, etc. In the seminar original literature of current topics in biochemistry will be discussed. **Qualification goals:** The module will give students a detailed understanding of current research questions and methods in biochemistry with a focus on basic research. Students will become familiar with the theoretical principles, scientific approaches and experimental methods in current biochemical research; they will gain practical experience by exercising these methods. The module will provide special knowledge and skills in the biochemical analysis of biological processes; these represent a central part of the master's program if the intention is to specialize in biochemistry, protein science or biotechnology. - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. - Students can discuss scientific questions in writing in a concise manner. - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	An exam in one of the following forms: Written exam, 90 min Oral exam, 30 min
Independent study time (in hours (h)):	120

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)	Module (partial) exam accompanying the

		For completing the module	For admission to the module exam	course (number, form, scope)
Lecture and seminar (lecture and seminar)	4	-	Presentation (15 min) or Exercises (70%)	-
Lab course (4 weeks) (lab course)	4	Lab course protocol (15 pages)	-	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-WM2: Biotechnology A	Number of credit points (CP): **8**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: This lecture focuses on current research questions and experimental approaches in biotechnology, such as antibody production and use, protein expression and purification, isolation and analysis of oligosaccharides from glycoproteins, isolation of bacterial glycans, glycobiology, nanotechnology, biosensors, novel cloning technologies, etc. The practical work will focus on examples and relevant methods for modern biotechnology and will be guided by current research questions, which will be addressed in the respective research groups organizing the lab course. Methods such as in vitro protein expression and purification, characterization of antibodies and proteins using spectroscopic methods, measurements of protein-protein and protein-glycan interactions (BLI, ITC, SPR), protein stability and protein conformation or structure, the use of biosensors etc. will be taught. In the seminar original literature of current topics in biochemistry will be discussed. **Qualification goals:** The module will provide students with a detailed understanding of current research questions and procedures in biotechnology with a focus on current research problems. These aspects will be addressed by groups at the University of Potsdam and biotechnology companies in the Berlin-Potsdam area. Students will become familiar with the theoretical principles, scientific approaches and experimental methods in current biotechnology, as well as the legal and social aspects; they will gain practical experience by exercising these methods. The module will provide special knowledge and skills in finding biotechnological solutions to existing problems, which will be a central part of the master's program if the student intends to specialize in biochemistry, protein science or biotechnology. - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. - Students can discuss scientific questions in writing in a concise manner. - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	An exam in one of the following forms: Written exam, 90 min Oral exam, 30 min
Independent study time (in hours (h)):	120

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lecture and seminar (lecture and seminar)	4	-	Presentation (15 min) or Exercises (70%)	-
Lab course (4 weeks) (lab course)	4	Lab course protocol (15 pages)	-	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-WM3: Protein Science A	Number of credit points (CP): **8**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: This lecture focuses on current research questions and experimental approaches in protein science, such as in vitro protein expression, purification, functional characterization, structure determination and application in biotechnological contexts, etc. Applied aspects of modern biochemistry will be discussed. The practical work will include the biochemical analysis of proteins and will be guided by current research questions, which will be addressed in the respective research groups organizing the lab course. Methods for in vitro protein expression and purification from prokaryotic and eukaryotic cells, the characterization of proteins by spectroscopic methods, measurements of protein-protein interactions (BLI, ITC, SPR), protein stability and protein conformation or structure will be taught. The design of proteins including binding ligands is of interest. In the seminar original literature of current topics in biochemistry will be discussed. **Qualification goals:** The module will provide students with a detailed understanding of current research questions and methods in protein science with a focus on structural and functional characterization. Students will become familiar with the theoretical principles, scientific approaches and experimental methods of current biochemical analysis of proteins. They should gain practical experience in the application of these methods. The module will provide special knowledge and skills in protein science; these represent a central part of the master's program if the intention is to specialize in biochemistry, protein science or biotechnology. - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. - Students can discuss scientific questions in writing in a concise manner. - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	An exam in one of the following forms: Written exam, 90 min Oral exam, 30 min
Independent study time (in hours (h)):	120

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	

Lecture and seminar (lecture and seminar)	4	-	Presentation (15 min) or Exercises (80%)	-
Lab course (4 weeks) (lab course)	4	Lab course protocol (15 pages)	-	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-WM4: Genome Research and Systems Biology A	Number of credit points (CP): **8**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: This lecture focuses on current research questions and experimental approaches in genomics and systems biology, such as genome structure and evolution, transcriptomics, proteomics and metabolomics, high-throughput analysis and screening, imaging and image analysis, bioinformatics and mathematical modeling of biological processes, etc. Evolutionary and applied aspects of genomics and systems biology in relation to human diseases and plant breeding are discussed. The practical work will include genomic and systems biology analysis of biological processes and will be guided by current research questions that will be addressed in the respective research groups organizing the lab course. Practical work will include methods of molecular cloning, expression analysis using reporter genes and/or RT-PCR, analysis of "next generation" sequencing or microarray data, image analysis, metabolic measurements etc In the seminar original literature of current topics in biochemistry will be discussed. **Qualification goals:** The module will provide students with a basic understanding of current research questions and methods in genomics and systems biology with a focus on genetic model systems. Students will become familiar with the theoretical principles, scientific approaches and experimental methods in genomics and systems biology. They will gain practical experience in the application of these methods. The module will provide special knowledge and skills in the genomic and systems biology analysis of biological processes; these represent a central part of the master's program if the intention is to specialize in genetics and genomics, molecular, cellular and systems biology. - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. - Students can discuss scientific questions in writing in a concise manner. - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	An exam in one of the following forms: Written exam, 90 min Oral exam, 30 min
Independent study time (in hours (h)):	120

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)	Module (partial) exam accompanying the

		For completing the module	For admission to the module exam	course (number, form, scope)
Lecture and seminar (lecture and seminar)	4	-	Presentation (15 min) or Exercises (80%)	-
Lab course (4 weeks) (lab course)	4	Lab course protocol (15 pages)	-	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-WM5: Molecular Biology A	Number of credit points (CP): **8**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: This lecture focuses on current research questions and experimental approaches in molecular biology, such as genome structure and evolution, transcriptomics, high-throughput analysis, novel cloning techniques, functional analysis of genes and proteins, bioinformatics, etc. Applied aspects of molecular biology, especially for human diseases and plant breeding, will be discussed. The practical work will include the molecular biological analysis of biological processes and will be guided by current research questions, which will be addressed in the respective research groups organizing the lab course. Comprehensive methods for molecular cloning, expression analysis using reporter genes and/or RT-PCR, protein interaction screens and protein expression in yeast etc. will be taught. In the seminar original literature of current topics in biochemistry will be discussed. **Qualification goals:** The module will provide students with a basic understanding of current research questions and methods in molecular biology with a focus on genetic model systems. Students will become familiar with the theoretical principles, scientific approaches and experimental methods in molecular biology. They should gain practical experience in the application of these methods. The module will provide special knowledge and skills in the molecular biological analysis of biological processes; these represent a central part of the master's program if the intention is to specialize in genetics and genomics, molecular, cellular and systems biology. - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. - Students can discuss scientific questions in writing in a concise manner. - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	An exam in one of the following forms: Written exam, 90 min Oral exam, 30 min
Independent study time (in hours (h)):	120

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	

Lecture and seminar (lecture and seminar)	4	-	Presentation (15 min) or Exercises (80%)	-
Lab course (4 weeks) (lab course)	4	Lab course protocol (15 pages)	-	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-WM6: Cellular and Developmental Biology A	Number of credit points (CP): **8**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: This lecture focuses on current research questions and experimental approaches in genetic and molecular analysis of cell biology and development, such as cell differentiation, stem cell biology, pattern formation, cell cycle control, cell motility, regulation of organ and tissue growth, morphogenesis, cell differentiation, etc. Interdisciplinary aspects of cell and developmental biology will be discussed, especially with regard to human diseases and plant breeding. The practical work will include the genetic, molecular and cell biological analysis of growth and development and will be guided by current research questions, which will be addressed in the respective research groups organizing the lab course. Methods of light and fluorescence microscopy, antibody staining, molecular cloning, expression analysis using reporter genes and/or RT-PCR, clonal analysis, etc. will be taught. In the seminar original literature of current topics in biochemistry will be discussed. **Qualification goals:** The module will provide students with a basic understanding of current research questions and methods in cell and developmental biology with a focus on genetic model systems. Students will become familiar with the theoretical principles, scientific approaches and experimental methods in cell and developmental biology. They should gain practical experience in the application of these methods. The module will provide special knowledge and skills in the molecular biological analysis of biological processes; these represent a central part of the master's program if the intention is to specialize in genetics and genomics, molecular, cellular and systems biology. - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. - Students can discuss scientific questions in writing in a concise manner. - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	An exam in one of the following forms: Written exam, 90 min Oral exam, 30 min
Independent study time (in hours (h)):	120

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)	Module (partial) exam accompanying the

		For completing the module	For admission to the module exam	course (number, form, scope)
Lecture and seminar (lecture and seminar)	4	-	Presentation (15 min) or Exercises (80%)	-
Lab course (4 weeks) (lab course)	4	Lab course protocol (15 pages)	-	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-WM7: Biochemistry B	Number of credit points (CP): **6**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: This lecture focuses on current research questions and experimental approaches in the biochemical analysis of biological processes, such as cell biochemistry, metal-containing proteins, protein-protein and protein-lipid interactions and antibody production and use, etc. Applied aspects of modern biochemistry will be discussed. In the seminar original literature of current topics in biochemistry will be discussed. **Qualification goals:** The module will give students a detailed understanding of current research questions and methods in biochemistry with a focus on basic research. Students will become familiar with the theoretical principles, scientific approaches and experimental methods in current biochemical research. The module will provide special knowledge and skills in the biochemical analysis of biological processes; these represent a central part of the master's program if the intention is to specialize in biochemistry, protein science or biotechnology. - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. - Students can discuss scientific questions in writing in a concise manner. - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	An exam in one of the following forms: Written exam, 90 min Oral exam, 30 min
Independent study time (in hours (h)):	120

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lecture and seminar (lecture and seminar)	4	-	Presentation (15 min) or Exercises (80%)	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-WM8: Biotechnology B	Number of credit points (CP): **6**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: This lecture focuses on current research questions and experimental approaches in biotechnology, such as antibody production and use, protein expression and purification, isolation and analysis of oligosaccharides from glycoproteins, isolation of bacterial glycans, glycobiology, nanotechnology, biosensors, novel cloning technologies, etc. In the seminar original literature of current topics in biochemistry will be discussed. **Qualification goals:** The module will provide students with a detailed understanding of current research questions and procedures in biotechnology with a focus on current research problems. These aspects will be addressed by groups at the University of Potsdam and biotechnology companies in the Berlin-Potsdam area. Students will become familiar with the theoretical principles, scientific approaches and experimental methods in current biotechnology, as well as the legal and social aspects. The module will provide special knowledge and skills in finding biotechnological solutions to existing problems, which will be a central part of the master's program if the student intends to specialize in biochemistry, protein science or biotechnology. - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. - Students can discuss scientific questions in writing in a concise manner. - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	An exam in one of the following forms: Written exam, 90 min Oral exam, 30 min
Independent study time (in hours (h)):	120

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lecture and seminar (lecture and seminar)	4	-	Presentation (15 min) or Exercises (70%)	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-WM9: Protein Science B	Number of credit points (CP): **6**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: This lecture focuses on current research questions and experimental approaches in protein science, such as in vitro protein expression, purification, functional characterization, structure determination and application in biotechnological contexts, etc. Applied aspects of modern biochemistry will be discussed. In the seminar original literature of current topics in biochemistry will be discussed. **Qualification goals:** The module will provide students with a detailed understanding of current research questions and methods in protein science with a focus on structural and functional characterization. Students will become familiar with the theoretical principles, scientific approaches and experimental methods of current biochemical analysis of proteins. The module will provide special knowledge and skills in protein science; these represent a central part of the master's program if the intention is to specialize in biochemistry, protein science or biotechnology. - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. - Students can discuss scientific questions in writing in a concise manner. - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	An exam in one of the following forms: Written exam, 90 min Oral exam, 30 min
Independent study time (in hours (h)):	120

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lecture and seminar (lecture and seminar)	4	-	Presentation (15 min) or Exercises (80%)	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-WM10: Genome Research and Systems Biology B	Number of credit points (CP): **6**

Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: This lecture focuses on current research questions and experimental approaches in genomics and systems biology, such as genome structure and evolution, transcriptomics, proteomics and metabolomics, high-throughput analysis and screening, imaging and image analysis, bioinformatics and mathematical modeling of biological processes, etc. Evolutionary and applied aspects of genomics and systems biology in relation to human diseases and plant breeding will be discussed. In the seminar original literature of current topics in biochemistry will be discussed. **Qualification goals:** The module will provide students with a basic understanding of current research questions and methods in genomics and systems biology with a focus on genetic model systems. Students will become familiar with the theoretical principles, scientific approaches and experimental methods in genomics and systems biology. The module will provide special knowledge and skills in the genomic and systems biology analysis of biological processes; these represent a central part of the master's program if the intention is to specialize in genetics and genomics, molecular, cellular and systems biology. - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. - Students can discuss scientific questions in writing in a concise manner. - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	An exam in one of the following forms: Written exam, 90 min Oral exam, 30 min
Independent study time (in hours (h)):	120

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lecture and seminar (lecture and seminar)	4	-	Presentation (15 min) or Exercises (80%)	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-WM11: Molecular Biology B	Number of credit points (CP): **6**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: This lecture focuses on current research questions and experimental approaches in molecular biology, such as genome structure and evolution, transcriptomics, high-throughput analysis, novel cloning techniques, functional analysis of genes and proteins, bioinformatics, etc. Applied aspects of molecular biology, especially for human diseases and plant breeding, will be discussed. In the seminar original literature of current topics in biochemistry will be discussed. **Qualification goals:** The module will provide students with a basic understanding of current research questions and methods in molecular biology with a focus on genetic model systems. Students will become familiar with the theoretical principles, scientific approaches and experimental methods in molecular biology. The module will provide special knowledge and skills in the molecular biological analysis of biological processes; these represent a central part of the master's program if the intention is to specialize in genetics and genomics, molecular, cellular and systems biology. - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. - Students can discuss scientific questions in writing in a concise manner. - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	An exam in one of the following forms: Written exam, 90 min Oral exam, 30 min
Independent study time (in hours (h)):	120

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lecture and seminar (lecture and seminar)	4	-	Presentation (15 min) or Exercises (80%)	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-WM12: Cellular and Developmental Biology B	Number of credit points (CP): **6**

Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: This lecture focuses on current research questions and experimental approaches in genetic and molecular analysis of cell biology and development, such as cell differentiation, stem cell biology, pattern formation, cell cycle control, cell motility, regulation of organ and tissue growth, morphogenesis, cell differentiation, etc. Interdisciplinary aspects of cell and developmental biology will be discussed, especially with regard to human diseases and plant breeding. In the seminar original literature of current topics in biochemistry will be discussed. **Qualification goals:** The module will provide students with a basic understanding of current research questions and methods in cell and developmental biology with a focus on genetic model systems. Students will become familiar with the theoretical principles, scientific approaches and experimental methods in cell and developmental biology. The module will provide special knowledge and skills in the molecular biological analysis of biological processes; these represent a central part of the master's program if the intention is to specialize in genetics and genomics, molecular, cellular and systems biology. - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. - Students can discuss scientific questions in writing in a concise manner. - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	An exam in one of the following forms: Written exam, 90 min Oral exam, 30 min
Independent study time (in hours (h)):	120

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lecture and seminar (lecture and seminar)	4	-	Presentation (15 min) or Exercises (80%)	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-WM13: Current Research in Biochemistry and Molecular Biology in Local Research Institutes and Biotechnology Companies B	Number of credit points (CP): **6**

Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: The module is designed to introduce students to current research in the fields of biochemistry and molecular biology. For this purpose, students must attend the lecture and seminar of one of the elective modules and, in addition, complete a 6-week internship at a regional research institute or biotechnology company in Potsdam and Berlin. **Qualification goals:** - Students will learn how to read and critically evaluate original scientific literature in English. - Students will learn how to extract the essential points from original scientific literature. - Students can discuss scientific questions in writing in a concise manner. - Students can present their work to a scientific audience using appropriate media and deal with questions and/or comments in a scientific discussion about their topic. - Students can ask concise, to-the-point questions about possible future research directions to follow up a given problem.
Module (partial) exams (number, form, scope, workload in CP):	Oral exam, 30 min
Independent study time (in hours (h)):	135

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lecture (lecture)	2	-	-	-
Seminar (seminar)	1	-	Presentation (20 min)	-
Lab course (2 weeks; in a research department of a regional research institute or a biotechnological company in Potsdam or Berlin) (lab course)	4	-	Lab course protocol (15 pages)	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie

BIO-B-WM14: Biochemistry and Molecular Biology as Reflected in other Sciences A	Number of credit points (CP): **8**

Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: Students choose from the course catalog of the Faculty of Sciences at the University of Potsdam. **Qualification goals:** 1.) Professional competence: Students - gain an insight into different mathematical and scientific contents and their significance for biochemistry and molecular biology; - will be introduced to the collection, analysis and presentation of experimental data; - can reflect on relationships between sub-disciplines and their significance in approaches to solving scientific problems. 2.) Methodological competence: Students - can work interdisciplinary; - learn how the different techniques from the above-mentioned fields can be combined in a practical way to open up new scientific questions; 3.) Action competence (socially relevant and strategic): Students can decide which interdisciplinary topics are relevant to them.
Module (partial) exams (number, form, scope, workload in CP):	Portfolio review, (report that formulates competences acquired in the module and summarizes the essential aspects in a scientifically way) (min. 1 page per course)
Independent study time (in hours (h)):	150

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lecture and exercise (lecture and exercise)	6	-	Exercises or presentation	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie (20%) Chemie (20%) Mathematik (20%) Physik (20%) Informatik (20%)

BIO-B-WM15: Biochemistry and Molecular Biology as Reflected in other Sciences B	Number of credit points (CP): **6**

Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: Students choose from the course catalog of the Faculty of Sciences at the University of Potsdam. **Qualification goals:** 1.) Professional competence: Students - gain an insight into different mathematical and scientific contents and their significance for biochemistry and molecular biology; - will be introduced to the collection, analysis and presentation of experimental data; - can reflect on relationships between sub-disciplines and their significance in approaches to solving scientific problems. 2.) Methodological competence: Students - can work interdisciplinary; - learn how the different techniques from the above-mentioned fields can be combined in a practical way to open up new scientific questions; 3.) Action competence (socially relevant and strategic): Students can decide which interdisciplinary topics are relevant to them.
Module (partial) exams (number, form, scope, workload in CP):	Portfolio review, (report that formulates competences acquired in the module and summarizes the essential aspects in a scientifically way) (min. 1 page per course)
Independent study time (in hours (h)):	120

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lecture and exercise (lecture and exercise)	4	-	Exercises or presentation	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie (20%) Chemie (20%) Mathematik (20%) Physik (20%) Informatik (20%)

BIO-B-WM16: Biochemistry and Molecular Biology in Practice A	Number of credit points (CP): **8**
Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: Consolidation of biochemical and molecular biological topics and natural phenomena as well as specific scientific techniques and methods. **Qualification goals:** 1.) Professional competence: Students - gain an insight into different mathematical and scientific contents and their significance for biochemistry and molecular biology; - will be introduced to the collection, analysis and presentation of experimental data; - can reflect on relationships between sub-disciplines and their significance in approaches to solving scientific problems. 2.) Methodological competence: Students - can work interdisciplinary; - learn how the different techniques from the above-mentioned fields can be combined in a practical way to open up new scientific questions; 3.) Action competence (socially relevant and strategic): Students can decide which interdisciplinary topics are relevant to them.
Module (partial) exams (number, form, scope, workload in CP):	Portfolio review, (report that formulates competences acquired in the module and summarizes the essential aspects in a scientifically way) (min. 1 page per course)
Independent study time (in hours (h)):	150

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lecture and exercise (lecture and exercise)	6	-	Exercises or presentation	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie (16%) Chemie (12%) Mathematik (12%) Physik (12%) Informatik (12%) Ernährungswissenschaften (12%) Geoökologie (12%) Geowissenschaften (12%)

BIO-B-WM17: Biochemistry and Molecular Biology in Practice B	Number of credit points (CP): **6**

Module type (mandatory or elective module):	Elective module
Content and qualification goals of module:	**Content**: Consolidation of biochemical and molecular biological topics and natural phenomena as well as specific scientific techniques and methods. **Qualification goals:** 1.) Professional competence: Students - gain an insight into different mathematical and scientific contents and their significance for biochemistry and molecular biology; - will be introduced to the collection, analysis and presentation of experimental data; - can reflect on relationships between sub-disciplines and their significance in approaches to solving scientific problems. 2.) Methodological competence: Students - can work interdisciplinary; - learn how the different techniques from the above-mentioned fields can be combined in a practical way to open up new scientific questions; 3.) Action competence (socially relevant and strategic): Students can decide which interdisciplinary topics are relevant to them.
Module (partial) exams (number, form, scope, workload in CP):	Portfolio review, (report that formulates competences acquired in the module and summarizes the essential aspects in a scientifically way) (min. 1 page per course)
Independent study time (in hours (h)):	120

Courses (forms of teaching)	Contact time (in semester hours)	Supplementary work for examination (number, form, scope)		Module (partial) exam accompanying the course (number, form, scope)
		For completing the module	For admission to the module exam	
Lecture and exercise (lecture and exercise)	4	-	Exercises or presentation	-

Frequency of the module:	Winter and summer semester
Requirement for participation in the module:	-
Academic organizational unit:	Biologie/Biochemie (16%) Chemie (12%) Mathematik (12%) Physik (12%) Informatik (12%) Ernährungswissenschaften (12%) Geoökologie (12%) Geowissenschaften (12%)