
Modulhandbuch
Biology - Bachelor's Programme
im Sommersemester 2023
erstellt am 08/06/23

bio215 - Introduction to Biology	5
bio220 - Introductory Zoology-Botany	6
bio233 - Basics in Microbiology and Genetics	8
bio236 - Basics in Biochemistry and Cell Biology	9
bio225 - Basics in Biochemistry, Cell Biology and Genetics	10
bio223 - Introductory Botany (Plant Anatomy and Histology)	11
bio224 - Introductory Zoology (Animal Morphology and Evolution)	12
bio256 - Form and Identification - Flora and Fauna	13
bio295 - Genetics	15
bio265 - General Microbiology	17
bio275 - Basics in Physiology	18
bio285 - Plant Physiology, Molecular Biology and Biotechnology	20
bio255 - Fundamentals of Molecular Ecology	21
bio240 - Flora and Fauna	22
bio260 - General Microbiology	24
bio270 - Basic Concepts in Animal Physiology	25
bio280 - Plant Physiology	26
bio290 - Genetics	27
bio237 - Basics in Microbiology	28
bio300 - Evolutionary Biology	29
bio310 - General Ecology	31

bio325 - Pollination and Dispersal - Concepts	33
bio326 - Pollination and Dispersal - Methods	34
bio327 - Pollination and Dispersal - Methods not just for Schools	35
bio330 - Marine Ecology	36
bio340 - Morphology, Phylogeny, and Evolution of Metazoa	38
bio355 - Microscopical Anatomy	40
bio360 - Marine Biodiversity	42
bio375 - Flora - Advanced Concepts	44
bio376 - Flora - Advanced Methods	45
bio377 - Flora - Advanced Methods not just for schools	46
bio385 - Specific Microbiology	48
bio395 - Plant Molecular Biology and Genetics I	49
bio396 - Plant Molecular Biology and Genetics II	50
bio405 - Introduction to Neurobiology I	51
bio408 - Introduction to Neurobiology I	52
bio415 - Introduction to Neurobiology II	54
bio416 - Experiments in Neurobiology II	55
bio420 - Biochemistry of the Cell	56
bio430 - Analytical Biochemistry	57
bio440 - Microfauna, Mircoflora & Protista of limnic and marine habitats	58
bio450 - Posters, Pictures, Presentations and Papers	60
bio460 - Diversity of marine Invertebrates	62

bio470 - Marine Biology Field Trip	64
bio472 - Marine Biology Field Trip	66
bio473 - Evolutionsgeschichte des Lebens: Leben im Wandel der Erdzeitalter	67
bio480 - Functional Morphology of Plants	68
bio417 - Introduction to Systems Neurobiology - Theory and Practice	69
che101 - Basic Chemistry	70
che102 - Basic Chemistry Laboratory	71
phy910 - Physics for Students of Biology and Dual Subject Chemistry	72
bio150 - Statistics for Biologists	73
mat980 - Mathematics for the Life Sciences	74
che190 - Basic Organic Chemistry	75
che290 - Experimental Organic Chemistry	76
bio251 - Exercises in Biochemistry and Molecular Biology	78
bam - Bachelor's Thesis Module	79

Basismodule

bio215 - Introduction to Biology

Module label	Introduction to Biology			
Modulkürzel	bio215			
Credit points	9.0 KP			
Workload	270 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Basismodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule 			
Zuständige Personen	<p>Gerlach, Gabriele (Module responsibility)</p> <p>Zotz, Gerhard (Module counselling)</p> <p>Sienknecht, Ulrike (Module counselling)</p> <p>Gerlach, Gabriele (Prüfungsberechtigt)</p> <p>Köppl, Christine (Prüfungsberechtigt)</p> <p>Zotz, Gerhard (Prüfungsberechtigt)</p> <p>Sienknecht, Ulrike (Prüfungsberechtigt)</p> <p>Käfer, Simon (Prüfungsberechtigt)</p>			
Prerequisites				
Skills to be acquired in this module	<p>[nop]++ biological knowledge + knowledge of techniques in biology ++ biologically relevant knowledge in the natural sciences and mathematics + cross-disciplinary knowledge and thinking[/nop]</p> <p>The students are enabled to approach their individual planning of studies according to their inclinations and abilities.</p>			
Module contents	Lecture conveys knowledge in - evolution, ecology and biodiversity (WiSe) - animal physiology and developmental biology (SoSe)			
Literatureempfehlungen	Campbell et al. "Biologie", Pearson Sadava et al. "Purves, Biologie", Springer			
Links				
Language of instruction	German			
Duration (semesters)	2 Semester			
Module frequency				
Module capacity	300			
Modullevel / module level	BC (Basiscurriculum / Base curriculum)			
Modulart / typ of module	Pflicht / Mandatory			
Lehr-/Lernform / Teaching/Learning method	Vorlesung			
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten	Type of examination		
Final exam of module	lecture-free periods after each series	2 written examinations (WiSe and SoSe)		
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		6	SoSe und WiSe	84
Seminar (Gefahrstoffverordnung und Arbeitsschutz (PFLICHT für Erstsemester!))			WiSe	0
Tutorial (optinal)			--	0
Präsenzzeit Modul insgesamt				84 h

bio220 - Introductory Zoology-Botany

Module label	Introductory Zoology-Botany
Modulkürzel	bio220
Credit points	9.0 KP
Workload	270 h
Verwendbarkeit des Moduls	<ul style="list-style-type: none">• Bachelor's Programme Biology (Bachelor) > Basismodule• Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule
Zuständige Personen	Ahrichs, Wilko (Module responsibility) Will, Maria (Module responsibility) Bininda-Emonds, Olaf (Module counselling) Zotz, Gerhard (Module counselling) Ahrichs, Wilko (Prüfungsberechtigt) Will, Maria (Prüfungsberechtigt) Zotz, Gerhard (Prüfungsberechtigt) Bininda-Emonds, Olaf (Prüfungsberechtigt) Plewka, Isabelle (Prüfungsberechtigt) Käfer, Simon (Prüfungsberechtigt)
Prerequisites	keine
Skills to be acquired in this module	<p>++ biological knowledge + knowledge of biological working methods ++ biologically relevant knowledge in the natural sciences and mathematics + abstract, logical, analytical thinking + independent learning and (research-based) working + teamwork</p> <p>THEORY:</p> <ul style="list-style-type: none">* To understand the fundamentals of reconstructing phylogenetic relationships* To know the phylogenetic system and ground pattern of high-ranking ancestral animal species* To know the cell structures, organization, and reproduction of plants and animals* To know the morphology and anatomy of individual species <p>PRACTICE:</p> <ul style="list-style-type: none">* To improve and verify the theoretical knowledge acquired from lectures and textbooks by studying the original* To train visual and tactile perception by studying various species* To learn that representations in textbooks are abstractions of a much more complex reality* To be able to criticize representations in textbooks and models* To acquire the knowledge of the function in living animals and plants by studying preserved specimens* Learning how to follow preparation instructions* Learning that the organization of individual species may be highly variable* Preparing records or drawings from the information obtained by original specimens studied
Module contents	<p>GENERAL: Light microscopic methods are applied to study structures in plants and animals. Records in the form of descriptions and drawings.</p> <p>BOTANY: Morphological structure and reproduction of various plant organization types with a focus on the structure of plant tissue. Representation of the relationships between structure and function with regard to absorption processes, transport processes, transpiration, and photosynthesis.</p> <p>ZOOLOGY: Morphological structure of animal tissues. Biology of selected partial taxa and metazoans. Principles of phylogenetic systematics and the phylogenetic position in the animal system of the taxa dealt with.</p>
Literatureempfehlungen	<p>GENERAL:: Campbell: Biologie (Spektrum Verlag) or Purves: Biologie (Spektrum Verlag), latest edition</p> <p>ZOOLOGY: V. Storch: Kükenthal Zoologisches Praktikum, one of the latest editions; Optional: Ax, P.</p>

(1999-2001): Das System der Metazoa (I,II, III), Fischer Verlag.
 Westheide/Rieger (1996): Spezielle Zoologie " First part: Einzeller und Wirbellose Tiere, Gustav Fischer Verlag, Stuttgart; Westheide, Wilfried; Rieger, Reinhard Spezielle Zoologie. Second part: Wirbel- oder Schädeltiere 2003, 714 S., 650 s/w Abb. Gebunden ISBN 3-8274-0900-4.

BOTANY: Script; Kück, Wolff Botanisches Grundpraktikum, 2nd edition, Springer, 2008, UTB; Grundlagen der Botanik, UTB; Lüttge, Kluge, Bauer, Botanik, WILEY-VCH, 2010

Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	jährlich			
Module capacity	unlimited			
Modullevel / module level	BC (Basiscurriculum / Base curriculum)			
Modulart / typ of module	Pflicht / Mandatory			
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Übung			
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten	Type of examination		
Final exam of module	Written examination in the final week of the current part	1 written examination (50%) following the part Zoology 1 written examination (50%) following the part Botany; voluntary bonus (10%) in the second part (botany) PLEASE NOTE: Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.		
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2		28
Exercises		4		56
Tutorial (optional)			WiSe	0
Präsenzzeit Modul insgesamt				84 h

bio233 - Basics in Microbiology and Genetics

Module label	Basics in Microbiology and Genetics			
Modulkürzel	bio233			
Credit points	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Basismodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule 			
Zuständige Personen	<p>Rabus, Ralf Andreas (Module responsibility)</p> <p>Claußen, Maike (Module counselling)</p> <p>Rabus, Ralf Andreas (Prüfungsberechtigt)</p> <p>Claußen, Maike (Prüfungsberechtigt)</p>			
Prerequisites				
Skills to be acquired in this module	<p>++ biological knowledge</p> <p>+ knowledge of biological working methods</p> <p>+ biologically relevant knowledge in the natural sciences and mathematics</p> <p>+ deepened expertise in biological specialist field</p> <p>+ independent learning and (research-based) working</p>			
Module contents	<p>Grundlagen der Mikrobiologie und Genetik: Mikrobiologie: Moleküle des Lebens; Energie und Enzyme,; Zentralstoffwechsel; Atmung; Photosynthese; anaerober Stoffwechsel; Chemolithotrophie; prokaryotische Zellstruktur; mikrobielle Diversität; Bedeutung von Mikroorganismen für Mensch, Pflanze und Tier, Biotechnologie und Erdsystem. Genetik: Mitose und Zellzyklus, Meiose und Rekombination, Mendelsche Vererbungslehre, chromosomale und molekulare Grundlagen der Vererbung; Replikation, Transkription, Translation, Mutation und DNA-Reparatur, Organisation des genetischen Materials und Genregulation</p>			
Literaturempfehlungen	<p>Purves Biologie (Spektrum Verlag), neuste Ausgabe Campbell et al., Biologie (Pearson Verlag), neuste Ausgabe Fuchs, Allgemeine Mikrobiologie (Thieme Verlag), neueste Auflage</p>			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency				
Module capacity	unlimited			
Modullevel / module level	BC (Basiscurriculum / Base curriculum)			
Modulart / typ of module	Pflicht / Mandatory			
Lehr-/Lernform / Teaching/Learning method	Vorlesung			
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten	Type of examination		
Final exam of module	Klausuren direkt nach jeweiligem Veranstaltungsteil	2 Prüfungsleistungen: <ul style="list-style-type: none"> • 1 Klausur (50 %) nach dem Teil Mikrobiologie • 1 Klausur (50 %) nach dem Teil Genetik 		
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		4	SoSe oder WiSe	56
Tutorial (optional)			SoSe und WiSe	0
Präsenzzeit Modul insgesamt				56 h

bio236 - Basics in Biochemistry and Cell Biology

Module label	Basics in Biochemistry and Cell Biology	
Modulkürzel	bio236	
Credit points	6.0 KP	
Workload	180 h	
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Basismodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule 	
Zuständige Personen	<p>Koch, Karl-Wilhelm (Module responsibility)</p> <p>Winklhofer, Michael (Module counselling)</p> <p>Koch, Karl-Wilhelm (Prüfungsberechtigt)</p> <p>Winklhofer, Michael (Prüfungsberechtigt)</p>	
Prerequisites	Zulassung BSc Biologie	
Skills to be acquired in this module	<p>++ biological knowledge</p> <p>+ knowledge of biological working methods</p> <p>++ biologically relevant knowledge in the natural sciences and mathematics</p> <p>+ abstract, logical, analytical thinking</p>	
Module contents	Introduction to structure and function of main biochemical building blocks; amino acids, carbohydrates, proteins, nucleic acids, introduction to metabolism; biological membranes and transmembrane transport; structure and function of cell organelles; protein synthesis and postranslational modification, intracellular transport and trafficking, signalling agents and cellular communication, cell division, controlled cell death	
Literatureempfehlungen	<p>Biochemie, Müller-Esterl</p> <p>Stryer Biochemie, Berg, Tymoczko, Stryer</p> <p>Lehninger Prinzipien der Biochemie, David L. Nelson und Michael M. Cox</p> <p>Principles of Biochemistry, Horton et al.</p> <p>Zellbiologie, Helmut Plattner und Joachim Hentschel</p> <p>Molekulare Zellbiologie, Gerald Karp</p> <p>Molekularbiologie der Zelle, Bruce Alberts</p>	
Links		
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency		
Module capacity	unlimited	
Modullevel / module level	BC (Basiscurriculum / Base curriculum)	
Modulart / typ of module	Pflicht / Mandatory	
Lehr-/Lernform / Teaching/Learning method	Vorlesung	
Vorkenntnisse / Previous knowledge		
Examination	Prüfungszeiten	Type of examination
Final exam of module	during the semester	written exam
Form of instruction	Lecture	
SWS	4	
Frequency	WiSe	
Workload Präsenzzeit	56 h	

bio225 - Basics in Biochemistry, Cell Biology and Genetics

Module label	Basics in Biochemistry, Cell Biology and Genetics	
Modulkürzel	bio225	
Credit points	9.0 KP	
Workload	270 h	
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Basismodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule 	
Zuständige Personen		
Prerequisites		
Skills to be acquired in this module		
Module contents		
Literatureempfehlungen		
Links		
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency		
Module capacity	unlimited	
Modullevel / module level	BC (Basiscurriculum / Base curriculum)	
Modulart / typ of module	Pflicht / Mandatory	
Lehr-/Lernform / Teaching/Learning method		
Vorkenntnisse / Previous knowledge		
Examination	Prüfungszeiten	Type of examination
Final exam of module		2 Prüfungsleistungen: 1 Klausur (Biochemie und Zellbiologie 2/3*100%) 1 Klausur (Genetik 1/3*100%)
Form of instruction	Lecture	
SWS		
Frequency	SoSe oder WiSe	
Workload Präsenzzeit	0 h	

bio223 - Introductory Botany (Plant Anatomy and Histology)

Module label	Introductory Botany (Plant Anatomy and Histology)			
Modulkürzel	bio223			
Credit points	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Basismodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule 			
Zuständige Personen				
Prerequisites				
Skills to be acquired in this module				
Module contents				
Literatureempfehlungen				
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency				
Module capacity	unlimited			
Modullevel / module level	BC (Basiscurriculum / Base curriculum)			
Modulart / typ of module	Pflicht / Mandatory			
Lehr-/Lernform / Teaching/Learning method				
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten	Type of examination		
Final exam of module		1 Prüfungsleistung: 1 Klausur		
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture			SoSe oder WiSe	0
Seminar			SoSe oder WiSe	0
Exercises			SoSe oder WiSe	0
Präsenzzeit Modul insgesamt				0 h

bio224 - Introductory Zoology (Animal Morphology and Evolution)

Module label	Introductory Zoology (Animal Morphology and Evolution)			
Modulkürzel	bio224			
Credit points	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Basismodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule 			
Zuständige Personen				
Prerequisites				
Skills to be acquired in this module				
Module contents				
Literatureempfehlungen				
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency				
Module capacity	unlimited			
Modullevel / module level	BC (Basiscurriculum / Base curriculum)			
Modulart / typ of module	Pflicht / Mandatory			
Lehr-/Lernform / Teaching/Learning method				
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten		Type of examination	
Final exam of module			1 Prüfungsleistung: 1 Klausur	
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture			SoSe oder WiSe	0
Seminar			SoSe oder WiSe	0
Exercises			SoSe oder WiSe	0
Präsenzzeit Modul insgesamt				0 h

Aufbaumodule

bio256 - Form and Identification - Flora and Fauna

Module label	Form and Identification - Flora and Fauna
Modulkürzel	bio256
Credit points	12.0 KP
Workload	360 h
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> Bachelor's Programme Biology (Bachelor) > Aufbaumodule
Zuständige Personen	<p>Albach, Dirk Carl (Module responsibility)</p> <p>Will, Maria (Module counselling)</p> <p>Niedringhaus, Rolf (Module counselling)</p> <p>von Hagen, Klaus Bernhard (Module counselling)</p> <p>Donat, Frank Henrik (Module counselling)</p> <p>Prinz, Markus (Prüfungsberechtigt)</p> <p>Albach, Dirk Carl (Prüfungsberechtigt)</p> <p>Will, Maria (Prüfungsberechtigt)</p> <p>Niedringhaus, Rolf (Prüfungsberechtigt)</p> <p>von Hagen, Klaus Bernhard (Prüfungsberechtigt)</p> <p>Donat, Frank Henrik (Prüfungsberechtigt)</p> <p>Plewka, Isabelle (Prüfungsberechtigt)</p>
Prerequisites	
Skills to be acquired in this module	<p>+ biological knowledge</p> <p>+ knowledge of biological working methods</p> <p>+ independent learning and (research-based) working</p> <p>+ knowledge of safety and environmental issues</p> <p>The module conveys the basic knowledge in animal and plant identification and their diversity. This is essential for all parts of biology concerned with plants and animals. Especially, education for the field of conservation and schools rely on these expertises. Therefore, topics and methods relevant for these professions are emphasized. Students shall get a basic knowledge of species and learn methods to identify them. This is connected with a systemic knowledge of habitats in Northwestern Germany. Basic evaluation competence in the field of biodiversity, species diversity and conservation is conveyed to sensitize students for a respectful treatment of organisms.</p>
Module contents	<p>L: Introduction to the diversity of native flora and fauna, presentation of important plant and animal groups, introduction to systematics and major traits, ecological perspectives of species diversity</p> <p>EXE: Working with identification keys for plants and animals and their classification</p> <p>EXC: Excursion to characteristic habitats of Northwestern Germany, practicing work with field guides and identification of important traits</p>
Literatureempfehlungen	<p>Botany:</p> <p>Rothmaler - Exkursionsflora von Deutschland, Band 2 - Grundband, Spektrum Akademischer Verlag</p> <p>Zoology:</p> <p>M. Schaefer: Brohmer - Fauna von Deutschland, ab 20. Auflage</p> <p>B. Klausnitzer: Stresemann - Exkursionsfauna von Deutschland. Band 1: Wirbellose (ohne Insekten)</p>
Links	
Language of instruction	German
Duration (semesters)	2 Semester
Module frequency	
Module capacity	unlimited
Modullevel / module level	AC (Aufbaucurriculum / Composition)
Modulart / typ of module	Pflicht / Mandatory
Lehr-/Lernform / Teaching/Learning	Vorlesung, Übung, Exkursion

method**Vorkenntnisse / Previous knowledge**

Examination	Prüfungszeiten	Type of examination
Final exam of module	exams at the end of the semester	1 written exam (botany) 50%, 1 written exam (zoology) 50%, excursion protocols (ungraded), additional requirements regarding presence and ungraded activities as specified by docents responsible for the module

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	SoSe oder WiSe	28
Exercises		5	SoSe oder WiSe	70
Study trip		1	SoSe oder WiSe	14
Präsenzzeit Modul insgesamt				112 h

bio295 - Genetics

Module label	Genetics			
Modulkürzel	bio295			
Credit points	9.0 KP			
Workload	270 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Master of Education Programme (Special Needs Education) Biology (Master of Education) > Frühere Module 			
Zuständige Personen	<p>Claußen, Maike (Module responsibility)</p> <p>Hartmann, Anna-Maria (Module counselling)</p> <p>Nothwang, Hans Gerd (Module counselling)</p> <p>Ebbers, Lena (Module counselling)</p> <p>Claußen, Maike (Prüfungsberechtigt)</p> <p>Nothwang, Hans Gerd (Prüfungsberechtigt)</p> <p>Hartmann, Anna-Maria (Prüfungsberechtigt)</p> <p>Ebbers, Lena (Prüfungsberechtigt)</p> <p>Schinzel, Friedrich (Prüfungsberechtigt)</p>			
Prerequisites				
Skills to be acquired in this module	<p>++ biological knowledge ++ knowledge of biological working methods + biologically relevant knowledge in the natural sciences and mathematics + abstract, logical, analytical thinking ++ deepened expertise in biological specialist field ++ independent learning and (research-based) working ++ data presentation and evidence-based discussion (written and spoken) + teamwork ++ (scientific) communication skills + project and time management + knowledge of safety and environmental issues</p> <p>Fundamentals of genetics, performing experiments, quantitative analyses.</p>			
Module contents	general and molecular genetics; mechanisms of mutation, recombination, DNA repair, regulation of transcription; quantitative experiments, prokaryotes and eukaryotes, human genome project, personalized medicine, genetic engineering, safety regulations, sterile working			
Literatureempfehlungen	Campbell/Reece Biologie (latest edition, Pearson Verlag), Strachan & Read Molekulare Humangenetik (latest edition, Spektrum Verlag); Purves Biologie (latest editdion, Spektrum Verlag).			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	jährlich			
Module capacity	72			
Modullevel / module level	AC (Aufbaucurriculum / Composition)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Seminar, Übung			
Vorkenntnisse / Previous knowledge	biochemisches und genetisches Grundlagenwissen			
Examination	Prüfungszeiten	Type of examination		
Final exam of module	Written examination (100%), ungraded presentation, protocol			
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		1.5	WiSe	21
Exercises		3	WiSe	42
Seminar		1.5	WiSe	21
Präsenzzeit Modul insgesamt				84 h

bio265 - General Microbiology

Module label	General Microbiology			
Modulkürzel	bio265			
Credit points	9.0 KP			
Workload	270 h	()	
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Bachelor's Programme Environmental Science (Bachelor) > Wahlpflichtmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Aufbaumodule 			
Zuständige Personen	<p>Rabus, Ralf Andreas (Module responsibility)</p> <p>Wöhland, Lars (Module counselling)</p> <p>Rabus, Ralf Andreas (Prüfungsberechtigt)</p> <p>Wöhland, Lars (Prüfungsberechtigt)</p>			
Prerequisites				
Skills to be acquired in this module	Basic knowledge of microbiology; ability to assess and apply fundamental microbiological techniques.			
Module contents	Imparting basic microbiological skills and working methods: Chemistry and structure of the cell, fundamentals of metabolism, taxonomy and phylogeny of microorganisms, diversity of microorganisms, insight into Applied Microbiology, propagation of microorganisms.			
Literatureempfehlungen	Allgemeine Mikrobiologie, Schlegel 1992; Brock-Biology of Microorganisms, eds.: Madigan et al., 2003; Grundlagen der Mikrobiologie, Cypionka, 2003			
Links	http://www-icbm.de/~gmb/11429.html			
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	jährlich			
Module capacity	unlimited			
Modullevel / module level				
Modulart / typ of module	je nach Studiengang Pflicht oder Wahlpflicht			
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Seminar, Praktikum			
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten	Type of examination		
Final exam of module	1 written examination			
PLEASE NOTE: Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.				
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	WiSe	28
Seminar		1	WiSe	14
Practical training		4	WiSe	56
Präsenzzeit Modul insgesamt				98 h

bio275 - Basics in Physiology

Module label	Basics in Physiology	
Modulkürzel	bio275	
Credit points	9.0 KP	
Workload	270 h	
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Aufbaumodule 	
Zuständige Personen	<p>Heyers, Dominik (Module responsibility)</p> <p>Köppl, Christine (Module counselling)</p> <p>Dedek, Karin (Module counselling)</p> <p>Heyers, Dominik (Prüfungsberechtigt)</p> <p>Köppl, Christine (Prüfungsberechtigt)</p> <p>Dedek, Karin (Prüfungsberechtigt)</p>	
Prerequisites		
Skills to be acquired in this module	<p>++ biological knowledge ++ knowledge of biological working methods + biologically relevant knowledge in the natural sciences and mathematics + statistics & scientific programming ++ abstract, logical, analytical thinking + deepened expertise in biological specialist field ++ independent learning and (research-based) working + teamwork</p> <p>Basic knowledge on physiological processes and their underlying mechanisms with a focus on human physiology. Designing, performing, documenting and analysing physiological experiments; troubleshooting, basic statistics, "experimental thinking".</p>	
Module contents	<p>The lecture covers topics such as cell physiology, sensory physiology, neurophysiology, functions of the vegetative system, blood physiology/immune response, blood cycle, respiration and digestion. Emphasis will be on human physiology. In the following lab exercises, students get the opportunity to perform physiological experiments linking to topics from the lecture. By performing experiments on themselves and computer simulations students will gain insight into the underlying physiological principles.</p>	
Literatureempfehlungen	<p>Klinke, Pape, Kurtz, Silbernagl: Physiologie, Aufl. 4, 2014 Schmidt, Lang, Heckmann: Physiologie des Menschen mit Pathophysiologie, Aufl. 31, 2011 Wehner, Gehring: Zoologie, Aufl. 25, 2013</p>	
Links		
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency	jährlich	
Module capacity	144	
Modullevel / module level	AC (Aufbaucurriculum / Composition)	
Modulart / typ of module	Wahlpflicht / Elective	
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Übung	
Vorkenntnisse / Previous knowledge		
Examination	Prüfungszeiten	Type of examination
Final exam of module	within a few weeks after the winter term lecture period	<p>written exam (100%) To qualify for the exam, the following additional requirements need to be met: - regular participation in the laboratory experiments (no more than 1 day of absence) - lab protocols for each experiment which have been accepted by the respective supervisors PLEASE NOTE: Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.</p>

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		4	WiSe	56
Exercises	A C H T U N G Die endgültige Einteilung für die Teilkurse wird über Stud.IP vorgenommen. Bitte achten Sie zu BEGINN des WiSe auf entsprechende Mitteilungen über Stud.IP.	2	WiSe	28
Präsenzzeit Modul insgesamt				84 h

bio285 - Plant Physiology, Molecular Biology and Biotechnology

Module label	Plant Physiology, Molecular Biology and Biotechnology			
Modulkürzel	bio285			
Credit points	9.0 KP			
Workload	270 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Aufbaumodule 			
Zuständige Personen	N., N. (Module responsibility)			
Prerequisites				
Skills to be acquired in this module	++ biological knowledge ++ knowledge of biological working methods + biologically relevant knowledge in the natural sciences and mathematics + statistics & scientific programming + abstract, logical, analytical thinking + independent learning and (research-based) working + teamwork + (scientific) communication skills			
Module contents	V: Theoretische Kenntnisse über den Stoffwechsel und die (molekulare) Steuerung der Entwicklung pflanzlicher Organismen, Einführung in die Gentechnik. Physiologie von Licht- und Dunkelreaktionen, Photosyntheseleistung und Standortfaktoren. Einfluss von Mineralstoffen auf das Pflanzenwachstum, Funktion des Lichtes als Entwicklungsfaktor, Funktion von Pflanzenhormonen als Entwicklungsfaktoren. Versuche zur molekularen Stressphysiologie. Analyse und Nachweis von gentechnisch veränderten Pflanzen in Lebensmitteln. S: Vorstellung der Experimente, Darstellung der theoretischen Grundlagen der Experimente, Vorstellung aktueller Fachliteratur.			
Literaturempfehlungen	Campbell/Reece: Biologie (Pearson); Schopfer/Brennicke: Pflanzenphysiologie (Springer Spektrum); Buchanan/Gruissem/Jones: Biochemistry and molecular biology of plants (American Society of Plant Physiologists); Heldt/Piechulla: Pflanzenbiochemie (Springer Spektrum).			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	jährlich			
Module capacity	32			
Modullevel / module level	AC (Aufbaucurriculum / Composition)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Seminar, Übung			
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten		Type of examination	
Final exam of module	spätestens in der letzten Woche der Vorlesungszeit		exam	
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	SoSe	28
Seminar		1	SoSe	14
Practical training		4	SoSe	0
Exercises			SoSe oder WiSe	56
Präsenzzeit Modul insgesamt				98 h

bio255 - Fundamentals of Molecular Ecology

Module label	Fundamentals of Molecular Ecology			
Modulkürzel	bio255			
Credit points	9.0 KP			
Workload	270 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Aufbaumodule 			
Zuständige Personen	<p>Nolte, Arne (Module responsibility)</p> <p>Nolte, Arne (Prüfungsberechtigt)</p>			
Prerequisites				
Skills to be acquired in this module	<p>++ biological knowledge ++ knowledge of biological working methods ++ biologically relevant knowledge in the natural sciences and mathematics + statistics & scientific programming ++ interdisciplinary knowledge & thinking ++ abstract, logical, analytical thinking ++ deepened expertise in biological specialist field</p> <p>The field of molecular ecology examines relationships among genotypes, phenotypes and the environment to explain evolution and diversity of organisms. The lecture will introduce basics in genomics, molecular evolution and population genetics to explore properties of the genome and the organism from an evolutionary perspective. Central aspects are the adaptation of species to their environment and ecological change, speciation, the genetic basis of phenotypic change. Methods and data used in genomics and molecular ecology will be introduced during the lecture and exercises.</p>			
Module contents	<p>Lecture: the lecture conveys knowledge about the fields of genomics, evolution and organismic biology. Moreover laboratory methods as well as basics and background information on the analysis of genetic and genomic datasets are given.</p> <p>Excercise: Modern data sets and up to date methods in genomics and population genetics are introduced. The practical emphasizes computer based data analyses.</p>			
Literatureempfehlungen				
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency				
Module capacity	30			
Modullevel / module level	AC (Aufbaucurriculum / Composition)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Übung			
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten	Type of examination		
Final exam of module		exam		
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		1.5	WiSe	21
Exercises		4.5	WiSe	63
Präsenzzeit Modul insgesamt				84 h

bio240 - Flora and Fauna

Module label	Flora and Fauna			
Modulkürzel	bio240			
Credit points	10.0 KP			
Workload	300 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> Bachelor's Programme Biology (Bachelor) > Aufbaumodule 			
Zuständige Personen	<p>Albach, Dirk Carl (Prüfungsberechtigt)</p> <p>Glatzel, Thomas (Prüfungsberechtigt)</p> <p>von Hagen, Klaus Bernhard (Prüfungsberechtigt)</p> <p>von Hagen, Klaus Bernhard (Module counselling)</p> <p>Will, Maria (Module counselling)</p>			
Prerequisites				
Skills to be acquired in this module	<p>+ biological knowledge</p> <p>+ knowledge of biological working methods</p> <p>+ independent learning and (research-based) working</p> <p>+ knowledge of safety and environmental issues</p> <p>To determine species-rich taxa and to verify the results independently using relevant literature</p>			
Module contents	<p>L: Introduction to the variety of indigenous flora and fauna, presentation of important plant families and animal groups, studying the characteristics important for determination, introduction to systematics. Moreover, subjects are included that present ecological aspects of the taxa dealt with.</p> <p>E: Applying literature to determine animal and plant species and to classify them systematically.</p> <p>EX: Excursions to the characteristic North German biotopes. The excursions focus on correct identification and classification of plants and animals according to the properties of the living organism.</p>			
Literaturempfehlungen	<p>Botany: Rothmaler - Exkursionsflora von Deutschland, Band 2 - Grundband, Spektrum Akademischer Verlag</p> <p>Zoology: M. Schaefer: Brohmer - Fauna von Deutschland, from 20th edition</p>			
Links				
Language of instruction	German			
Duration (semesters)	2 Semester			
Module frequency	jährlich			
Module capacity	unlimited			
Reference text	<p>Modulverantwortung Teil Fauna (Wintersemester): Dr. Thomas Glatzel Modulverantwortung Teil Flora (Sommersemester): Prof. Dr. Dirk Albach</p>			
Modullevel / module level	AC (Aufbaucurriculum / Composition)			
Modulart / typ of module	Pflicht / Mandatory			
Lehr-/Lernform / Teaching/Learning method				
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten	Type of examination		
Final exam of module	<p>Botany: Written examination before the end of the lecture</p> <p>Zoology: Written examination before the end of the lecture</p>	<p>1 written examination (Botany 50 %)</p> <p>1 written examination (Zoology 50 %)</p> <p>ungraded minutes</p> <p>PLEASE NOTE: Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.</p>		
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2		28
Exercises		4		56
Study trip		1		14

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Präsenzzeit Modul insgesamt				98 h

bio260 - General Microbiology

Module label	General Microbiology			
Modulkürzel	bio260			
Credit points	10.0 KP			
Workload	300 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> Bachelor's Programme Biology (Bachelor) > Aufbaumodule 			
Zuständige Personen	<p>Rhiel, Erhard (Module counselling)</p> <p>Wöhlbrand, Lars (Module counselling)</p> <p>Rabus, Ralf Andreas (Prüfungsberechtigt)</p>			
Prerequisites				
Skills to be acquired in this module	<p>++ biological knowledge ++ knowledge of biological working methods + biologically relevant knowledge in the natural sciences and mathematics + interdisciplinary knowledge & thinking + abstract, logical, analytical thinking ++ deepened expertise in biological specialist field + independent learning and (research-based) working + data presentation and evidence-based discussion (written and spoken) ++ teamwork + project and time management + knowledge of safety and environmental issues</p> <p>Basic knowledge of microbiology; ability to assess and apply fundamental microbiological techniques.</p>			
Module contents	Imparting basic microbiological skills and working methods: Chemistry and structure of the cell, fundamentals of metabolism, taxonomy and phylogeny of microorganisms, diversity of microorganisms, insight into Applied Microbiology, propagation of microorganisms.			
Literatureempfehlungen	Allgemeine Mikrobiologie, Schlegel 1992; Brock-Biology of Microorganisms, eds.: Madigan et al., 2003; Grundlagen der Mikrobiologie, Cypionka, 2003			
Links	http://www-icbm.de/~gmb/11429.html			
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	jährlich			
Module capacity	unlimited			
Modullevel / module level	AC (Aufbaucurriculum / Composition)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method				
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten	Type of examination		
Final exam of module		1 written examination Protocols		
		PLEASE NOTE: Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.		
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2		28
Seminar		1		14
Practical training		4		56
Präsenzzeit Modul insgesamt				98 h

bio270 - Basic Concepts in Animal Physiology

Module label	Basic Concepts in Animal Physiology			
Modulkürzel	bio270			
Credit points	10.0 KP			
Workload	300 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> Bachelor's Programme Biology (Bachelor) > Aufbaumodule 			
Zuständige Personen	<p>Heyers, Dominik (Prüfungsberechtigt)</p> <p>Köppl, Christine (Module counselling)</p> <p>Dedek, Karin (Module counselling)</p>			
Prerequisites				
Skills to be acquired in this module	<p>++ biological knowledge ++ knowledge of biological working methods + biologically relevant knowledge in the natural sciences and mathematics + statistics & scientific programming ++ abstract, logical, analytical thinking + deepened expertise in biological specialist field ++ independent learning and (research-based) working + teamwork</p> <p>Basic knowledge on physiological processes and their underlying mechanisms with a focus on human physiology. Performing, analysing and documenting physiological experiments.</p>			
Module contents	<p>The lecture (Vorlesung: 5.02.271 - Physiologie der Tiere und des Menschen) covers topics such as cell physiology, sensory physiology, neurophysiology, functions of the vegetative system, blood physiology/immune response, blood cycle, respiration and digestion. Emphasis will be on human physiology. In the following lab exercises, students get the opportunity to perform physiological experiments linking to topics from the lecture. By performing experiments on themselves and computer simulations students will gain insight into the underlying physiological principles.</p>			
Literatureempfehlungen	<p>Klinke, Pape, Kurtz, Silbernagl: Physiologie, Aufl. 6, 2010 Schmidt, Lang, Heckmann: Physiologie des Menschen mit Pathophysiologie, Aufl. 31, 2011 (if available: Wehner, Gehring: Zoologie)</p>			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	jährlich			
Module capacity	unlimited			
Modullevel / module level	AC (Aufbaucurriculum / Composition)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method				
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten	Type of examination		
Final exam of module	within a few weeks after the winter term lecture period	<p>written exam (100%) To qualify for the exam, the following additional requirements need to be met: - regular participation in the laboratory experiments (no more than 1 day of absence) - lab protocols for each experiment which have been accepted by the respective supervisors PLEASE NOTE: Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.</p>		
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		4		56
Exercises		3		42
Präsenzzeit Modul insgesamt				98 h

bio280 - Plant Physiology

Module label	Plant Physiology			
Modulkürzel	bio280			
Credit points	10.0 KP			
Workload	300 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> Bachelor's Programme Biology (Bachelor) > Aufbaumodule 			
Zuständige Personen	<p>Zotz, Gerhard (Module counselling)</p> <p>Laubinger, Sascha (Prüfungsberechtigt)</p>			
Prerequisites				
Skills to be acquired in this module	<p>++ biological knowledge ++ knowledge of biological working methods + biologically relevant knowledge in the natural sciences and mathematics + statistics & scientific programming + abstract, logical, analytical thinking + independent learning and (research-based) working + teamwork + (scientific) communication skills</p> <p>Fundamentals of metabolism and developmental physiology of plants. Theoretical knowledge acquired from lectures and textbooks is improved by experiments, the instructions for experiments are applied independently, laboratory device is handled independently, measured values are calculated independently, the correctness of experimental results is assessed, the results obtained are interpreted and compared to theoretical expectations.</p>			
Module contents	<p>L: Theoretical knowledge of metabolism and of the control of development in plant organisms, introduction to genetic engineering. S: Presentation of experiments, presentation of theoretical fundamentals of experiments. L: Photosynthesis: Physiology of light and dark reactions, photosynthetic ability and environmental factors. Ecophysiology: Influence of mineral substances on plant growth, function of light as developmental factor, function of plant hormones as developmental factors.</p>			
Literatureempfehlungen	<p>Campbell: Biologie; Taiz/Zeiger: Physiologie der Pflanzen (Verlag Spektrum); Buchanan/Gruissem/Jones: Biochemistry and molecular biology of plants (American Society of Plant Physiologists); Kutschera: Prinzipien der Pflanzenphysiologie (Spektrum Akademischer Verlag).</p>			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	jährlich			
Module capacity	unlimited			
Modullevel / module level	AC (Aufbaucurriculum / Composition)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method				
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten	Type of examination		
Final exam of module	in the final week of the semester at the latest	Records		
		PLEASE NOTE: Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.		
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2		28
Seminar		1		14
Practical training		4		56
Präsenzzeit Modul insgesamt				98 h

bio290 - Genetics

Module label	Genetics			
Modulkürzel	bio290			
Credit points	10.0 KP			
Workload	300 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> Bachelor's Programme Biology (Bachelor) > Aufbaumodule 			
Zuständige Personen	<p>Claußen, Maïke (Prüfungsberechtigt)</p> <p>Nothwang, Hans Gerd (Module counselling)</p> <p>Hartmann, Anna-Maria (Module counselling)</p>			
Prerequisites				
Skills to be acquired in this module	<p>++ biological knowledge ++ knowledge of biological working methods + biologically relevant knowledge in the natural sciences and mathematics + abstract, logical, analytical thinking ++ deepened expertise in biological specialist field ++ independent learning and (research-based) working ++ data presentation and evidence-based discussion (written and spoken) + teamwork ++ (scientific) communication skills + project and time management + knowledge of safety and environmental issues</p> <p>Fundamentals of genetics, performing experiments, quantitative analyses.</p>			
Module contents	<p>general and molecular genetics; mechanisms of mutation, recombination, DNA repair, regulation of transcription; quantitative experiments, prokaryotes and eukaryotes, human genome project, personalized medicine, genetic engineering, safety regulations, sterile working</p>			
Literatureempfehlungen	<p>Campbell/Reece Biologie (latest edition, Pearson Verlag), Strachan & Read Molekulare Humangenetik (latest edition, Spektrum Verlag); Purves Biologie (latest edition, Spektrum Verlag).</p>			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	jährlich			
Module capacity	unlimited			
Modullevel / module level	AC (Aufbaucurriculum / Composition)			
Modulart / typ of module	Pflicht o. Wahlpflicht / compulsory or optional			
Lehr-/Lernform / Teaching/Learning method				
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten	Type of examination		
Final exam of module		<p>Written examination (100%) ungraded presentation ungraded protocol</p> <p>PLEASE NOTE: Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.</p>		
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		1		14
Exercises			WiSe	0
Seminar		1		14
Practical training		4	WiSe	56
Präsenzzeit Modul insgesamt				84 h

bio237 - Basics in Microbiology

Module label	Basics in Microbiology	
Modulkürzel	bio237	
Credit points	6.0 KP	
Workload	180 h	
Verwendbarkeit des Moduls	<ul style="list-style-type: none">• Bachelor's Programme Biology (Bachelor) > Aufbaumodule• Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule	
Zuständige Personen		
Prerequisites		
Skills to be acquired in this module		
Module contents		
Literatureempfehlungen		
Links		
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency		
Module capacity	unlimited	
Modullevel / module level	AC (Aufbaucurriculum / Composition)	
Modulart / typ of module	Pflicht / Mandatory	
Lehr-/Lernform / Teaching/Learning method		
Vorkenntnisse / Previous knowledge		
Examination	Prüfungszeiten	Type of examination
Final exam of module		1 Prüfungsleistung: 1 Klausur
Form of instruction	Lecture	
SWS		
Frequency	SoSe oder WiSe	
Workload Präsenzzeit	0 h	

Akzentsetzungsmodule

bio300 - Evolutionary Biology

Module label	Evolutionary Biology	
Modulkürzel	bio300	
Credit points	15.0 KP	
Workload	450 h	
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 	
Zuständige Personen	<p>Bininda-Emonds, Olaf (Module responsibility)</p> <p>Bininda-Emonds, Olaf (Prüfungsberechtigt)</p> <p>Ahrichs, Wilko (Prüfungsberechtigt)</p> <p>Albach, Dirk Carl (Prüfungsberechtigt)</p> <p>Gerlach, Gabriele (Prüfungsberechtigt)</p> <p>Nolte, Arne (Prüfungsberechtigt)</p>	
Prerequisites		
Skills to be acquired in this module	<p>++ biological knowledge + knowledge of biological working methods ++ biologically relevant knowledge in the natural sciences and mathematics + statistics & scientific programming + interdisciplinary knowledge & thinking + abstract, logical, analytical thinking ++ deepened expertise in biological specialist field + independent learning and (research-based) working ++ data presentation and evidence-based discussion (written and spoken) + teamwork ++ (scientific) communication skills + project and time management</p> <p>Introduction to both microevolution (speciation and species concepts, adaptation and selection, behavioural ecology, reproduction systems) and macroevolution. Introduction to phylogenetics (phyloinformatics, molecular systematics, phylogeography).</p>	
Module contents	<p>The lecture imparts basic knowledge in areas including population biology, phylogenetic systematics, phyloinformatics, behavioural and reproduction ecology. These fundamentals are extended in the seminar and exercises.</p>	
Literatureempfehlungen	<p>Freeman, S. and C.J. Herron. 2007. Evolutionary analysis. 4th edition. 800 pp.; Futuyma, D.J. 2007. Evolution. The original with translation. Spektrum Akademischer Verlag. 607 pp.; Knoop, V. and K. Müller. 2009. Gene und Stammbäume: ein Handbuch zur molekularen Phylogenetik. 2. Auflage. Spektrum Akademischer Verlag. 386 pp.; Zrzavy, J., D. Storch, and S. Mihalca. 2009. Evolution: ein Lese-Lehrbuch. Spektrum Akademischer Verlag. 493 pp</p>	
Links		
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency	jährlich	
Module capacity	unlimited	
Modullevel / module level	AS (Akzentsetzung / Accentuation)	
Modulart / typ of module	Wahlpflicht / Elective	
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Seminar, Übung	
Vorkenntnisse / Previous knowledge		
Examination	Prüfungszeiten	Type of examination
Final exam of module	Written examination in the final week of the semester or in the first week following the lecture period.	Written examination (60%) Portfolio (40%)
		PLEASE NOTE:

Examination		Prüfungszeiten		Type of examination	
				Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.	
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance	
Lecture		2		28	
Exercises		6		84	
Seminar		2		28	
Präsenzzeit Modul insgesamt				140 h	

bio310 - General Ecology

Module label	General Ecology
Modulkürzel	bio310
Credit points	15.0 KP
Workload	450 h
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule
Zuständige Personen	<p>Hillebrand, Helmut (Module responsibility)</p> <p>Niedringhaus, Rolf (Module counselling)</p> <p>Striebel, Maren (Module counselling)</p> <p>Zotz, Gerhard (Module counselling)</p> <p>Schupp, Peter (Module counselling)</p> <p>Rohde, Sven (Module counselling)</p> <p>Zotz, Gerhard (Prüfungsberechtigt)</p> <p>Hillebrand, Helmut (Prüfungsberechtigt)</p> <p>Niedringhaus, Rolf (Prüfungsberechtigt)</p> <p>Schupp, Peter (Prüfungsberechtigt)</p> <p>Rohde, Sven (Prüfungsberechtigt)</p> <p>Striebel, Maren (Prüfungsberechtigt)</p> <p>Fernandez-Mendez, Mar (Prüfungsberechtigt)</p>
Prerequisites	Bestandene Pflichtmodule des Kerncurriculums
Skills to be acquired in this module	<p>++ biological knowledge</p> <p>++ knowledge of biological working methods</p> <p>++ biologically relevant knowledge in the natural sciences and mathematics</p> <p>+ statistics & scientific programming</p> <p>+ interdisciplinary knowledge & thinking</p> <p>++ abstract, logical, analytical thinking</p> <p>+ deepened expertise in biological specialist field</p> <p>+ independent learning and (research-based) working</p> <p>+ data presentation and evidence-based discussion (written and spoken)</p> <p>+ (scientific) communication skills</p>
Module contents	<p>Allgemeine Ökologie VL (Hillebrand) 2 SWS, 3 KP; Präsenzzeit 21 h, Nachbereitungszeit 69 h; im Wintersemester Theoretische Grundlagen, Ressourcen, Populationsökologie, biologische Interaktionen, Lebensgemeinschaften, Ökosysteme</p> <p>PR/S, 4 SWS, 6 KP; Präsenzzeit 42 h, Nachbereitungszeit 138 h; im folgenden Sommersemester B.Sc. Biologie: alternativ 2 aus 5 Wahlpraktika B.Sc. Umweltwissenschaften: alternativ 1 aus 5 Wahlpraktika</p> <p>PR/S Vegetationsökologie / Naturschutz (Buchwald) Vegetationskundliche Aufnahmefethoden (Artenzusammensetzung, Struktur), Nährstoffverhältnisse des Oberbodens, Mikroklima, Naturschutzprojekte</p> <p>PR/S Zoo-Ökologie (Niedringhaus) Repräsentative Fragestellungen der (terrestrischen) Freiland-Ökologie, Problematik von Erfassungsmethoden sowie der Einfluss abiotischer und biotischer Faktoren auf Struktur und Dynamik von Populationen, Arbeiten im Freiland, Auswertungen im Labor</p> <p>PR/SE Funktionelle Ökologie der Pflanzen (Zotz, Bader) Analyse abiotischer Rahmenbedingungen (u.a. Mikroklima), Wasser-, Nährstoff-, Kohlenstoffhaushalt, Aspekte der Populationsbiologie, Analyse von Pflanzenbeständen (Struktur, Funktion), statistische Auswertung und Modellierung</p> <p>PR/S Aquatische Ökologie (Hillebrand, Moorthi) Experimentelle Analyse von Artwechselwirkungen, zum Beispiel Räuber-Beute und Konkurrenz.</p>

Experimentelles Design. Auswertung von Proben, Biomassebestimmungen, Auszählungen, Mikroskopie. Statistische Analyse. Schreiben unter wissenschaftlicher Publikationsnorm

PR/S Benthische Ökologie (Schupp, Rohde)
 Experimentelle Analyse abiotischer und biotischer Faktoren auf makrobenthische Organismen und Gemeinschaften. Salinitäts- und Temperatureinflüsse, Räuber-Beute Beziehungen, Konkurrenzeffekte, statistische Auswertung und Verfassung wissenschaftlicher Berichte.
 S Gemeinsames Symposium zu den Praktikumsresultaten (O-Woche des folgenden Wintersemesters), 4h.

Literaturempfehlungen	<p>VL Allgemeine Ökologie Nentwig, W., Bacher, S., Brandl, R., 2007. Ökologie kompakt. Spektrum Akademischer Verlag, Heidelberg. Vorlesungsunterlagen (Stud-IP)</p> <p>Vegetationsökologie / Naturschutz</p> <p>Zoo-Ökologie Nentwig et al., 2004. Ökologie. Spektrum Lehrbuch, Heidelberg. 466 S. Southwood, T.R.E. & P.A. Henderson 2000: Ecological Methods. Blackwell Science, Oxford. 574 S.</p> <p>Funktionelle Ökologie der Pflanzen Lambers, H., F. S. Chapin, & T. L. Pons. 2008. Plant Physiological Ecology. New York, Springer Verlag.</p> <p>Aquatische Ökologie Lampert, Sommer 1999: Limnoökologie. Thieme Praktikumskript</p> <p>Benthische Ökologie Sommer, U., 2005. Biologische Meereskunde. Springer</p>
------------------------------	---

Links		
Language of instruction	German	
Duration (semesters)	2 Semester	
Module frequency	jährlich	
Module capacity	unlimited	
Modullevel / module level	AS (Akzentsetzung / Accentuation)	
Modulart / typ of module	Wahlpflicht / Elective	
Lehr-/Lernform / Teaching/Learning method	V (2 SWS) , S (1 SWS) , PR (3 SWS) VL Ökologie (3 KP) Alternativ 2 aus 5 Wahlpraktika (5+1 KP): PR/SE Vegetationsökologie/Naturschutz PR/SE Funktionelle Ökologie der Pflanzen PR/SE Zoo-Ökologie PR/SE Aquatische Ökologie PR/SE Benthische Ökologie	

Vorkenntnisse / Previous knowledge		
Examination	Prüfungszeiten	Type of examination
Final exam of module	VL: Ende des Wintersemesters PR: Ende des jeweiligen Praktikumblockes	2 Prüfungsleistungen: 1) Prüfung zur Vorlesung (Klausur; 30%) im 1. Semester des Moduls sowie 2) Portfolio zum Praktikum (Portfolio; 70%) im 2. Semester des Moduls Zum Bestehen des Moduls müssen alle Teilleistungen bestanden sein. Voraussetzung für die Vergabe von Kreditpunkten ist die aktive Teilnahme an: Seminar und Praktikum

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2		28
Seminar		1		14
Practical training		3		42
Präsenzzeit Modul insgesamt				84 h

bio325 - Pollination and Dispersal - Concepts

Module label	Pollination and Dispersal - Concepts			
Modulkürzel	bio325			
Credit points	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 			
Zuständige Personen	<p>Albach, Dirk Carl (Module responsibility)</p> <p>von Hagen, Klaus Bernhard (Module counselling)</p> <p>Will, Maria (Module counselling)</p> <p>Albach, Dirk Carl (Prüfungsberechtigt)</p> <p>von Hagen, Klaus Bernhard (Prüfungsberechtigt)</p> <p>Will, Maria (Prüfungsberechtigt)</p>			
Prerequisites	bio256 Flora and Fauna			
Skills to be acquired in this module	<ul style="list-style-type: none"> + biological knowledge + knowledge of biological working methods + abstract, logical, analytical thinking + deepened expertise in biological specialist field + independent learning and (research-based) working + data presentation and evidence-based discussion (written and spoken) + teamwork + (scientific) communication skills + project and time management + knowledge of safety and environmental issues <p>Extended knowledge of biodiversity and evolution of plants focusing on reproduction, dispersal, germination and establishment of plants</p>			
Module contents	<p>L: Pollination, dispersal, germination of plants, plant breeding</p> <p>S: Pollination and dispersal biology of plants in a systematic context</p>			
Literatureempfehlungen	The course does not follow a special textbook. The following German literature is recommended to students interested in the course: Dieter Heß – Die Blüte, Eugen Ulmer Verlag as well as Leins & Erbar -Blüte und Frucht, Schweizerbart'sche Verlagsbuchhandlung.			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	The module will be offered every other year			
Module capacity	12			
Modullevel / module level	AS (Akzentsetzung / Accentuation)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Seminar			
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten		Type of examination	
Final exam of module			portfolio	
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	SoSe	28
Seminar		2	SoSe	28
Präsenzzeit Modul insgesamt				56 h

bio326 - Pollination and Dispersal - Methods

Module label	Pollination and Dispersal - Methods	
Modulkürzel	bio326	
Credit points	6.0 KP	
Workload	180 h	
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule 	
Zuständige Personen	<p>Albach, Dirk Carl (Module responsibility)</p> <p>von Hagen, Klaus Bernhard (Module counselling)</p> <p>Will, Maria (Module counselling)</p> <p>Albach, Dirk Carl (Prüfungsberechtigt)</p> <p>von Hagen, Klaus Bernhard (Prüfungsberechtigt)</p> <p>Will, Maria (Prüfungsberechtigt)</p>	
Prerequisites	<p>bio325 Pollination and dispersal concepts</p> <p>bio256 Flora/Fauna</p>	
Skills to be acquired in this module	<p>+ biological knowledge</p> <p>+ knowledge of biological working methods</p> <p>+ abstract, logical, analytical thinking</p> <p>+ deepened expertise in biological specialist field</p> <p>+ independent learning and (research-based) working</p> <p>+ data presentation and evidence-based discussion (written and spoken)</p> <p>+ teamwork</p> <p>+ (scientific) communication skills</p> <p>+ project and time management</p> <p>+ knowledge of safety and environmental issues</p> <p>Extended knowledge of biodiversity and evolution of plants focusing on reproduction, dispersal, germination and establishment of plants</p>	
Module contents	Pollination, fertilisation, dispersal and germination biological experiments in regard of adaptation to environmental factors	
Literatureempfehlungen	The course does not follow a special textbook. The following German literature is recommended to students interested in the course: Dieter Heß – Die Blüte, Eugen Ulmer Verlag as well as Leins & Erbar -Blüte und Frucht, Schweizerbart'sche Verlagsbuchhandlung.	
Links		
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency	The module will be offered every other year	
Module capacity	12	
Modullevel / module level	AS (Akzentsetzung / Accentuation)	
Modulart / typ of module	Wahlpflicht / Elective	
Lehr-/Lernform / Teaching/Learning method	Übung	
Vorkenntnisse / Previous knowledge		
Examination	Prüfungszeiten	Type of examination
Final exam of module		Portfolio
Form of instruction	Exercises	
SWS	4	
Frequency	SoSe	
Workload Präsenzzeit	56 h	

bio327 - Pollination and Dispersal - Methods not just for Schools

Module label	Pollination and Dispersal - Methods not just for Schools	
Modulkürzel	bio327	
Credit points	9.0 KP	
Workload	270 h	
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 	
Zuständige Personen	<p>Albach, Dirk Carl (Module responsibility)</p> <p>von Hagen, Klaus Bernhard (Module counselling)</p> <p>Will, Maria (Module counselling)</p> <p>Albach, Dirk Carl (Prüfungsberechtigt)</p> <p>von Hagen, Klaus Bernhard (Prüfungsberechtigt)</p> <p>Will, Maria (Prüfungsberechtigt)</p>	
Prerequisites	<p>bio325 Pollination and dispersal concepts</p> <p>bio256 Flora/fauna</p>	
Skills to be acquired in this module	<p>+ biological knowledge</p> <p>+ knowledge of biological working methods</p> <p>+ abstract, logical, analytical thinking</p> <p>+ deepened expertise in biological specialist field</p> <p>+ independent learning and (research-based) working</p> <p>+ data presentation and evidence-based discussion (written and spoken)</p> <p>+ teamwork</p> <p>+ (scientific) communication skills</p> <p>+ project and time management</p> <p>+ knowledge of safety and environmental issues</p> <p>Extended knowledge of biodiversity and evolution of plants focusing on reproduction, dispersal, germination and establishment of plants</p>	
Module contents	<p>The module introduces methods to study pollination, fertilisation, dispersal and germination in regard of adaptation to environmental factors. Experiments applicable to school lessons will be presented and especially thoroughly discussed.</p>	
Literatureempfehlungen	<p>The course does not follow a special textbook. The following German literature is recommended to students interested in the course: Dieter Heß – Die Blüte, Eugen Ulmer Verlag as well as Leins & Erbar -Blüte und Frucht, Schweizerbart'sche Verlagsbuchhandlung.</p>	
Links		
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency	Das Modul wird alle zwei Jahre stattfinden.	
Module capacity	12	
Modullevel / module level	AS (Akzentsetzung / Accentuation)	
Modulart / typ of module	Wahlpflicht / Elective	
Lehr-/Lernform / Teaching/Learning method	Übung	
Vorkenntnisse / Previous knowledge		
Examination	Prüfungszeiten	Type of examination
Final exam of module	portfolio	
Form of instruction	Exercises	
SWS	6	
Frequency	SoSe	
Workload Präsenzzeit	84 h	

bio330 - Marine Ecology

Module label	Marine Ecology
Modulkürzel	bio330
Credit points	15.0 KP
Workload	450 h
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule
Zuständige Personen	<p>Moorthi, Stefanie (Module counselling)</p> <p>Hillebrand, Helmut (Module responsibility)</p> <p>Hillebrand, Helmut (Prüfungsberechtigt)</p> <p>Moorthi, Stefanie (Prüfungsberechtigt)</p>
Prerequisites	
Skills to be acquired in this module	<p>++ biological knowledge ++ knowledge of biological working methods ++ biologically relevant knowledge in the natural sciences and mathematics + statistics & scientific programming + interdisciplinary knowledge & thinking ++ abstract, logical, analytical thinking ++ deepened expertise in biological specialist field ++ independent learning and (research-based) working ++ data presentation and evidence-based discussion (written and spoken) + teamwork ++ (scientific) communication skills + project and time management</p> <p>Basic knowledge and practical experience in biological oceanography Apply theoretical concepts from different fields in marine ecology Analyse, present, and interpret results from the marine ecological literature and own investigations Acknowledge the importance of general ecological concepts for ecosystem management Gain experience in the application of field and lab methods in ecology</p>
Module contents	<p>Lecture Biological Oceanography 2 SWS = 3 CP. Presence time 24 h, additional study time 66h, winter-term Abiotic environmental conditions in marine systems (light, temperature, chemical and physical properties of the water, waves, tides, global distribution of water masses and currents. Pelagic communities, plankton (phyt-, zoo-, bacterio-, viroplankton), microbial loop, sedimentation, C-and N cycling, Nekton, Fisheries, El Nino, Benthic communities, estuaries.</p> <p>Exercise Concepts in marine ecology 6 SWS = 9 CP. Presence time 70 h, additional study time 200h, winter-term Practical and theoretical exercises on marine ecology, including field studies, experiments and working with case studies from the literature. The focus is on concepts here, pinpointing at general ecological frameworks.</p> <p>Lecture Marine Ecology 2 SWS = 3 CP. Presence time 24 h, additional study time 66h, winter-term Ecology of marine systems: estuaries, rocky and sediment coasts, pelagial, shelves, mangroves, seagrass meadows, coral reefs, deep sea, polar regions. The focus is on ecological specifics and interactions in the biotic communities of these systems. The second half of the lecture will focus on importance and consequences of overfishing, habitat destruction, pollution, climate change and bioinvasion on marine systems.</p>
Literatureempfehlungen	C.M. Lalli, T.R. Parsons, Biological Oceanography: An Introduction, Elsevier, Oxford. U. Sommer, Biologische Meereskunde, Springer Verlag, Heidelberg.
Links	
Language of instruction	German
Duration (semesters)	2 Semester
Module frequency	jährlich
Module capacity	unlimited
Modullevel / module level	AS (Akzentsetzung / Accentuation)
Modulart / typ of module	Wahlpflicht / Elective
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Übung
Vorkenntnisse / Previous knowledge	

Examination	Prüfungszeiten	Type of examination
Final exam of module	Written exam at the end of the Lecture Marine Ecology	1 written exam (Lecture) (50%), 1 oral presentation (Exercise) (50%)

PLEASE NOTE:
Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		4		56
Exercises		6		84
Präsenzzeit Modul insgesamt				140 h

bio340 - Morphology, Phylogeny, and Evolution of Metazoa

Module label	Morphology, Phylogeny, and Evolution of Metazoa			
Modulkürzel	bio340			
Credit points	15.0 KP			
Workload	450 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 			
Zuständige Personen	<p>Bininda-Emonds, Olaf (Module responsibility)</p> <p>Ahrichs, Wilko (Module counselling)</p> <p>Bininda-Emonds, Olaf (Prüfungsberechtigt)</p> <p>Ahrichs, Wilko (Prüfungsberechtigt)</p>			
Prerequisites				
Skills to be acquired in this module	<p>++ biological knowledge + knowledge of biological working methods ++ biologically relevant knowledge in the natural sciences and mathematics + statistics & scientific programming + interdisciplinary knowledge & thinking + abstract, logical, analytical thinking ++ deepened expertise in biological specialist field + independent learning and (research-based) working ++ data presentation and evidence-based discussion (written and spoken) + teamwork ++ (scientific) communication skills + project and time management</p> <p>Upon successful completion of the module the students will gain:</p> <ol style="list-style-type: none"> 1. a survey of topical subjects relating to the morphology and phylogeny of animals, 2. a thorough knowledge of the development of morphological characteristics, 3. technical skills in studying morphological structures, and 4. knowledge into recent hypotheses on the phylogeny of animals. 			
Module contents	<p>Lecture: Details regarding the morphology and evolution of Metazoa from an explicit phylogenetic framework Seminar: Presentation and discussion of recent subjects and issues relating to the evolution of Metazoa; presentation of individual metazoan taxa Exercise: Preparation and documentation of exemplary species of Metazoa; various field studies (e.g. visit to the Dierenpark Emmen or to the Zoo am Meer (Bremerhaven), sampling aquatic micrometazoans, observing birds)</p>			
Literatureempfehlungen	Relevant literature will be announced during the first seminar and is contingent on the latest developments in the research field.			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	jährlich			
Module capacity	unlimited			
Modullevel / module level	AS (Akzentsetzung / Accentuation)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method				
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten	Type of examination		
Final exam of module	Portfolio during the course of the seminar; written examination in the final week of the course or in the first week following the lecture period.	1 Written examination (50%), 1 Portfolio (50%), PLEASE NOTE: Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.		
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2		28
Exercises		5		70
Seminar		2		28
Präsenzzeit Modul insgesamt				126 h

bio355 - Microscopical Anatomy

Module label	Microscopical Anatomy	
Modulkürzel	bio355	
Credit points	9.0 KP	
Workload	270 h	
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 	
Zuständige Personen	<p>Ahrichs, Wilko (Module responsibility)</p> <p>Kieneke, Alexander (Module counselling)</p> <p>Hoppenrath, Mona (Module counselling)</p> <p>Ahrichs, Wilko (Prüfungsberechtigt)</p> <p>Hoppenrath, Mona (Prüfungsberechtigt)</p> <p>Kieneke, Alexander (Prüfungsberechtigt)</p>	
Prerequisites		
Skills to be acquired in this module	<p>++ biological knowledge</p> <p>++ knowledge of biological working methods</p> <p>++ biologically relevant knowledge in the natural sciences and mathematics</p> <p>+ interdisciplinary knowledge & thinking</p> <p>++ abstract, logical, analytical thinking</p> <p>++ deepened expertise in biological specialist field</p> <p>++ independent learning and (research-based) working</p> <p>++ data presentation and evidence-based discussion (written and spoken)</p> <p>+ teamwork</p> <p>++ (scientific) communication skills</p> <p>+ project and time management</p> <p>+ knowledge of safety and environmental issues</p> <p>This course is designed for students to learn about the basic light and electron optical methods. Students will be able to work with preparative techniques for scanning electron microscopy, transmission electron microscopy, and light microscopy, and confocal scanning laser microscopy. Students completing this course will have learned basic principles for fixing and embedding biological materials for electron microscopy. Students will have learned how to operate a transmission electron microscope, a scanning electron microscope, several ultramicrotomes, a vacuum evaporator, a critical point dryer, and a sputter coater. Digital imaging techniques that will be learned will include print making, design and assembly of materials for publication, PowerPoint presentations, and poster design. Students will be introduced to the principles of light microscopy utilizing different optical systems and will have the opportunity to have hands-on experience with a Leica photomicroscope as well as the Leica SP5 confocal laser scanning.</p>	
Module contents	Microscopy of protists and micro metazoans. Students are required plan and carry out a research project that exposes them to some of the challenges and problems encountered by microscopical anatomy - and some of the techniques that are used to solve these problems. Students have to present a scientific poster, a short oral presentation and a scientific paper.	
Literatureempfehlungen	Will be announced in the course.	
Links		
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency	annually	
Module capacity	8 (For more applicants than places, a motivation letter decides on the admission.)	
Modullevel / module level	AS (Akzentsetzung / Accentuation)	
Modulart / typ of module	Wahlpflicht / Elective	
Lehr-/Lernform / Teaching/Learning method	Vorlesung/Seminar, Übung	
Vorkenntnisse / Previous knowledge		
Examination	Prüfungszeiten	Type of examination

Examination		Prüfungszeiten	Type of examination		
Final exam of module		end of module	portfolio		
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance	
Vorlesung und Seminar		2	WiSe	28	
Exercises		3.5	WiSe	49	
Präsenzzeit Modul insgesamt				77 h	

bio360 - Marine Biodiversity

Module label	Marine Biodiversity
Modulkürzel	bio360
Credit points	15.0 KP
Workload	450 h
Verwendbarkeit des Moduls	<ul style="list-style-type: none">• Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule• Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule• Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule
Zuständige Personen	<p>Martinez Arbizu, Pedro Miguel (Module responsibility)</p> <p>Hoppenrath, Mona (Module counselling)</p> <p>Martinez Arbizu, Pedro Miguel (Prüfungsberechtigt)</p> <p>Hoppenrath, Mona (Prüfungsberechtigt)</p> <p>Wehrmann, Achim (Prüfungsberechtigt)</p>
Prerequisites	
Skills to be acquired in this module	<p>++ biological knowledge ++ knowledge of biological working methods + interdisciplinary knowledge & thinking + abstract, logical, analytical thinking ++ deepened expertise in biological specialist field ++ independent learning and (research-based) working ++ data presentation and evidence-based discussion (written and spoken) + teamwork + (scientific) communication skills + project and time management</p> <p>By active participation the students acquire the following knowledge/abilities/qualification:</p> <ul style="list-style-type: none">* Preparation and organization of sampling* Keeping organisms – field study* Marine deposits, development of marine sediments and their effects on the fauna* Methods of meiofauna and macrofauna sampling, also plankton sampling* Methods of quantitative community analysis* Diversity comparison of various sites applying statistical methods* Multivariate statistics for correlation of biocenoses and environmental variables* Biocenoses of marine habitats* Biology, morphology, systematics, behaviour and ecology of selected taxa in marine water systems* Formulation and definition of scientific questions and selection of methods* Habitat and biocenoses, interstitial, littoral (lotic, lenitic), diversity* Planning behavioural experiments* Presentation and discussion of scientific results* Independent scientific work in groups and presentation of results
Module contents	<p>The module gives an introduction to marine biodiversity research demonstrated by various animal groups from the Wadden Sea and the North Sea including independent sampling on the coast and on the islands. The students will collect the organisms in the field or on board using sampling equipment. In the laboratory course, the biology and morphology as well as the ecology and behaviour of certain species are investigated and documented. The morphology of marine sediments and their development are further aspects of this module.</p>
Literatureempfehlungen	<p>Literatur: EMSCHERMANN, P., HOFRICHTER, O., KÖRNER, H. & D., ZISSLER, 1992: Meeresbiologische Exkursion – Beobachtung und Experiment. Gustav Fischer Verlag, Stuttgart, Jena, New York. GIERE, O., 2009: Meiobenthology – The Microscopic Motile Fauna of Aquatic Sediments. Springer Verlag, Berlin-Heidelberg. GRZIMEK, B., 1979: Grzimeks Tierleben. 13 Bände. Dtv. GRUNER, H.-E., 1993: Urania Tierreich. 6 Bände. Urania-Verlag Leipzig, Jena, Berlin. GRUNER, H.-E., 1993: „Der Kaestner“, A., Lehrbuch der speziellen Zoologie. All volumes, Gustav Fischer Verlag, Jena, Stuttgart. HAYWARD, P. NELSON-SMITH, T., SHIELDS, C. & M. KREMER, 2008: Der neue Kosmos Strandführer - 1500 Arten der Küsten Europas. Franckh-Kosmos Verlag. HEMPEL, G., HEMPEL, I. & S. SCHIEL, 2006: Faszination Meeresforschung – Ein ökologisches Lesebuch. Hausschild. HIGGINS, R.P. & H., THIEL, 1988: Introduction to the Study of Meiofauna. Smithsonian Institution Press, Washington, D.C., London. RUNDLE, S.D., ROBERTSON, A.L. & J.M. SCHMID-ARAYA, 2002: Freshwater Meiofauna: Biology and Ecology. Backhuys Publishers, Leiden.</p>

SOMMER, U., 2005: Biologische Meereskunde. 2. Auflage, Springer Verlag, Berlin, Heidelberg.
 TARDENT, P., 1993: Meeresbiologie, eine Einführung. 2. Auflage, Georg Thieme Verlag, Stuttgart, New York.
 WESTHEIDE, W. & R., RIEGER, 2007/2004: Spezielle Zoologie. Band I, II. Gustav Fischer Verlag, Stuttgart, Jena.

The literature listed above is available in the university library. More reading will be recommended in the course of the lecture.

Literature inquiry:

web of science: [externhttp://www.bis.uni-oldenburg.de](http://www.bis.uni-oldenburg.de) - Datenbanken(DBIS) - Biologie - TOP-Datenbanken z.
 B. ASFA, Science Citation Index, Zoological Record
<http://www.biodiversitylibrary.org/bibliography/14107>
[externhttp://scholar.google.de/](http://scholar.google.de/)
[externhttp://www.vifabio.de](http://www.vifabio.de)
 Open access journals: [externhttp://www.doaj.org/](http://www.doaj.org/) - [externhttp://www.plosone.org](http://www.plosone.org)

Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	jährlich			
Module capacity	unlimited			
Modullevel / module level	AS (Akzentsetzung / Accentuation)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Seminar, Übung			
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten	Type of examination		
Final exam of module	During lectures	1 Portfolio		
PLEASE NOTE: Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.				
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2		28
Exercises		9		126
Seminar		2		28
Präsenzzeit Modul insgesamt				182 h

bio375 - Flora - Advanced Concepts

Module label	Flora - Advanced Concepts			
Modulkürzel	bio375			
Credit points	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 			
Zuständige Personen	<p>Albach, Dirk Carl (Module responsibility)</p> <p>von Hagen, Klaus Bernhard (Module counselling)</p> <p>Will, Maria (Module counselling)</p> <p>Albach, Dirk Carl (Prüfungsberechtigt)</p> <p>von Hagen, Klaus Bernhard (Prüfungsberechtigt)</p> <p>Will, Maria (Prüfungsberechtigt)</p>			
Prerequisites	bio256 Flora and Fauna			
Skills to be acquired in this module	<p>+ biological knowledge</p> <p>+ knowledge of biological working methods</p> <p>+ deepened expertise in biological specialist field</p> <p>+ independent learning and (research-based) working</p> <p>+ data presentation and evidence-based discussion (written and spoken)</p> <p>+ (scientific) communication skills</p> <p>+ knowledge of safety and environmental issues</p> <p>The module is intended to give students in-depth knowledge on plant determination and the diversity of plants. Students shall increase their knowledge on species and learn and improve their abilities in plant determination and plant conservation. Subjects and methods relevant for nature conservation are emphasized. Along with these, students shall improve their systemic thinking with relation to nature in northwestern Germany and its flora. Students learn about plants and how to group them according to their phylogeny and evolutionary adaptations, so they can pass this knowledge on to others. Competence in assessment is conveyed in the areas of diversity and nature conservation to sensitize students for a respectful treatment of nature and passing on this ability to others. Finally, we will discuss sustainable use of plants and habitats and their restoration.</p>			
Module contents	<p>The module comprises a lecture in the Botanical Garden, where plants will be observed and investigated. This includes algae, bryophytes, ferns, gymnosperms and various families of angiosperms.</p> <p>The seminar is intended to let students study in-depth additional plant families with their typical characters.</p>			
Literatureempfehlungen	Rothmaler - Exkursionsflora von Deutschland. Gefäßpflanzen: Grundband			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	The module will be offered every other year			
Module capacity	12			
Modullevel / module level	AS (Akzentsetzung / Accentuation)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Seminar			
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten		Type of examination	
Final exam of module			portfolio	
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	SoSe	28
Seminar		2	SoSe	28
Präsenzzeit Modul insgesamt				56 h

bio376 - Flora - Advanced Methods

Module label	Flora - Advanced Methods	
Modulkürzel	bio376	
Credit points	6.0 KP	
Workload	180 h	
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule 	
Zuständige Personen	<p>Albach, Dirk Carl (Module responsibility)</p> <p>von Hagen, Klaus Bernhard (Module counselling)</p> <p>Will, Maria (Module counselling)</p> <p>Albach, Dirk Carl (Prüfungsberechtigt)</p> <p>von Hagen, Klaus Bernhard (Prüfungsberechtigt)</p> <p>Will, Maria (Prüfungsberechtigt)</p>	
Prerequisites	<p>bio256 Flora and Fauna</p> <p>bio375 Flora - Advanced concepts</p>	
Skills to be acquired in this module	<p>+ biological knowledge</p> <p>+ knowledge of biological working methods</p> <p>+ deepened expertise in biological specialist field</p> <p>+ independent learning and (research-based) working</p> <p>+ data presentation and evidence-based discussion (written and spoken)</p> <p>+ (scientific) communication skills</p> <p>+ knowledge of safety and environmental issues</p> <p>The module is intended to give students in-depth knowledge on plant determination and the diversity of plants. Students shall increase their knowledge on species and learn and improve their abilities in plant determination and plant conservation. Subjects and methods relevant for nature conservation are emphasized. Along with these, students shall improve their systemic thinking with relation to nature in northwestern Germany and its flora. Students learn about plants and how to group them according to their phylogeny and evolutionary adaptations, so they can pass this knowledge on to others. Competence in assessment is conveyed in the areas of diversity and nature conservation to sensitize students for a respectful treatment of nature and passing on this ability to others. Finally, we will discuss sustainable use of plants and habitats and their restoration.</p>	
Module contents	The exercises will be used to apply the abilities to plant species in the vicinity of Oldenburg and to practice methods in mapping and surveying plant species.	
Literatureempfehlungen	Rothmaler - Exkursionsflora von Deutschland. Gefäßpflanzen: Grundband	
Links		
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency	The module will be offered every other year	
Module capacity	12	
Modullevel / module level	AS (Akzentsetzung / Accentuation)	
Modulart / typ of module	Wahlpflicht / Elective	
Lehr-/Lernform / Teaching/Learning method	Übung	
Vorkenntnisse / Previous knowledge		
Examination	Prüfungszeiten	Type of examination
Final exam of module		portfolio
Form of instruction	Exercises	
SWS	4	
Frequency	SoSe	
Workload Präsenzzeit	56 h	

bio377 - Flora - Advanced Methods not just for schools

Module label	Flora - Advanced Methods not just for schools	
Modulkürzel	bio377	
Credit points	9.0 KP	
Workload	270 h	
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 	
Zuständige Personen	<p>Albach, Dirk Carl (Module responsibility)</p> <p>von Hagen, Klaus Bernhard (Module counselling)</p> <p>Will, Maria (Module counselling)</p> <p>Albach, Dirk Carl (Prüfungsberechtigt)</p> <p>von Hagen, Klaus Bernhard (Prüfungsberechtigt)</p> <p>Will, Maria (Prüfungsberechtigt)</p>	
Prerequisites	<p>bio375 Flora - Advanced Concepts</p> <p>bio256 Flora and Fauna</p>	
Skills to be acquired in this module	<p>+ biological knowledge</p> <p>+ knowledge of biological working methods</p> <p>+ deepened expertise in biological specialist field</p> <p>+ independent learning and (research-based) working</p> <p>+ data presentation and evidence-based discussion (written and spoken)</p> <p>+ (scientific) communication skills</p> <p>+ knowledge of safety and environmental issues</p> <p>The module is intended to give students in-depth knowledge on plant determination and the diversity of plants. Students shall increase their knowledge on species and learn and improve their abilities in plant determination and plant conservation. Subjects and methods relevant for nature conservation are emphasized. Along with these, students shall improve their systemic thinking with relation to nature in northwestern Germany and its flora. Students learn about plants and how to group them according to their phylogeny and evolutionary adaptations, so they can pass this knowledge on to others. Competence in assessment is conveyed in the areas of diversity and nature conservation to sensitize students for a respectful treatment of nature and passing on this ability to others. Finally, we will discuss sustainable use of plants and habitats and their restoration.</p>	
Module contents	<p>The exercises will be used to apply the abilities to identify plant species in the vicinity of Oldenburg and to practice methods in mapping and surveying plant species. Investigations applicable to school lessons will be presented and especially thoroughly discussed.</p>	
Literatureempfehlungen	Rothmaler - Exkursionsflora von Deutschland. Gefäßpflanzen: Grundband	
Links		
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency	The module will be offered every other year	
Module capacity	12	
Modullevel / module level	AS (Akzentsetzung / Accentuation)	
Modulart / typ of module	Wahlpflicht / Elective	
Lehr-/Lernform / Teaching/Learning method	Übung	
Vorkenntnisse / Previous knowledge		
Examination	Prüfungszeiten	Type of examination
Final exam of module		portfolio
Form of instruction	Exercises	
SWS	6	
Frequency	SoSe	
Workload Präsenzzeit	84 h	

bio385 - Specific Microbiology

Module label	Specific Microbiology			
Modulkürzel	bio385			
Credit points	12.0 KP			
Workload	360 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 			
Zuständige Personen	<p>Rabus, Ralf Andreas (Module responsibility)</p> <p>Rabus, Ralf Andreas (Prüfungsberechtigt)</p> <p>Wünsch, Daniel (Prüfungsberechtigt)</p>			
Prerequisites	<p>bio233 Basics in microbiology and genetics</p> <p>bio265 general microbiology</p>			
Skills to be acquired in this module	<p>THEORIE: verschiedene Kultivierungsstrategien (batch, fed-batch, kontinuierlich) und physiologische Interpretation von Meßparameteren (Wachstumsraten, Respirationsraten, Ertrag) PRAXIS: apparatives Verständnis von und praktischer Umgang mit Bioreaktoren inkl. Sensorsystemen</p>			
Module contents	<p>Grundlagen der Prozess-kontrollierten Kultivierung in Bioreaktoren TEIL A: Umgang mit Bioreaktoren inkl. Analyse und Regelung von Prozess-Parametern TEIL B: Kultivierung mariner Bakterien unter definierten Bedingungen im Bioreaktor, Bilanzierung von Stoffwechselaktivitäten</p>			
Literaturempfehlungen	<p>Schmauder HP (1994) Methoden der Biotechnologie, Kapitel 3.2.2. Gustav Fischer Verlag Jena Chmiel H, Briechle S (1991) Bioprozesstechnik. Gustav Fischer Verlag Stuttgart</p>			
Links	<p>www.icbm.de/ammb</p>			
Language of instruction	<p>German</p>			
Duration (semesters)	<p>1 Semester</p>			
Module frequency	<p>jährlich</p>			
Module capacity	<p>8</p>			
Modullevel / module level	<p>AS (Akzentsetzung / Accentuation)</p>			
Modulart / typ of module	<p>Wahlpflicht / Elective</p>			
Lehr-/Lernform / Teaching/Learning method	<p>Vorlesung, Seminar, Praktikum</p>			
Vorkenntnisse / Previous knowledge	<p>Chemie</p>			
Examination	<p>Prüfungszeiten</p>		<p>Type of examination</p>	
Final exam of module			<p>exam (50%) protocol (50%)</p>	
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	WiSe	28
Seminar		2	WiSe	28
Practical training		6	WiSe	84
Präsenzzeit Modul insgesamt				140 h

bio395 - Plant Molecular Biology and Genetics I

Module label	Plant Molecular Biology and Genetics I			
Modulkürzel	bio395			
Credit points	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 			
Zuständige Personen	1 N., N. (Module responsibility)			
Prerequisites				
Skills to be acquired in this module	<p>++ biological knowledge ++ knowledge of biological working methods + biologically relevant knowledge in the natural sciences and mathematics + statistics & scientific programming ++ interdisciplinary knowledge & thinking ++ abstract, logical, analytical thinking ++ deepened expertise in biological specialist field ++ independent learning and (research-based) working ++ data presentation and evidence-based discussion (written and spoken) ++ teamwork ++ (scientific) communication skills ++ project and time management + knowledge of safety and environmental issues</p> <p>The module serves the in-depth study of state-of-the-art techniques and problems in the field of molecular plant biology and plant genetics. Specialist competencies: basic knowledge in plant genetics, plant developmental genetics, plant/environment interactions and molecular basis of gene regulation General competencies: Presentation of scientific papers, presentation techniques, teamwork, problem solving competencies</p>			
Module contents	Part of this module is a lecture that addresses several topics of modern plant molecular biology. The main focus is on plant developmental genetics, plant/environment interactions and the underlying molecular mechanisms of gene regulation in plants. At the beginning of the module, the students will present diverse molecular biology techniques and the latest developments in the field in a "method and techniques" seminar. In a "literature" seminar, the students will present and discuss a recent publication on one of the above-mentioned topics.			
Literatureempfehlungen	Literature will be handed out at the beginning of the course.			
Links				
Languages of instruction	German, English			
Duration (semesters)	1 Semester			
Module frequency	jährlich			
Module capacity	16			
Reference text	This module is mandatory for "Plant molecular biology and genetics II"			
Modullevel / module level	AS (Akzentsetzung / Accentuation)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Seminar			
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten		Type of examination	
Final exam of module			Written examination (good seminar presentations improve the grade)	
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	WiSe	28
Seminar		2	WiSe	28
Präsenzzeit Modul insgesamt				56 h

bio396 - Plant Molecular Biology and Genetics II

Module label	Plant Molecular Biology and Genetics II	
Modulkürzel	bio396	
Credit points	6.0 KP	
Workload	180 h	
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 	
Zuständige Personen	<p>Laubinger, Sascha (Module responsibility)</p> <p>Laubinger, Sascha (Prüfungsberechtigt)</p>	
Prerequisites	bio395 Plant molecular biology and genetics I	
Skills to be acquired in this module	<p>++ biological knowledge ++ knowledge of biological working methods + biologically relevant knowledge in the natural sciences and mathematics + statistics & scientific programming ++ interdisciplinary knowledge & thinking ++ abstract, logical, analytical thinking ++ deepened expertise in biological specialist field ++ independent learning and (research-based) working ++ data presentation and evidence-based discussion (written and spoken) ++ teamwork ++ (scientific) communication skills ++ project and time management + knowledge of safety and environmental issues</p> <p>The module serves the in-depth study of state-of-the-art techniques and problems in the field of molecular plant biology and plant genetics. Specialist competencies: Acquiring basic skill in plant molecular biology, genetics and plant biochemistry Methodological competencies: molecular biology techniques, conducted independently General competencies: Presentation of scientific results, presentation techniques, teamwork, problem solving competencies</p>	
Module contents	Part of this module is a lecture that addresses several topics of modern plant molecular biology. The main focus is on plant developmental genetics, plant/environment interactions and the underlying molecular mechanisms of gene regulation in plants. At the beginning of the module, the students will present diverse molecular biology techniques and the latest developments in the field in a "method and techniques" seminar. In a "literature" seminar, the students will present and discuss a recent publication on one of the above-mentioned topics.	
Literatureempfehlungen	Literature will be handed out at the beginning of the course.	
Links		
Languages of instruction	German, English	
Duration (semesters)	1 Semester	
Module frequency	annually	
Module capacity	16	
Modullevel / module level	AS (Akzentsetzung / Accentuation)	
Modulart / typ of module	Wahlpflicht / Elective	
Lehr-/Lernform / Teaching/Learning method	Übung	
Vorkenntnisse / Previous knowledge		
Examination	Prüfungszeiten	Type of examination
Final exam of module		portfolio (presentation, protocols)
Form of instruction	Exercises	
SWS	4	
Frequency	WiSe	
Workload Präsenzzeit	56 h	

bio405 - Introduction to Neurobiology I

Module label	Introduction to Neurobiology I			
Modulkürzel	bio405			
Credit points	12.0 KP			
Workload	360 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 			
Zuständige Personen	<p>Greschner, Martin (Module responsibility)</p> <p>Koch, Karl-Wilhelm (Module counselling)</p> <p>Janssen-Bienhold, Ulrike (Module counselling)</p> <p>Greschner, Martin (Prüfungsberechtigt)</p> <p>Janssen-Bienhold, Ulrike (Prüfungsberechtigt)</p> <p>Koch, Karl-Wilhelm (Prüfungsberechtigt)</p> <p>Köppl, Christine (Prüfungsberechtigt)</p>			
Prerequisites				
Skills to be acquired in this module	<p>++ deepened biological expertise</p> <p>++ deepened knowledge of biological working methods</p> <p>+ scientific/mathematical basic knowledge relevant for biology</p> <p>+ critical and analytical thinking</p> <p>++ data presentation and discussion in German (written and spoken)</p> <p>+ teamwork</p>			
Module contents	The lecture covers the molecular and cellular basis of neurobiology, the electrical properties of nerve cells, the organization and development of the nervous system and the function of the motor system. In the seminar, topics related to the lectures of the week are covered in more depth. In the exercises, the theoretical knowledge from the lectures will be tested in small experiments.			
Literatureempfehlungen	Purves D. et al.: Neuroscience, Sinauer Associates, Sunderland USA, latest edition			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	annually			
Module capacity	30			
Reference text	associated with the modules bio415 and bio416 Introduction to Neurobiology II in the winter semester			
Modullevel / module level	AS (Akzentsetzung / Accentuation)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Seminar, Übung			
Vorkenntnisse / Previous knowledge	Grundlagen der Physiologie/ Zellbiologie			
Examination	Prüfungszeiten		Type of examination	
Final exam of module	end of semester		exam and protocol	
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		3	SoSe	42
Seminar		1	SoSe	14
Exercises		4	SoSe	56
Tutorial (optional)			SoSe und WiSe	0
Präsenzzeit Modul insgesamt				112 h

bio408 - Introduction to Neurobiology I

Module label	Introduction to Neurobiology I			
Modulkürzel	bio408			
Credit points	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 			
Zuständige Personen	<p>Greschner, Martin (Module responsibility)</p> <p>Koch, Karl-Wilhelm (Module counselling)</p> <p>Janssen-Bienhold, Ulrike (Module counselling)</p> <p>Greschner, Martin (Prüfungsberechtigt)</p> <p>Janssen-Bienhold, Ulrike (Prüfungsberechtigt)</p> <p>Koch, Karl-Wilhelm (Prüfungsberechtigt)</p>			
Prerequisites				
Skills to be acquired in this module	<p>[nop]++ biologische Fachkenntnisse ++ Kenntnisse biologischer Arbeitstechniken + biologierelevante naturwissenschaftliche/mathematische Grundkenntnisse + Abstraktes, logisches, analytisches Denken ++ Datenpräsentation und evidenzbasierte Diskussion in Wort und Schrift + Teamfähigkeit [/nop]</p>			
Module contents	<p>Der Vorlesungsstoff (3 SWS) umfasst im Teil I die molekularen und zellulären Grundlagen der Neurobiologie, die elektrischen Vorgänge in Nervenzellen, die Organisation und Entwicklung des Nervensystems, die Funktion am Beispiel einfacher Schaltkreise. Im Seminar (1 SWS) werden einzelne Themen aus der Vorlesung vertiefend behandelt.</p>			
Literaturempfehlungen	<p>Purves D. et al.: Neuroscience, Sinauer Associates, Sunderland USA, jeweils neueste Auflage.</p>			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency				
Module capacity	unlimited			
Reference text	<p>Aus bio405 und bio408 kann nur 1 Modul gewählt werden.</p> <p>Verknüpft mit den Modulen bio415 und bio416 Einführung in die Neurobiologie II im WS</p>			
Modullevel / module level	BW (Bereichswahlmodul / Range selection)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Seminar			
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten		Type of examination	
Final exam of module	1 Klausur; aktive Teilnahme im Seminar			
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		3	SoSe	32

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Seminar		1	SoSe	14
Präsenzzeit Modul insgesamt				46 h

bio415 - Introduction to Neurobiology II

Module label	Introduction to Neurobiology II			
Modulkürzel	bio415			
Credit points	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 			
Zuständige Personen	<p>Greschner, Martin (Module responsibility)</p> <p>Thiel, Christiane Margarete (Module counselling)</p> <p>Köppl, Christine (Module counselling)</p> <p>Greschner, Martin (Prüfungsberechtigt)</p> <p>Thiel, Christiane Margarete (Prüfungsberechtigt)</p> <p>Köppl, Christine (Prüfungsberechtigt)</p>			
Prerequisites				
Skills to be acquired in this module	<p>++ deepened biological expertise</p> <p>++ deepened knowledge of biological working methods</p> <p>+ scientific/mathematical basic knowledge relevant for biology</p> <p>+ critical and analytical thinking</p>			
Module contents	The lecture covers the basics of systemic neuroscience with a focus on processing in sensory systems, the plasticity of the nervous system and the mechanisms underlying cognitive processing. In the seminar, topics related to the lectures of the week are covered in more depth.			
Literatureempfehlungen	Purves D. et al.: Neuroscience, Sinauer Associates, Sunderland USA, latest edition			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency				
Module capacity	30			
Modullevel / module level	AS (Akzentsetzung / Accentuation)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Seminar			
Vorkenntnisse / Previous knowledge	Grundlagen der Physiologie/ Wahrnehmung			
Examination	Prüfungszeiten		Type of examination	
Final exam of module	end of semester		written exam	
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		3	WiSe	42
Seminar		1	WiSe	14
Präsenzzeit Modul insgesamt				56 h

bio416 - Experiments in Neurobiology II

Module label	Experiments in Neurobiology II	
Modulkürzel	bio416	
Credit points	6.0 KP	
Workload	180 h	
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 	
Zuständige Personen	<p>Beutemann, Rainer (Module responsibility)</p> <p>Thiel, Christiane Margarete (Module counselling)</p> <p>Langemann, Ulrike (Module counselling)</p> <p>Rosemann, Stephanie (Module counselling)</p> <p>Beutemann, Rainer (Prüfungsberechtigt)</p> <p>Thiel, Christiane Margarete (Prüfungsberechtigt)</p> <p>Langemann, Ulrike (Prüfungsberechtigt)</p> <p>Rosemann, Stephanie (Prüfungsberechtigt)</p>	
Prerequisites	bio415 "Introduction to Neurobiology II"	
Skills to be acquired in this module	<p>++ deepened biological expertise</p> <p>++ deepened knowledge of biological working methods</p> <p>++ data analysis skills</p> <p>++ data presentation and discussion in German and English (written and spoken)</p> <p>+ teamwork</p> <p>+ scientific/mathematical basic knowledge relevant for biology</p>	
Module contents	The exercise immediately follows the module "Introduction to Neurobiology II". By experimenting with each other, the students deepen their knowledge in the fields of cognitive neuroscience and hearing science. The students analyze their own data (incl. statistics) and present these in a written report.	
Literatureempfehlungen	Purves D. et al.: Neuroscience, Sinauer Associates, Sunderland USA, latest edition	
Links		
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency	annually	
Module capacity	30	
Modullevel / module level	AS (Akzentsetzung / Accentuation)	
Modulart / typ of module	Wahlpflicht / Elective	
Lehr-/Lernform / Teaching/Learning method	Übung	
Vorkenntnisse / Previous knowledge	Neurobiologie II	
Examination	Prüfungszeiten	Type of examination
Final exam of module	end of module	portfolio (data analysis, presentation)
Form of instruction	Exercises	
SWS	4	
Frequency	WiSe	
Workload Präsenzzeit	56 h	

bio420 - Biochemistry of the Cell

Module label	Biochemistry of the Cell			
Modulkürzel	bio420			
Credit points	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 			
Zuständige Personen	<p>Scholten, Alexander (Module responsibility)</p> <p>Scholten, Alexander (Prüfungsberechtigt)</p>			
Prerequisites				
Skills to be acquired in this module	<p>++ biological knowledge</p> <p>+ knowledge of biological working methods</p> <p>+ biologically relevant knowledge in the natural sciences and mathematics</p> <p>+ abstract, logical, analytical thinking</p> <p>+ data presentation and evidence-based discussion (written and spoken)</p> <p>++ (scientific) communication skills</p>			
Module contents	supramolecular organization in the cell, interactions of biomolecules, signalling fluxes			
Literaturempfehlungen	Biochemie, Müller-Esterl Biochemie, Lubert Stryer Lehninger Prinzipien der Biochemie, David L. Nelson und Michael M. Cox Principles of Biochemistry, Horton et al.			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	annually			
Module capacity	20			
Modullevel / module level	AS (Akzentsetzung / Accentuation)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Seminar, Übung			
Vorkenntnisse / Previous knowledge	Biochemie und Molekularbiologie			
Examination	Prüfungszeiten	Type of examination		
Final exam of module	during the semester	oral presentation		
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		1	WiSe	14
Exercises		1	WiSe	14
Seminar		2	WiSe	28
Präsenzzeit Modul insgesamt				56 h

bio430 - Analytical Biochemistry

Module label	Analytical Biochemistry			
Modulkürzel	bio430			
Credit points	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 			
Zuständige Personen	<p>Koch, Karl-Wilhelm (Module responsibility)</p> <p>Scholten, Alexander (Module counselling)</p> <p>Koch, Karl-Wilhelm (Prüfungsberechtigt)</p> <p>Scholten, Alexander (Prüfungsberechtigt)</p>			
Prerequisites				
Skills to be acquired in this module	<p>++ biological knowledge ++ knowledge of biological working methods + biologically relevant knowledge in the natural sciences and mathematics + abstract, logical, analytical thinking + deepened expertise in biological specialist field ++ data presentation and evidence-based discussion (written and spoken) + teamwork</p> <p>The students get a survey of current techniques in Biochemistry and learn some essential techniques such as column chromatography and enzyme kinetic measurements in practice. They understand the theoretical fundamentals of these techniques and assess experimentally collected data bases.</p>			
Module contents	Bioanalytical methods in theory and practice			
Literaturempfehlungen	Bioanalytik, Lottspeich/Engels			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	annually			
Module capacity	20			
Modullevel / module level	AS (Akzentsetzung / Accentuation)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Seminar, Übung			
Vorkenntnisse / Previous knowledge	Biochemie, Molekularbiologie			
Examination	Prüfungszeiten		Type of examination	
Final exam of module	during semester		oral presentation and protocoll	
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		1	SoSe	14
Seminar		1	SoSe	14
Exercises		2	SoSe	28
Präsenzzeit Modul insgesamt				56 h

bio440 - Microfauna, Mircoflora & Protista of limnic and marine habitats

Module label	Microfauna, Mircoflora & Protista of limnic and marine habitats
Modulkürzel	bio440
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule
Zuständige Personen	<p>Ahrichs, Wilko (Module responsibility)</p> <p>Kieneke, Alexander (Module counselling)</p> <p>Hoppenrath, Mona (Module counselling)</p> <p>Ahrichs, Wilko (Prüfungsberechtigt)</p> <p>Kieneke, Alexander (Prüfungsberechtigt)</p> <p>Hoppenrath, Mona (Prüfungsberechtigt)</p>
Prerequisites	
Skills to be acquired in this module	<p>++ biological knowledge ++ knowledge of biological working methods ++ biologically relevant knowledge in the natural sciences and mathematics + statistics & scientific programming ++ interdisciplinary knowledge & thinking + abstract, logical, analytical thinking ++ deepened expertise in biological specialist field ++ independent learning and (research-based) working ++ data presentation and evidence-based discussion (written and spoken) + teamwork ++ (scientific) communication skills + project and time management</p> <p>The objectives of the module are the teaching and learning of methods in the field of taxonomy, systematics, morphology, ecology, and evolution. Competencies for finding, identifying, preparing, micro-copying, illustrating, describing, and publishing species are taught. It learns how a scientific collection is created and managed. Another goal is the teaching of basics of molecular systematics and barcoding. The focus is on taxa of the microfauna and protists of limnic and marine habitats. The goal is the knowledge of biotic and abiotic properties of aquatic habitats, their formation and biodiversity. The students should learn to hypothesize structural adaptations of organisms to aquatic habitats.</p>
Module contents	<p>We study microfauna and protists of limnic and marine habitats. Microfauna refers to microscopic animals. They live together with protists aquatic habitats in high diversity. Animals of the microfauna and protists usually belong to groups that developed early in evolution. The study of communities of these groups give a unique insight into the evolution of animals and protists. The microfauna and the protists are little studied compared to other groups of animals and offer great potential. But they must be examined under the optical microscope. This requires special techniques and knowledge. Fortunately, through digital techniques, the investigation and publications have been greatly simplified. We will make excursions to ponds, ponds, lakes, rivers, bogs, sea beaches, etc. It teaches where, when, and how to find species of microfauna and protists. The collected organisms are determined, prepared, microscoped, photographed, drawn, and digitally illustrated. Art descriptions are produced. Attention is paid to the correct application of nomenclature rules. We show how a scientific collection is built and managed. For this purpose, basic knowledge in SQL database technology is taught. Dichotomous, synoptic, and digital identification keys are presented and developed. In addition to the classical morphological methods, it will be shown how species for molecular barcoding and phylogenetic analyzes are investigated. The students will create art portraits. The results are communicated in the form of posters, short lectures, and scientific publications.</p>
Literaturempfehlungen	Will be announced in the course.
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	irregular
Module capacity	12 (For more applicants than places, a motivation letter decides on the admission.)

Modullevel / module level	AS (Akzentsetzung / Accentuation)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method	Seminar, Übung, Exkursion			
Vorkenntnisse / Previous knowledge	Lichtmikroskopie			
Examination	Prüfungszeiten		Type of examination	
Final exam of module				Portfolio
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Study trip		1	SoSe	14
Seminar		1	SoSe	14
Exercises		2	SoSe	28
Präsenzzeit Modul insgesamt				56 h

bio450 - Posters, Pictures, Presentations and Papers

Module label	Posters, Pictures, Presentations and Papers	
Modulkürzel	bio450	
Credit points	9.0 KP	
Workload	270 h	
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 	
Zuständige Personen	<p>Bininda-Emonds, Olaf (Module responsibility)</p> <p>Ahrichs, Wilko (Module counselling)</p> <p>Bininda-Emonds, Olaf (Prüfungsberechtigt)</p> <p>Ahrichs, Wilko (Prüfungsberechtigt)</p>	
Prerequisites		
Skills to be acquired in this module	<p>+ interdisciplinary knowledge & thinking + abstract, logical, analytical thinking + deepened expertise in biological specialist field ++ independent learning and (research-based) working ++ data presentation and evidence-based discussion (written and spoken) ++ (scientific) communication skills + project and time management</p> <p>Practical experience with four forms of scientific presentation: papers, presentations, scientific drawings, and posters. The students will learn / gain: 1) the logical and structural form of a scientific paper (or protocol or thesis) so as to communicate their results more effectively; 2) the distillation of the key information out of a project and its focused presentation in a lecture or poster; 3) experience with constructive criticism in a group setting as well as the critical assessment of scientific studies; 4) experience with scientific English; and 5) the art of scientific drawing, including the making of high-quality photo montages for papers or posters through microphotography and digital editing.</p>	
Module contents	<p>Theoretical part: General tips regarding the logical and structural form of a scientific paper, presentation, or posters, including how to avoid making the most common mis-takes.</p> <p>Practical part: Critical analysis of selected papers from the (evolutionary biological) literature. Writing of a scientific paper using pre-given results. Construction and presentation of a lecture and poster in front of the group based on a recent paper from the literature. Through the feedback obtained in this process, improvements will be made in both cases. Microscopic photography of selected zoological specimens that will then be transferred to / drawn on transparent paper before being rescanned for digital editing. High-quality photo montages of both the photos themselves and the drawings derived from them will be obtained through diverse software (e.g., Ado-be Illustrator or InDesign).</p>	
Literatureempfehlungen	None. The relevant scientific literature will be distributed during the course.	
Links		
Languages of instruction	German, English	
Duration (semesters)	1 Semester	
Module frequency	annually	
Module capacity	10 (Letter of motivation)	
Modullevel / module level	AS (Akzentsetzung / Accentuation)	
Modulart / typ of module	Wahlpflicht / Elective	
Lehr-/Lernform / Teaching/Learning method	Übung	
Vorkenntnisse / Previous knowledge	Erfahrungen in der Anwendung von Excel oder ähnlichen Software-Programmen mit Graph-Fähigkeiten, von Adobe Photoshop, und von PowerPoint, Keynote oder ähnlichen Software-Programmen	
Examination	Prüfungszeiten	Type of examination
Final exam of module	Portfolio (100%)	
Form of instruction	Exercises	
SWS	6	
Frequency	SoSe	

Workload Präsenzzeit

84 h

bio460 - Diversity of marine Invertebrates

Module label	Diversity of marine Invertebrates
Modulkürzel	bio460
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule
Zuständige Personen	1 N., N. (Module responsibility)
Prerequisites	
Skills to be acquired in this module	<p>++ biological knowledge + knowledge of biological working methods + interdisciplinary knowledge & thinking ++ deepened expertise in biological specialist field ++ independent learning and (research-based) working ++ data presentation and evidence-based discussion (written and spoken) + teamwork ++ (scientific) communication skills ++ project and time management + knowledge of safety and environmental issues</p> <p>By actively participating in this module the students acquire qualifications in the fields stated below: -Survey of recent subjects concerning the biology and morphology of aquatic organisms -Extended knowledge of how morphological characteristics have developed -Technical skills in preparing and documenting morphological structures -Knowledge of organizational principles of these structures</p>
Module contents	<p>The module serves an extended examination of selected aquatic animals from a function morphological point of view. Living and fixed animals are investigated and histological preparations are analysed. Thus, the morphology, anatomy, and histology are studied in detail. The biology and ecology of these animals are also considered, which enables the organisms to be studied very intensively and provides an illustrative basis for theoretical discussions.</p>
Literatureempfehlungen	<p>AX, P., 1995: Das System der Metazoa. I, II, III. Ein Lehrbuch der phylogenetischen Systematik. Gustav Fischer Verlag, Stuttgart, Jena. Textbook with somehow different ideas! Very well illustrated! Illustrations are suitable for presentations!</p> <p>GRUNER, H.-E., 1993: „Der Kaestner“, A., Lehrbuch der speziellen Zoologie. All volumes, Gustav Fischer/Spektrum Akademischer Verlag, Jena, Stuttgart. Many interesting details are found only in these volumes!</p> <p>GRÜTER, W., 2001: Leben im Meer – Vielfalt und Zusammenhänge. Dr. Friedrich Pfeil Verlag, München. This book arouses your curiosity about the underwater world.</p> <p>HAYWARD, P. NELSON-SMITH, T., SHIELDS, C. & M. KREMER, 2008: Der neue Kosmos Strandführer - 1500 Arten der Küsten Europas. Franckh-Kosmos Verlag. This coastal guide provides excellent and clearly arranged colour tables for individual groups.</p> <p>HOFRICHTER, R., 2002: Das Mittelmeer, Fauna-Flora-Ökologie. Band I, II, Spektrum Akademischer Verlag, Heidenberg, Berlin. Numerous details on individual groups in the second part.</p> <p>WESTHEIDE, W. & R., RIEGER, 2013: Spezielle Zoologie. Band I, II. Gustav Fischer Verlag, Stuttgart, Jena. The textbook absolute! My explicit recommendation!</p> <p>The literature listed above is available in the university library in Wechloy. Further reading will be recommended in the course of the lecture.</p> <p>Literature inquiry: web of science: http://rzblx10.uni-regensburg.de/dbinfo/dbliste.php?bib_id=ubol&colors=7&ocolors=40&lett=f&gebiete=5 – Data banks(DBIS) - Biology - TOPData banks e.g. ASFA, Science Citation Index, Zoological Record http://www.biodiversitylibrary.org/bibliography/14107 http://scholar.google.de/ http://www.vifabio.de Open access journals: http://www.doaj.org/ - www.plosone.org</p>
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	annually
Module capacity	15
Modullevel / module level	AS (Akzentsetzung / Accentuation)
Modulart / typ of module	Wahlpflicht / Elective

Lehr-/Lernform / Teaching/Learning method Seminar, Übung

Vorkenntnisse / Previous knowledge

Examination	Prüfungszeiten	Type of examination
-------------	----------------	---------------------

Final exam of module	During the lecture	portfolio
-----------------------------	--------------------	-----------

PLEASE NOTE:
Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Exercises		3	WiSe	42
Seminar		1	WiSe	14
Präsenzzeit Modul insgesamt				56 h

bio470 - Marine Biology Field Trip

Module label	Marine Biology Field Trip			
Modulkürzel	bio470			
Credit points	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 			
Zuständige Personen	<p>Ahrichs, Wilko (Module responsibility)</p> <p>Kieneke, Alexander (Module counselling)</p> <p>Ahrichs, Wilko (Prüfungsberechtigt)</p> <p>Kieneke, Alexander (Prüfungsberechtigt)</p>			
Prerequisites	Motivationsschreiben bei mehr Teilnehmern als Plätzen.			
Skills to be acquired in this module	<p>[nop] ++ biological knowledge ++ knowledge of biological working methods ++ biologically relevant knowledge in the natural sciences and mathematics + statistics & scientific programming + interdisciplinary knowledge & thinking + abstract, logical, analytical thinking ++ deepened expertise in biological specialist field ++ independent learning and (research-based) working ++ data presentation and evidence-based discussion (written and spoken) + teamwork ++ (scientific) communication skills + project and time management[/nop]</p> <p>Objective of the module/skills:</p> <p>On completion of this modul students will: have a basic knowledge of the diversity of marine life; understand the fundamental physiochemical and physiological processes underlying the productivity of marine environments; understand the ecological dynamics of marine ecosystems; appreciate the role of humans in disturbing and exploiting marine ecosystems; have developed a critical, analytical approach to scientific research; have developed skills in writing scientific reports and in oral communication of scientific information.</p>			
Module contents	<p>Content of the module:</p> <p>Microscopy of marine fauna and flora of the wadden sea; Students are required plan and carry out a research project that exposes them to some of the challenges and problems encountered by field biologists - and some of the techniques that are used to solve these problems. Students have to present a scientific poster and a short oral presentation.</p>			
Literaturempfehlungen	Will be announced in Stud.IP.			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	annually			
Module capacity	14 (For more applicants than places, a letter of motivation decides on the admission.)			
Reference text	<p>Takes place alternately with Bio472 Marinbiological Course I. (Change between focus on rocky shore / mud flat & sand flat)</p> <p>If there are more applicants than places available, a letter of motivation decides on the acceptance.</p>			
Modullevel / module level	AS (Akzentsetzung / Accentuation)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method	Seminar, Übung, Exkursion			
Vorkenntnisse / Previous knowledge	Kenntnisse der Großgruppen der Tiere, der Pflanzen und der Protisten			
Examination	Prüfungszeiten		Type of examination	
Final exam of module	Modulende		1 portfolio	
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Seminar		2	SoSe	28
Exercises		2	SoSe	28
Study trip		2	SoSe	28
Präsenzzeit Modul insgesamt				84 h

bio472 - Marine Biology Field Trip

Module label	Marine Biology Field Trip			
Modulkürzel	bio472			
Credit points	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 			
Zuständige Personen	<p>Ahrichs, Wilko (Module responsibility)</p> <p>Kieneke, Alexander (Module counselling)</p> <p>Ahrichs, Wilko (Prüfungsberechtigt)</p> <p>Kieneke, Alexander (Prüfungsberechtigt)</p>			
Prerequisites				
Skills to be acquired in this module	<p>++biological knowledge ++knowledge of biological working methods +biologically relevant knowledge in the natural sciences and mathematics +abstract, logical, analytical thinking ++deepened expertise in biological specialist field ++independent learning and (research-based) working +data presentation and evidence-based discussion (written and spoken) ++teamwork ++(scientific) communication skills +project and time management</p> <p>In completion of this modul students will: have a basic knowledge of the diversity of marine life; understand the fundamental physiochemical and physiological processes underlying the productivity of marine environments; understand the ecological dynamics of marine ecosystems; appreciate the role of humans in disturbing and exploiting marine ecosystems; have developed a critical, analytical approach to scientific research; have developed skills in writing scientific reports and in oral communication of scientific information.</p>			
Module contents	<p>Content of the module:</p> <p>Microscopy of marine fauna and flora of the wadden sea; Students are required plan and carry out a research project that exposes them to some of the challenges and problems encountered by field biologists - and some of the techniques that are used to solve these problems. Students have to present a scientific poster and a short oral presentation.</p>			
Literatureempfehlungen	Will be announced in Studt IP.			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency				
Module capacity	14			
Reference text	Takes place alternately with Bio470 Marinbiological Course I. (Change between focus on Felswatt / Sandwatt.) If there are more applicants than places available, a letter of motivation decides on the acceptance.			
Modullevel / module level	BW (Bereichswahlmodul / Range selection)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method				
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten		Type of examination	
Final exam of module			1 Portfolio	
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Seminar		2	SoSe oder WiSe	28
Exercises		2	SoSe oder WiSe	28
Präsenzzeit Modul insgesamt				56 h

bio473 - Evolutionsgeschichte des Lebens: Leben im Wandel der Erdzeitalter

Module label	Evolutionsgeschichte des Lebens: Leben im Wandel der Erdzeitalter			
Modulkürzel	bio473			
Credit points	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 			
Zuständige Personen				
Prerequisites	none If there are more applicants than places available, a letter of motivation decides on the acceptance.			
Skills to be acquired in this module	++biological knowledge+knowledge of biological working methods ++biologically relevant knowledge in the natural sciences and mathematics ++interdisciplinary knowledge & thinking ++abstract, logical, analytical thinking ++deepened expertise in biological specialist field +independent learning and (research-based) working +data presentation and evidence-based discussion (written and spoken) +(scientific) communication skills Objective of the module/skills: Understanding of continental migration (plate tectonics), the formation of mountains and oceans. Understanding the formation of marine (coastal and deep sea), limnic and terrestrial habitats (e.g. swamp, forest, desert). Understanding the importance of climate change through continental migration, ice ages and climate catastrophes for the evolution of organisms. Knowledge of the phylogenetic system of important groups of organisms, their formation and evolution. Knowledge of the five major extinction events in Earth's history and their significance.			
Module contents	Content of the module: Earth age, continental migration, formation of marine, limnic and terrestrial habitats, species extinction, mass extinction and their causes (climate change, ice ages) and consequences (extinction and/or renewed radiation); anatomy and morphology ("baupläne") of ancestral species; evolution important characteristic complexes (nutrition, respiration, excretion and osmoregulation, reproduction, movement); important evolutionary steps of selected animals (e.g. molluscs with cephalopods, arthropods with insects, dinosaurs with birds, mammals with humans), taxa of plants and protists in the conquest of marine, limnic and terrestrial habitats.			
Literatureempfehlungen	Will be announced in Studt IP.			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency				
Module capacity	unlimited			
Modullevel / module level	BW (Bereichswahlmodul / Range selection)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method				
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten		Type of examination	
Final exam of module	End of module		Portfolio	
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Seminar		2	SoSe oder WiSe	28
Exercises		1	SoSe oder WiSe	14
Study trip		1	SoSe oder WiSe	14
Präsenzzeit Modul insgesamt				56 h

bio480 - Functional Morphology of Plants

Module label	Functional Morphology of Plants			
Modulkürzel	bio480			
Credit points	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 			
Zuständige Personen	<p>Zotz, Gerhard (Module responsibility)</p> <p>Einzmann, Helena (Module counselling)</p> <p>Zotz, Gerhard (Prüfungsberechtigt)</p> <p>Einzmann, Helena (Prüfungsberechtigt)</p>			
Prerequisites				
Skills to be acquired in this module	<p>++ biological knowledge + knowledge of biological working methods + biologically relevant knowledge in the natural sciences and mathematics + interdisciplinary knowledge & thinking + abstract, logical, analytical thinking ++ deepened expertise in biological specialist field + independent learning and (research-based) working</p> <p>Students acquire knowledge in macroscopic and microscopic morphology of plants, always putting form in the context of function Students understand the concepts of allometry and scaling Students put this knowledge in the context of theoretical concepts of ecology and evolution Students learn experimental techniques in diverse topics, e.g. biomechanics or water relations</p>			
Module contents	<p>V: Functional Morphology of Plants (1 SWS) E: Mikroskopie, biomechanical Experiments, Form/Function Experiments regarding water uptake, storage and loss (2 SWS) S new studies in the field of functional morphology (1 SWS)</p>			
Literatureempfehlungen	<p>Kadereit JW, et al (2014) Strasburger Lehrbuch der Botanik. 37. Aufl. Spektrum Akademischer Verlag Eschrich, W. (1995) Funktionelle Pflanzenanatomie. Springer</p>			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	annually			
Module capacity	8			
Modullevel / module level	AS (Akzentsetzung / Accentuation)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Seminar, Übung			
Vorkenntnisse / Previous knowledge	Ökologie, Flora			
Examination	Prüfungszeiten		Type of examination	
Final exam of module			1 Portfolio (oral presentation and 1 report) OR 1 Written examination	
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		1	WiSe	14
Seminar		1	WiSe	14
Exercises		2	WiSe	28
Präsenzzeit Modul insgesamt				56 h

bio417 - Introduction to Systems Neurobiology - Theory and Practice

Module label	Introduction to Systems Neurobiology - Theory and Practice			
Modulkürzel	bio417			
Credit points	12.0 KP			
Workload	360 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Akzentsetzungsmodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule 			
Zuständige Personen				
Prerequisites				
Skills to be acquired in this module				
Module contents				
Literaturempfehlungen				
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency				
Module capacity	unlimited			
Modullevel / module level	AC (Aufbaucurriculum / Composition)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method				
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten	Type of examination		
Final exam of module		Prüfungsleistungen: 1 Klausur (100%) 1 fachpraktische Übung (unbenotet)		
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture			SoSe oder WiSe	0
Seminar			SoSe oder WiSe	0
Exercises			SoSe oder WiSe	0
Präsenzzeit Modul insgesamt				0 h

Naturwissenschaftliche Grundlagen

che101 - Basic Chemistry

Module label	Basic Chemistry			
Modulkürzel	che101			
Credit points	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Naturwissenschaftliche Grundlagen • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Ergänzungsmodule 			
Zuständige Personen	<p>Wark, Michael (Module responsibility)</p> <p>Wark, Michael (Prüfungsberechtigt)</p> <p>Bottke, Patrick (Prüfungsberechtigt)</p>			
Prerequisites				
Skills to be acquired in this module	<p>Die Studierenden haben grundlegende Kenntnisse über den Aufbau von Atomen und Molekülen. Sie kennen das Periodensystem der chemischen Elemente, die Eigenschaften wichtiger Elemente und deren wichtigste Verbindungen und Reaktionen. Die Gleichgewichte in wässriger Lösung sind Ihnen vertraut. Sie können Gleichgewichtseinstellungen zur Lösung kleiner analytischer Aufgabenstellungen einsetzen und diese Gleichgewichte formelhaft beschreiben. Sie kennen Säuren und Basen sowie Reduktions- und Oxidationsreaktionen. Ausgewählte Methoden zur Quantifizierung von chemischen Verbindungen mittels Spektroskopie sind den Studierenden bekannt. Die Studierenden kennen die wichtigsten organischen Moleküle und Naturstoffklassen.</p>			
Module contents	<p>V: Allgemeine und Anorganische Chemie (3 SWS)</p> <p>Aufbau des Periodensystems; Grundlagen der chemischen Bindung; Nomenklatur chemischer Verbindungen; stöchiometrische Gesetze; chemische Gleichgewichte; fundamentale Stoffchemie; Struktur wichtiger Verbindungen; Säuren und Basen; Reduktionen und Oxidationen; Einführung in Methoden der Spektroskopie und der Chromatographie.</p> <p>Ü: Übung zur Vorlesung Allgemeine und Anorganische Chemie (1 SWS)</p>			
Literaturempfehlungen	<p>Zeeck: Chemie für Mediziner, Urban & Schwarzenberg; Latscha/Katzmaier: Chemie für Biologen, Springer; Riedel: Anorganische Chemie, de Gruyter; Holleman-Wiberg: Lehrbuch der Anorganischen Chemie, de Gruyter; Skript zur Vorlesung</p>			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	jährlich			
Module capacity	unlimited			
Reference text	6 KP / WiSe: V 101, Ü 101Ü			
Modullevel / module level				
Modulart / typ of module	je nach Studiengang Pflicht oder Wahlpflicht			
Lehr-/Lernform / Teaching/Learning method				
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten	Type of examination		
Final exam of module	Klausur am Beginn der vorlesungsfreien Zeit (normalerweise Anfang Februar)	written exam (100%)		
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		3	WiSe	42
Exercises		1	WiSe	14
Präsenzzeit Modul insgesamt				56 h

che102 - Basic Chemistry Laboratory

Module label	Basic Chemistry Laboratory	
Modulkürzel	che102	
Credit points	6.0 KP	
Workload	180 h	
Verwendbarkeit des Moduls	<ul style="list-style-type: none">• Bachelor's Programme Biology (Bachelor) > Naturwissenschaftliche Grundlagen• Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule• Dual-Subject Bachelor's Programme Biology (Bachelor) > Ergänzungsmodule	
Zuständige Personen	Koch, Rainer (Module responsibility) Koch, Rainer (Prüfungsberechtigt)	
Prerequisites	bestandene Modulprüfung che101 (Nachweis chemischer Grundkenntnisse für Laborsicherheit)	
Skills to be acquired in this module	Die Studierenden beherrschen die praktischen Grundlagen der allgemeinen und anorganischen Chemie. Sie lernen die Arbeit im chemischen Labor anhand von Standardprozeduren kennen und machen sich mit den Grundregeln der chemischen Laborpraxis vertraut. Sie können die Durchführung und die Beobachtung chemischer Experimente nach den Regeln guter wissenschaftlicher Praxis dokumentieren und die Ergebnisse von Versuchen aussagekräftig und fundiert protokollieren.	
Module contents	VL: Theoretische Grundlagen der im Praktikum durchgeführten Versuche PR: Einführung in die Laborpraxis: Erlernen wichtiger Standardprozeduren im chemischen Labor.	
Literaturempfehlungen	Lehrbücher der allgemeinen und anorganischen Chemie, z.B. Riedel, Anorganische Chemie, de Gruyter; Holleman-Wiberg, Lehrbuch der Anorganischen Chemie, de Gruyter; Zeeck: Chemie für Mediziner, Urban & Schwarzenberg; Latsche/Katzmaier: Chemie für Biologen, Springer; Praktikumsskript.	
Links		
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency	jährlich	
Module capacity	unlimited (Die maximale Teilnehmerzahl ist beim Modulverantwortlichen zu erfragen.)	
Reference text	VL 5.07.714, PR 5.07.713	
Modullevel / module level		
Modulart / typ of module	je nach Studiengang Pflicht oder Wahlpflicht	
Lehr-/Lernform / Teaching/Learning method		
Vorkenntnisse / Previous knowledge		
Examination	Prüfungszeiten	Type of examination
Final exam of module		not graded
Form of instruction	Lecture	
SWS	6	
Frequency	WiSe	
Workload Präsenzzeit	84 h	

phy910 - Physics for Students of Biology and Dual Subject Chemistry

Module label	Physics for Students of Biology and Dual Subject Chemistry	
Modulkürzel	phy910	
Credit points	6.0 KP	
Workload	180 h	
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Naturwissenschaftliche Grundlagen • Dual-Subject Bachelor's Programme Biology (Bachelor) > Ergänzungsmodule • Dual-Subject Bachelor's Programme Chemistry (Bachelor) > Aufbaumodule 	
Zuständige Personen	<p>Gütay, Levent (Module responsibility)</p> <p>Petrovic, Vlaho (Module responsibility)</p>	
Prerequisites	Keine	
Skills to be acquired in this module	<p>Die Studierenden sollen folgende Fähigkeiten erlangen: Theorie: - Verständnis von Naturvorgängen und ihre mathematische Beschreibung - Erhebung und quantitative Analyse von Messdaten - Verständnis der physikalischen Grundlagen von Messapparaturen mit Schwerpunkt auf die in der Biologie häufig verwendeten Messinstrumente. Praxis - Vertiefung und Überprüfung ihrer theoretischen Kenntnisse aus Vorlesungen und Lehrbuch am eigenen Experiment - Teamfähigkeit durch gemeinsames Durchführen der Experimente handwerkliche Fähigkeiten beim Umgang mit Messapparaturen sachkenntliches Arbeiten mit Messanleitungen - Protokollierung einer Messung</p>	
Module contents	<p>Vorlesung und Praktikum geben eine Einführung in die Physik, wobei schwerpunktmäßig die grundlegenden Sachverhalte aus Mechanik, Optik, Elektrodynamik, Wärmelehre sowie Atom- und Kernphysik behandelt werden. Zusätzlich werden allgemeine Themen wie Messfehler und Fehlerrechnung behandelt.</p>	
Literaturempfehlungen	<p>Giancoli, C.D., „Physik“, Verlag Pearson Studium Tipler, P.A., „Physik“, Spektrum Akademischer, Heidelberg Und ausgewählte Kapitel aus: Halliday, D., Resnick, R., Walker, J.: „Fundamentals of physics“, Wiley VCH Weltner, K., „Mathematik für Physiker 1+2“, Springer Verlag Außerdem speziell für das Praktikum: Anleitungsskript zum Praktikum Geschke, D., „Physikalisches Praktikum“, Teubner Walcher, W., „Praktikum der Physik“, Teubner Westphal W.H., „Physikalisches Praktikum“, Vieweg</p>	
Links	http://www.uni-oldenburg.de/physik/lehre/praktika/bio-che/bio/	
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency	jährlich	
Module capacity	unlimited	
Modullevel / module level		
Modulart / typ of module	je nach Studiengang Pflicht oder Wahlpflicht	
Lehr-/Lernform / Teaching/Learning method	Vorlesung mit optionalem, jedoch dringlich empfohlenen Tutorium, Praktikum	
Vorkenntnisse / Previous knowledge		
Examination	Prüfungszeiten	Type of examination
Final exam of module	Modulende	1 written exam or 1 oral exam
Form of instruction	Seminar	
SWS		
Frequency		
Workload Präsenzzeit	0 h	

bio150 - Statistics for Biologists

Module label	Statistics for Biologists			
Modulkürzel	bio150			
Credit points	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Naturwissenschaftliche Grundlagen • Dual-Subject Bachelor's Programme Biology (Bachelor) > Ergänzungsmodule 			
Zuständige Personen	<p>Kretzberg, Jutta (Module responsibility)</p> <p>Kretzberg, Jutta (Prüfungsberechtigt)</p>			
Prerequisites				
Skills to be acquired in this module	[nop] + knowledge of biological working methods ++ biologically relevant knowledge in the natural sciences and mathematics ++ statistics & scientific programming + interdisciplinary knowledge & thinking ++ abstract, logical, analytical thinking + independent learning and (research-based) working + data presentation and evidence-based discussion (written and spoken) + teamwork [/nop] Knowledge in applied statistics Basic knowledge of programming language R Ability to plan, conduct and interpret statistical analysis of biological data			
Module contents	Introduction to applied statistics - background and application in R: Logic, set theory, combinatorics, probability theory, distributions, descriptive statistics, inferential statistics, statistical tests, ANOVA, study design, Bayes' statistics, correlation, regression, curve fitting			
Literatureempfehlungen	A detailed script for lecture and exercises is available in Stud.IP			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	jährlich			
Module capacity	unlimited			
Reference text	Übungen mit R können auf einem eigenen Laptop oder im Rechnerraum absolviert werden			
Modullevel / module level	EB (Ergänzungsbereich / Complementary)			
Modulart / typ of module	Pflicht / Mandatory			
Lehr-/Lernform / Teaching/Learning method	Vorlesung, Übung			
Vorkenntnisse / Previous knowledge	Schulmathematik, sicherer Umgang mit Computern			
Examination	Prüfungszeiten	Type of examination		
Final exam of module	within two weeks after lecture time	written exam (+15% bonus points from exercises)		
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	--	28
Exercises		2	--	28
Präsenzzeit Modul insgesamt				56 h

mat980 - Mathematics for the Life Sciences

Module label	Mathematics for the Life Sciences			
Modulkürzel	mat980			
Credit points	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Naturwissenschaftliche Grundlagen • Dual-Subject Bachelor's Programme Biology (Bachelor) > Ergänzungsmodule 			
Zuständige Personen	<p>Vertman, Boris (Module responsibility)</p> <p>Harmand, Peter (Prüfungsberechtigt)</p> <p>Schöpfer, Frank (Module counselling)</p> <p>Shestakov, Ivan (Module counselling)</p> <p>Werner, Tino (Module counselling)</p>			
Prerequisites				
Skills to be acquired in this module	<p>Aufbauend auf einem mittleren Abiturwissen werden Teile des Schulstoffs wiederholt (Ableitung und Integral), ergänzt (allgemeiner Abbildungsbegriff, Folgen und Reihen) und weiterentwickelt (Taylorreihe, Differentialgleichungen). Die Mathematik wird dabei im wesentlichen ohne Beweise als Handwerkszeug präsentiert. Die Ideen hinter den Begriffen und die Bedeutung der Ergebnisse werden jedoch ausführlich erklärt. Die Studierenden sollen - ihr Schulwissen wiederholen und festigen, - die Anwendung von Mathematik in der Biologie mit zahlreichen praktischen Übungsaufgaben lernen, - ihr allgemeines Wissen mathematischer Methoden und Modelle verbreitern und üben, - die grundlegenden Formen von diskreten und kontinuierlichen, ungebremsten und gebremsten Wachstumsprozessen kennenlernen, - erfahren, wie analytisches und abstraktes Denken bei dem Studium realer Probleme helfen kann.</p>			
Module contents	<p>Folgen und Konvergenz: Abbildungen und Funktionen, rekursiv definierte Folgen und diskrete Wachstumsmodelle, Konvergenz, Reihen. Reelle Funktionen: Grenzwert und Stetigkeit, Exponential- und trigonometrische Funktionen, Koordinatentransformationen. Differential- und Integralrechnung: Ableitung und Integral, Mittelwertsatz, Taylorentwicklung, Newton-Verfahren, Hauptsatz, uneigentliche Integrale. Differentialgleichungen: Einfache Differentialgleichungen 1. Ordnung (linear homogen, logistisch), Richtungsfeld, stationäre Zustände und Stabilität, Anwendungen. Differentialgleichungen höherer Ordnung und Systeme (Schwingungsgleichung, Lotka-Volterra-Modell).</p>			
Literaturempfehlungen				
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency	jährlich			
Module capacity	unlimited			
Reference text	6 KP 1 V: 981, 1 Ü: 982 1. FS			
Modullevel / module level	BC (Basiscurriculum / Base curriculum)			
Modulart / typ of module	Wahlpflicht / Elective			
Lehr-/Lernform / Teaching/Learning method	Vorlesung + Übung			
Vorkenntnisse / Previous knowledge				
Examination	Prüfungszeiten		Type of examination	
Final exam of module	Vorlesungsende		KL	
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		3		42
Exercises		1		14
Präsenzzeit Modul insgesamt				56 h

che190 - Basic Organic Chemistry

Module label	Basic Organic Chemistry	
Modulkürzel	che190	
Credit points	6.0 KP	
Workload	180 h	
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Naturwissenschaftliche Grundlagen • Bachelor's Programme Chemistry (Bachelor) > Aufbaumodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Ergänzungsmodule • Dual-Subject Bachelor's Programme Chemistry (Bachelor) > Aufbaumodule • Dual-Subject Bachelor's Programme Chemistry (Bachelor) > Erweiterungsmodule • Master of Education Programme (Special Needs Education) Chemistry (Master of Education) > Mastermodule • Master of Education Programme (Vocational and Business Education) Chemistry (Master of Education) > Mastermodule 	
Zuständige Personen	<p>Christoffers, Jens (Module responsibility)</p> <p>Christoffers, Jens (Prüfungsberechtigt)</p> <p>Hilt, Gerhard (Prüfungsberechtigt)</p> <p>Doye, Sven (Prüfungsberechtigt)</p> <p>Hilt, Gerhard (Module counselling)</p> <p>Doye, Sven (Module counselling)</p> <p>Christoffers, Jens (Module counselling)</p>	
Prerequisites		
Skills to be acquired in this module	<p>Kenntnisse Grundlegende Stoffsystematik der Organischen Chemie, Reaktionsweisen organischer Verbindungen, grundlegende Reaktionsmechanismen</p> <p>Fertigkeiten Beherrschung der Grundlagen der Organischen Chemie: Stoffklassen, funktionelle Gruppen, Nomenklatur; Formulieren organisch-chemischer Reaktionsgleichungen, Transformationen funktioneller Gruppen, Aufbau von Kohlenstoff-Kohlenstoff-Bindungen; Benennung der Konfiguration chiraler Verbindungen</p>	
Module contents	<p>Mit dem Besuch dieses Moduls erwerben die Studierenden das Basiswissen der Organischen Chemie. Hierzu zählen insbesondere Kenntnisse über die Stoffsystematik, die Nomenklatur, eine Übersicht über funktionelle Gruppen, deren Herstellung und wichtigste Eigenschaften, die Stereochemie, die Reaktivität organischer Verbindungen, grundlegende Reaktionsmechanismen, wichtige synthetische Makromoleküle und die bedeutendsten Naturstoffklassen.</p>	
Literaturempfehlungen	Wird in der Vorlesung bekannt gegeben	
Links		
Language of instruction	German	
Duration (semesters)	1 Semester	
Module frequency	jährlich	
Module capacity	unlimited	
Reference text	Empfohlene Belegung 3 (WiSe)	
Modullevel / module level	AC (Aufbaucurriculum / Composition)	
Modulart / typ of module	je nach Studiengang Pflicht oder Wahlpflicht	
Lehr-/Lernform / Teaching/Learning method	V (4 SWS)	
Vorkenntnisse / Previous knowledge		
Examination	Prüfungszeiten	Type of examination
Final exam of module	In der vorlesungsfreien Zeit entsprechend separater Ankündigung	written exam
Form of instruction	Lecture	
SWS	4	
Frequency	WiSe	
Workload Präsenzzeit	56 h	

che290 - Experimental Organic Chemistry

Module label	Experimental Organic Chemistry		
Modulkürzel	che290		
Credit points	6.0 KP		
Workload	180 h		
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Naturwissenschaftliche Grundlagen • Dual-Subject Bachelor's Programme Biology (Bachelor) > Ergänzungsmodule • Dual-Subject Bachelor's Programme Chemistry (Bachelor) > Aufbaumodule • Master of Education Programme (Vocational and Business Education) Chemistry (Master of Education) > Mastermodule 		
Zuständige Personen	<p>Doye, Sven (Module responsibility)</p> <p>Christoffers, Jens (Prüfungsberechtigt)</p> <p>Doye, Sven (Prüfungsberechtigt)</p> <p>Martens, Jürgen (Prüfungsberechtigt)</p> <p>Hilt, Gerhard (Prüfungsberechtigt)</p> <p>Christoffers, Jens (Module counselling)</p> <p>Doye, Sven (Module counselling)</p> <p>Hilt, Gerhard (Module counselling)</p>		
Prerequisites	Erfolgreiche Teilnahme am Modul "che190 - Grundvorlesung Organische Chemie"		
Skills to be acquired in this module	Den Studierenden soll der Ausbau ihrer grundlegenden Kenntnisse über die Reaktivität organisch-chemischer Substanzen in Theorie und Praxis ermöglicht werden. Hierfür werden die Studierenden in die Lage versetzt, unter sicherheits- und umweltrelevanten Gesichtspunkten fach- und ordnungsgemäß mit einfachen Chemikalien umzugehen und selbständig organisch-chemische Experimente durchzuführen. Sie erlangen darüber hinaus grundlegende Fähigkeiten zur Präsentation wissenschaftlicher Sachverhalte in schriftlicher und mündlicher Form.		
Module contents	Mit diesem Modul bauen die Studierenden ihr Basiswissen der Organischen Chemie weiter aus und wenden es im Rahmen dieses Praktikums im Labor an. Sie erlernen dabei grundlegende Arbeitstechniken aus dem Bereich der präparativen Organischen Chemie, indem sie ausgewählte organische Reaktionen und Analysemethoden (z.B. Substitution, Eliminierung, Polymerisation, Veresterung, Verseifung, Oxidation, Reduktion, Aldolkondensation, Extraktion, Dünnschichtchromatographie) eigenhändig durchführen.		
Literaturempfehlungen			
Links	http://www.chemie.uni-oldenburg.de/oc...		
Language of instruction	German		
Duration (semesters)	1 Semester		
Module frequency	jährlich		
Module capacity	70		
Reference text	6 KP / SoSe: PR 204, S 205 / 4. FS / Doye		
Modullevel / module level	AC (Aufbaucurriculum / Composition)		
Modulart / typ of module			
Lehr-/Lernform / Teaching/Learning method	1PR, 1S (6 SWS)		
Vorkenntnisse / Previous knowledge	Sichere Beherrschung der theoretischen Grundlagen der Organischen Chemie		
Examination	Prüfungszeiten	Type of examination	
Final exam of module	Konsultationen zu den Experimenten und Anfertigung von Versuchsprotokollen begleitend zum Praktikum, ein Vortrag im Anschluss an das Praktikum (Termine laut Aushang), eine mündliche Prüfung von maximal 45 Minuten Dauer nach erfolgreichem Abschluss der anderen zu erbringenden Leistungen und Terminvereinbarung mit einem der möglichen Prüfer spätestens zum Ende des Semesters	KL	
Form of instruction	Comment	SWS	Frequency
			Workload of compulsory attendance

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Seminar	Blockveranstaltung	6	SoSe	15
Practical training	Blockveranstaltung	6	SoSe	65
Präsenzzeit Modul insgesamt				80 h

bio251 - Exercises in Biochemistry and Molecular Biology

Module label	Exercises in Biochemistry and Molecular Biology			
Modulkürzel	bio251			
Credit points	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> • Bachelor's Programme Biology (Bachelor) > Naturwissenschaftliche Grundlagen • Dual-Subject Bachelor's Programme Biology (Bachelor) > Ergänzungsmodule 			
Zuständige Personen	<p>Scholten, Alexander (Module responsibility)</p> <p>Nolte, Arne (Module counselling)</p> <p>Scholten, Alexander (Prüfungsberechtigt)</p> <p>Nolte, Arne (Prüfungsberechtigt)</p>			
Prerequisites	admission of BSc students in Biology			
Skills to be acquired in this module	++ biological knowledge ++ knowledge of biological working methods + biologically relevant knowledge in the natural sciences and mathematics + abstract, logical, analytical thinking + data presentation and evidence-based discussion (written and spoken) + teamwork + knowledge of safety and environmental issues			
Module contents	General introduction to principles of laboratory work in Biochemistry and Cell Biology			
Literatureempfehlungen	Script			
Links				
Language of instruction	German			
Duration (semesters)	1 Semester			
Module frequency				
Module capacity	unlimited			
Modullevel / module level	EB (Ergänzungsbereich / Complementary)			
Modulart / typ of module	Pflicht / Mandatory			
Lehr-/Lernform / Teaching/Learning method	Übung, Seminar			
Vorkenntnisse / Previous knowledge	VL Biochemie und Zellbiologie			
Examination	Prüfungszeiten		Type of examination	
Final exam of module	during semester		written exam; additionally ungraded protocolls	
Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Seminar		1	SoSe	14
Exercises		3	SoSe	42
Präsenzzeit Modul insgesamt				56 h

Abschlussmodul

bam - Bachelor's Thesis Module

Module label	Bachelor's Thesis Module	
Modulkürzel	bam	
Credit points	15.0 KP	
Workload	450 h	
Verwendbarkeit des Moduls	<ul style="list-style-type: none"> Bachelor's Programme Biology (Bachelor) > Abschlussmodul 	
Zuständige Personen	der Biologie, Lehrende (Prüfungsberechtigt)	
Prerequisites		
Skills to be acquired in this module	<p>Successful completion of the Bachelor module demonstrates that students are able to work on a problem in the field of Biology within a fixed period applying scientific methods.</p> <ul style="list-style-type: none"> ++ biological knowledge ++ knowledge of biological working methods + statistics & scientific programming + abstract, logical, analytical thinking ++ deepened expertise in biological specialist field ++ independent learning and (research-based) working ++ data presentation and evidence-based discussion (written and spoken) + (scientific) communication skills ++ project and time management 	
Module contents	<p>Preparing the Bachelor thesis Active participation in the seminar of the research group, in which the Bachelor's thesis is written</p>	
Literatureempfehlungen	Supervisors may supply an initial reading list with important literature. The students are expected to find and use further literature as needed.	
Links		
Languages of instruction	German, English	
Duration (semesters)	1 Semester	
Module frequency	halbjährlich	
Module capacity	unlimited	
Modullevel / module level	Abschlussmodul (Abschlussmodul / Conclude)	
Modulart / typ of module	Pflicht / Mandatory	
Lehr-/Lernform / Teaching/Learning method		
Vorkenntnisse / Previous knowledge		
Examination	Prüfungszeiten	Type of examination
Final exam of module	Bachelor's thesis (12 CP) and accompanying seminar (3 CP)	
Form of instruction	Seminar	
SWS	1	
Frequency	--	
Workload Präsenzzeit	14 h	

