Modulhandbuch

Biology - Dual-Subject Bachelor's Programme

im Sommersemester 2023

erstellt am 29/03/24

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Basismodule

bio215 - Introduction to Biology

Module label	Introduction to Biology
Modulkürzel	bio215
Credit points	9.0 KP
Workload	270 h
Verwendbarkeit des Moduls	• Bachelor's Programme Biology (Bachelor) > Basismodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule
Zuständige Personen	• Gerlach, Gabriele (module responsibility) • Zotz, Gerhard (Module counselling) • Sienknecht, Ulrike (Module counselling) • Gerlach, Gabriele (Prüfungsberechtigt) • Zotz, Gerhard (Prüfungsberechtigt) • Köppl, Christine (Prüfungsberechtigt) • Sienknecht, Ulrike (Prüfungsberechtigt) • Käfer, Simon (Prüfungsberechtigt)
Prerequisites	
Skills to be acquired in this module	++ biological eknoledge ++ biologically relevant knowledge in the natural sciences and mathematics ++ interdisciplinary knowledge & thinking ++ abstract, logical, analytical thinking Qualifications that the module provides • The theoretical basics of the different disciplines of biology are acquired • The overview gained enables the students to start their individual study planning, which fits their inclinations and abilities • for the professional field of school teachers: consideration of living nature on different system levels (organism, population, ecosystem, biosphere) and with regard to its evolutionary history. Content specifically relevant to this career field are plant morphology and physiology, animal morphology and physiology, neurobiology, behavioural biology, genetics, molecular biology, developmental biology, evolution and biodiversity (systematics), ecology, biogeography, sustainable use of nature, human biology and immunobiology.
Module contents	Lecture conveys knowledge in - evolution, ecology and biodiversity (WiSe) - animal physiology and developmental biology (SoSe)
Literaturempfehlungen	Campbell et al. "Biologie", Pearson Sadava et al. "Purves, Biologie", Springer
Links	
Language of instruction	German
Duration (semesters)	2 Semester
Module frequency	jährlich
Module capacity	300

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		12	SoSe und WiSe	168
Seminar (Gefahrstoffverordnung und Arbeitsschutz (PFLICHT für Erstsemester!))			WiSe	0
Tutorial (optional)			--	0
Präsenzzeit Modul insgesamt				168 h

bio220 - Introductory Zoology-Botany

Module label	Introductory Zoology-Botany
Modulkürzel	bio220
Credit points	9.0 KP
Workload	270 h
Verwendbarkeit des Moduls	• Bachelor's Programme Biology (Bachelor) > Basismodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule
Zuständige Personen	• Ahlrichs, Wilko (module responsibility) • Will, Maria (module responsibility) • Bininda-Emonds, Olaf (Module counselling) • Zotz, Gerhard (Module counselling) • Ahlrichs, 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	++ 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 THEORY: * 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 PRACTICE: * 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	GENERAL: Light microscopic methods are applied to study structures in plants and animals. Records in the form of descriptions and drawings. 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. 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.
Literaturempfehlungen	GENERAL:: Campbell: Biologie (Spektrum Verlag) or Purves: Biologie (Spektrum Verlag), latest edition ZOOLOGY: V. Storch: Kükenthal Zoologisches Praktikum, one of the latest

	edidtions; Optional: Ax, 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
Reference text	Modul für Studierende **mit Studienbeginn vor dem WiSe 23/24**. (Übergangsbestimmung bis zum Sommersemester 2025; auf Antrag und mit Zustimmung des Prüfungsausschusses ist auch ein Wechsel in die aktuelle Prüfungsordnung möglich). Studierende mit Studienbeginn ab dem WiSe 23/24 studieren die Module bio223 und bio224.

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	WiSe	28
Exercises		4	WiSe	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	• Bachelor's Programme Biology (Bachelor) > Basismodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule
Zuständige Personen	• Rabus, Ralf Andreas (module responsibility) • Claußen, Maike (Module counselling) • Rabus, Ralf Andreas (Prüfungsberechtigt) • Claußen, Maike (Prüfungsberechtigt)
Prerequisites	
Skills to be acquired in this module	++ biological knowledge + knowledge of biological working methods + biologically relevant knowledge in the natural sciences and mathematics + deepened expertise in biological specialist field + independent learning and (research-based) working
Module contents	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
Literaturempfehlungen	Purves Biologie (Spektrum Verlag), neuste Ausgabe Campbell et al., Biologie (Pearson Verlag), neuste Ausgabe Fuchs, Allgemeine Mikrobiologie (Thieme Verlag), neueste Auflage
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	Sommersemester
Module capacity	unlimited
Reference text	Modul für Studierende **mit Studienbeginn vor dem WiSe 23/24**. (Übergangsbestimmung bis zum Sommersemester 2025; auf Antrag und mit Zustimmung des Prüfungsausschusses ist für Studierende mit einem Studienbeginn vor WiSe 2023/24 auch ein Wechsel in die aktuelle Prüfungsordnung möglich). Studierende mit Studienbeginn ab dem WiSe 23/24 studieren die Module bio225 und bio237.

Examination	Prüfungszeiten	Type of examination
Final exam of module	Klausuren direkt nach jeweiligem Veranstaltungsteil	2 Prüfungsleistungen: • 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	56
Tutorial (optional)			SoSe	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	• Bachelor's Programme Biology (Bachelor) > Basismodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule
Zuständige Personen	• Koch, Karl-Wilhelm (module responsibility) • Winklhofer, Michael (Module counselling) • Koch, Karl-Wilhelm (Prüfungsberechtigt) • Winklhofer, Michael (Prüfungsberechtigt)
Prerequisites	
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
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
Literaturempfehlungen	Biochemie, Müller-Esterl Stryer Biochemie, Berg, Tymoczko, Stryer Lehninger Prinzipien der Biochemie, David L. Nelson und Michael M. Cox Principles of Biochemistry, Horton et al. Zellbiologie, Helmut Plattner und Joachim Hentschel Molekulare Zellbiologie, Gerald Karp Molekularbiologie der Zelle, Bruce Alberts
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	Wintersemester
Module capacity	unlimited
Reference text	Modul für Studierende **mit Studienbeginn vor dem WiSe 23/24**. (Übergangsbestimmung bis zum Sommersemester 2025; auf Antrag und mit Zustimmung des Prüfungsausschusses ist für Studierende mit einem Studienbeginn vor WiSe 2023/24 auch ein Wechsel in die aktuelle Prüfungsordnung möglich). Studierende mit Studienbeginn ab dem WiSe 23/24 studieren das Modul bio225.

Examination	Prüfungszeiten	Type of examination
Final exam of module	during the semester	written exam

Form of instruction	Lecture
SWS	4
Frequency	WiSe

bio239 - Didactical Excercises and Genetics

Module label	Didactical Excercises and Genetics
Modulkürzel	bio239
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule
Zuständige Personen	• Hößle, Corinna (module responsibility) • Weusmann, Birgit (Module counselling) • Kapteina, Ulrich (Module counselling) • Knapp, Edgar (Module counselling) • Plewka, Isabelle (Module counselling) • Claußen, Maike (Module counselling) • Hößle, Corinna (Prüfungsberechtigt) • Claußen, Maike (Prüfungsberechtigt) • Weusmann, Birgit (Prüfungsberechtigt) • Kapteina, Ulrich (Prüfungsberechtigt) • Knapp, Edgar (Prüfungsberechtigt) • Plewka, Isabelle (Prüfungsberechtigt)
Prerequisites	
Skills to be acquired in this module	- Die Studierenden erwerben genetische Fachkenntnisse - Entwicklung bzw. Adaptation von Lerneinheiten an Lernausgangssituation von Schülern - Erprobung dieser Lerneinheiten ohne und mit Schülern, anschließende Reflexion
Module contents	Teil 1: Grundlagen der Genetik: Mitose und Zellzyklus, Meiose und Rekombination, Mendelsche Verer-bungslehre, chromosomale und molekulare Grundlagen der Vererbung; Replikation, Transkription, Translation, Mutation und DNA-Reparatur, Organisation des genetischen Materials und Genregulation. (Studierende mit dem Ziel "Master of Education" müssen nur den Vorlesungsteil "Genetik" belegen, der ab der 2. Semesterhälfte stattfindet.) Teil 2: Didaktische Übungen: In der ersten Phase begleiten Studierende Umweltpädagogen der Grünen Schule oder anderer außerschulischer Lernstandorte (Regionalen Umweltbildungszentrum Oldenburg, Park der Gärten) und lernen im Selbsttest verschiedene Aktionskonzepte kennen. Diese Konzeptionen werden anschließend an ausgewählte Lerngruppen adaptiert und untereinander erprobt (Phase 2). In der dritten Phase können Studierende die Lernprozesse der Schüler selbst anregen, indem sie selbst im Teamteaching unterrichten. In einer abschließenden Reflexion werden die Erfahrungen gesammelt und eingeordnet (Phase 4).
Literaturempfehlungen	Genetik: Purves Biologie (Spektrum Verlag), neuste Ausgabe Campbell et al., Biologie (Pearson Verlag), neuste Ausgabe Didaktik: Raith, A. & Lude, A. (2014): Startkapital Natur: Wie Naturerfahrung die kindliche Entwicklung fördert. München: oekom
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	
Module capacity	4 x 16 Studierende

Examination	Prüfungszeiten	Type of examination
Final exam of module	Klausur im Anschluss an Vorlesungsteil Genetik	KL

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	SoSe oder WiSe	28
Seminar		2	SoSe oder WiSe	28
Präsenzzeit Modul insgesamt				56 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	• Bachelor's Programme Biology (Bachelor) > Basismodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule	
Zuständige Personen	• Will, Maria (module responsibility) • Zotz, Gerhard (Module counselling) • Will, Maria (Prüfungsberechtigt) • Plewka, Isabelle (Prüfungsberechtigt)	
Prerequisites	keine	
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 + independent learning and (research-based) working + teamwork THEORY: * To understand the fundamentals of reconstructing phylogenetic relationships * To know the cell structures, organization, and reproduction of plants * To know the morphology and anatomy of individual species PRACTICE: * 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 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	Light microscopic methods are applied to study structures in plants. Records in the form of descriptions and drawings. 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.	
Literaturempfehlungen	Springer, 2008, UTB; Grundlagen der Botanik, UTB; Lüttge, Kluge, Bauer, Botanik, WILEY-VCH, 2010 Campbell: Biologie (Spektrum Verlag), neueste Ausgabe oder Purves: Biologie (Spektrum Verlag), neueste Ausgabe BOTANIK: Skript; Kück, Wolff Botanisches Grundpraktikum, 2. Auflage, 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	Wintersemester	
Module capacity	unlimited	
Reference text	Modul für Studierende **mit Studienbeginn ab dem WiSe 23/24**. Studierende mit Studienbeginn vor dem WiSe 23/24 studieren das Modul bio220. (Übergangsbestimmung bis zum Sommersemester 2025; auf Antrag und mit Zustimmung des Prüfungsausschusses ist für Studierende mit einem Studienbeginn vor WiSe 2023/24 auch ein Wechsel in die aktuelle Prüfungsordnung möglich).	
Type of module	Pflicht / Mandatory	
Module level	BC (Basiscurriculum / Base curriculum)	
Teaching/Learning method	lecture, exercise, seminar	
Examination	Prüfungszeiten	Type of examination
Final exam of module	Written examination in the final week	1 written examination; voluntary bonus (10%) 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		1	WiSe	14
Seminar		1	WiSe	14
Exercises		2	WiSe	28
Tutorial (optional)			WiSe	0
Präsenzzeit Modul insgesamt				56 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	• Bachelor's Programme Biology (Bachelor) > Basismodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule
Zuständige Personen	• Ahlrichs, Wilko (module responsibility) • Ahlrichs, Wilko (Module counselling) • Käfer, Simon (Module counselling) • Ahlrichs, Wilko (Prüfungsberechtigt)
Prerequisites	
Skills to be acquired in this module	++ biologische Fachkenntnisse + Kenntnisse biologischer Arbeitstechniken ++grundlegende Kenntnisse zum Aufbau und Umgang mit dem Mikroskop (Köhlern) ++grundlegende Kenntnisse zur menschlichen Wahrnehmung von Gestalt ++ grundlegende Kenntnisse zum wissenschaftlichen Zeichnen und Illustration ++ biologierelevante naturwissenschaftliche/mathematische Grundkenntnisse + Abstraktes, logisches, analytisches Denken + Selbstständiges Lernen und (forschendes) Arbeiten + Teamfähigkeit THEORIE: - Grundlagen der Methoden der Rekonstruktion der phylogenetischen Systematik verstehen - Die Stellung der wichtigsten Tiergruppen im Phylogenetisches System der Tiere kennen. Grundmuster, insbesondere Autapomorphien von ranghohen Stammarten kennen. Morphologie, Funktion und Evolution tierischer Zellstrukturen, Organe und Organsysteme (Epidermis, Muskelsysteme, Leibeshöhlenverhältnisse, Kreislaufsysteme, Exkretionssysteme, Nerven- und Sinnessysteme, Verdauungssysteme, Reproduktionssysteme; weiterhin Atmung, Ernährung, Fortpflanzung und Entwicklung kennen. Morphologie und Ökologie ausgesuchter Tierarten kennen. PRAXIS: - theoretischen Kenntnisse aus Vorlesungen und Lehrbuch am Original vertiefen und überprüfen - visuelle und taktile Wahrnehmung an unterschiedlichen Arten schulen - erfahren, dass Lehrbuchdarstellungen Abstraktionen einer sehr viel komplexeren Wirklichkeit sind - in die Lage versetzt werden, Lehrbuchdarstellungen und Modelle zu kritisieren - am Präparat die Kenntnisse erwerben, die für das Verständnis der Funktion am lebenden Tier erforderlich sind - lernen, mit Präparieranleitungen zu arbeiten - lernen, dass der Bau einzelner Arten sehr variabel sein kann - sich üben in der Umsetzung des am Original Gesehenen in ein Protokoll, z.B. eine Zeichnung - einen verantwortungsvollen Umgang mit Tieren lernen - handwerkliches Geschick in der Präparation von Tieren erlernen.
Module contents	ALLGEMEIN: Methode der phylogenetischen Systematik, Hierarchischer Aufbau des Lebens. Lichtmikroskop und lichtmikroskopische Methoden zur Untersuchung tierischer Strukturen. Protokolle in der Form von Beschreibungen und Zeichnungen. SPEZIELL: Phylogenie der Tiere (Metazoa) und Teilen der Protisten. Die phylogenetische Stellung der behandelten Taxa im System der Tiere. Grundmuster der ranghohen Stammarten der Tiere und insbesondere deren Autapomorphien. Die Evolution wichtiger Zelltypen und die Evolution der Organsysteme, insbesondere Habitus mit Gliederung, Extremitäten und Anhänge, Epidermis, Muskelsysteme, Leibeshöhlen und Kreislaufsysteme, Exkretionssysteme, Nerven- und Sinnessysteme, Verdauungssysteme, Reproduktionssysteme; weiterhin Fortpflanzung und Entwicklung, Nahrungsbeschaffung, Nahrungsaufnahme und Verdauung. Die Morphologie und Ökologie ausgewählter Arten.
Literaturempfehlungen	wird im Modul bekannt gegeben
Links	

Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	Wintersemester
Module capacity	150
Reference text	Modul für Studierende **mit Studienbeginn ab dem WiSe 23/24**. Studierende mit Studienbeginn vor dem WiSe 23/24 studieren das Modul bio220. (Übergangsbestimmung bis zum Sommersemester 2025; auf Antrag und mit Zustimmung des Prüfungsausschusses ist für Studierende mit einem Studienbeginn vor WiSe 2023/24 auch ein Wechsel in die aktuelle Prüfungsordnung möglich).

Examination	Prüfungszeiten	Type of examination
Final exam of module	Wintersemester	1 Prüfungsleistung: 1 Klausur

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		1	WiSe	14
Seminar		1	WiSe	14
Exercises		2	WiSe	28
Tutorial (optional)			WiSe	0
Präsenzzeit Modul insgesamt				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	• Bachelor's Programme Biology (Bachelor) > Basismodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule
Zuständige Personen	• Koch, Karl-Wilhelm (module responsibility) • Claußen, Maike (Module counselling) • Winklhofer, Michael (Module counselling) • Claußen, Maike (Prüfungsberechtigt) • Koch, Karl-Wilhelm (Prüfungsberechtigt) • Winklhofer, Michael (Prüfungsberechtigt)
Prerequisites	
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 + deepened expertise in biological specialist field + independent learning and (research-based) working
Module contents	Overview of structure, function and biosynthesis of the major classes of substances and metabolic processes, structure and function of carbohydrates, proteins and nucleic acids; biological membranes and transmembrane transport; cell structure, structure and function of organelles, protein synthesis and post-translational modification; intracellular transport processes, messenger substances and cellular communication, cell division and controlled cell death. Introduction in pathogens, cell biology of bacterial and viral infection, innate and aquired immune system. • Molecular basis of genetics • DNA replication • Cell division Mitosis and meiosis • Transcription • The genetic code • Translation • Regulation of gene expression • Mutation and DNA repair • Mendelian genetics and formal genetics • Analysis of pedigrees • Sex chromosome-linked inheritance • Genome organization
Literaturempfehlungen	Allgemeine Lehrbücher der Biochemie, z. B.: Biochemie, Müller-Esterl Biochemie, Lubert Stryer Lehninger Prinzipien der Biochemie, David L. Nelson und Michael M. Cox Principles of Bioche-mistry, Horton et al. Zellbiologie: Zellbiologie, Helmit Plattner und Joachim Hentschel Molekulare Zellbiologie, Gerald Karp Molekularbiologie der Zelle, Bruce Alberts Purves Biologie, Springer Verlag, neueste Auflage; Campbell Biologie, Person Verlag neueste Auflage; Molekulare Genetik, Thieme Verlag, neueste Auflage Molekularbiologie der Zelle, Wiley/VCH, neueste Auflage
Links	
Language of instruction	German

Duration (semesters)		2 Semester		
Module frequency		WiSe und SoSe		
Module capacity		unlimited ()		
Examination	Prüfungszeiten		Type of examination	
Final exam of module	End of winter semester: written exam in biochemistry and cell biology, end of summer semester: written exam in genetics, follow-up exams at the beginning of the following semesters.		2 examinations: 1 written exam in biochemistry and cell biology (2/3*100%) 1 written exam on genetics (1/3*100%)	

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture	Der Teil Biochemie und Zellbiologie wird im Wintersemester und der Teil Genetik in der zweiten Hälfte des Sommersemesters angeboten.	4	SoSe und WiSe	56
Exercises		2	SoSe oder WiSe	28
Präsenzzeit Modul insgesamt				84 h

bio237 - Basics in Microbiology

Module label	Basics in Microbiology
Modulkürzel	bio237
Credit points	3.0 KP
Workload	90 h
Verwendbarkeit des Moduls	• Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule
Zuständige Personen	• Rabus, Ralf Andreas (module responsibility) • Rabus, Ralf Andreas (Prüfungsberechtigt)
Prerequisites	
Skills to be acquired in this module	++ biological knowledge ++ knowledge of biological working methods ++ biologically relevant knowledge in the natural sciences and mathematics + deepened expertise in biological specialist field + independent learning and (research-based) working The students acquire microbiological expertise
Module contents	introduction: History, principle of smallness, importance Fungi: Growth, forms of reproduction, life cycles, phytopathogens, mycorrhiza, lichens. Viruses: Technical handling, development, lytic/lysogenic cycle, structure, classification, examples. Prokaryotic cell: Microscopy, cell wall of Gram positive/negative bacteria, cytoplasmic membrane, cytoskeleton, compartments, storage substances, flagella, fimbriae, pili, cellulosome, endospores, heterocysts. Metabolism: Central metabolic pathways, degradation of organic compounds, oxidation of inorganic compounds (chemolithotrophy), microbial fermentations, anaerobic respiration, phototrophic lifestyle. Diversity, evolution and systematics: Diversity concept, components of systematics, evolutionary mechanisms, Archaea, deep branching Bacteria, Firmicutes, Actinobacteria, Cyanobacteria, Spirochaetae, PVC superphylum, Proteobacteria (alpha, beta, gamma, delta and epsilon), et al.
Literaturempfehlungen	Fuchs, Allgemeine Mikrobiologie, Thieme Verlag
Links	
Language of instruction	German
Duration (semesters)	1. Sommersemesterhäfte Semester
Module frequency	jährlich
Module capacity	unlimited

Type of module	Pflicht / Mandatory	
Module level	AC (Aufbaucurriculum / Composition)	
Examination	Prüfungszeiten	Type of examination
Final exam of module	im Anschluss an den Veranstaltungsteil	written exam
Form of instruction	Lecture	
SWS	2	
Frequency	SoSe	

bio218 - Learning biological Instruction in the Nature

Module label	Learning biological Instruction in the Nature
Modulkürzel	bio218
Credit points	3.0 KP
Workload	90 h
Verwendbarkeit des Moduls	• Dual-Subject Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule
Zuständige Personen	• Plewka, Isabelle (module responsibility) • Hößle, Corinna (Module counselling) • Plewka, Isabelle (Module counselling) • Weusmann, Birgit (Prüfungsberechtigt) • Plewka, Isabelle (Prüfungsberechtigt) • Knapp, Edgar (Prüfungsberechtigt) • Zietz, Anna (Prüfungsberechtigt) • Wölki, Dana (Prüfungsberechtigt)
Prerequisites	
Skills to be acquired in this module	Development or adaptation of learning units to the specific learning situation of pupils - testing of these learning units without and with pupils, subsequent reflection +biological knowledge +knowledge of biological working methods +biologically relevant knowledge in the natural sciences and mathematics +interdisciplinary knowledge & thinking +deepened expertise in biological specialist field +independent learning and (research-based) working +teamwork ++(scientific) communication skills +project and time management +knowledge of safety and environmental issues
Module contents	In the first phase, students accompany environmental educators from the Green School or other extracurricular learning locations (Regionales Umweltbildungszentrum Oldenburg, Park der Gärten) and learn about various action concepts in a self-test. These concepts are then adapted to selected learning groups and tested among themselves (phase 2). In the third phase, students can stimulate the learning processes of the pupils by team teaching. In a final reflection, the experiences are collected and classified (phase 4).
Literaturempfehlungen	Raith, A. & Lude, A. (2014): Startkapital Natur: Wie Naturerfahrung die kindliche Entwicklung fördert. München: oekom
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	
Module capacity	64
Type of module	Pflicht / Mandatory
Module level	BC (Basiscurriculum / Base curriculum)
Teaching/Learning method	Seminar
Previous knowledge	Experience in comunication with children / adolescents

Examination	Prüfungszeiten	Type of examination
Final exam of module	during the time of the seminar	Portfolio, ungraded

Form of instruction	Seminar
SWS	2
Frequency	SoSe

bio303 - Flora and Fauna

Module label	Flora and Fauna
Modulkürzel	bio303
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Dual-Subject Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule • Master of Education Programme (Special Needs Education) Biology (Master of Education) > Mastermodule
Zuständige Personen	• Albach, Dirk Carl (module responsibility) • Will, Maria (Module counselling) • Wilke, Tanja (Module counselling) • Albach, Dirk Carl (Prüfungsberechtigt) • Will, Maria (Prüfungsberechtigt) • Wilke, Tanja (Prüfungsberechtigt) • von Hagen, Klaus Bernhard (Prüfungsberechtigt) • Plewka, Isabelle (Prüfungsberechtigt) • Donat, Frank Henrik (Prüfungsberechtigt)
Prerequisites	
Skills to be acquired in this module	
	+ Biological expertise for species and family knowledge and independent identification of native plant species (focus on angiosperms). + Biological knowledge of plant morphology and characteristics relevant to plant identification + Understanding of concepts of evolution of biological diversity and classification systems underlying plant systematics. + Knowledge of biological working techniques, especially the use of magnifying glasses and stereolenses + Independent learning and (research-oriented) work + Knowledge of safety and environmental issues + Sustainable handling of nature
Module contents	
	The module is designed to introduce students to the diversity of native flora and fauna and to animal and Plant identification. This is essential for all areas of biology that deal with plants and animals, indispensable. Especially for the education in the field of nature conservation and teaching profession this knowledge is essential. Topics and methods that are relevant for these professions are therefore emphasized. The students should get basic species knowledge and learn the working methods and skills of identification. This also involves providing a systemic basis of knowledge of Habitats in Northwest Germany. There will be a basic assessment competency in the biodiversity and nature conservation, in order to teach the students how to responsible handling of organisms. Ü1: Work with different literature for the identification of animal and plant species and their classification in the systematics. Ü2: Excursions to characteristic northern German habitats and to the botanical garden. During the excursions the emphasis is on the correct identification and classification of plants and animals according to the characteristics of the living organism.
Literaturempfehlungen	Botanik: Rothmaler - Exkursionsflora von Deutschland, Band 2 - Grundband, Spektrum, ab 21. Auflage Akademischer Verlag Zoologie: M. Schaefer: Brohmer - Fauna von

	Deutschland, ab 20. Auflage
Links	
Language of instruction	German
Duration (semesters)	1 oder 2 Semester
Module frequency	jährlich
Module capacity	unlimited (Die Übungen zur Fauna können bei zeitlichen Überschneidungen alternativ semesterbegleitend im Sommersemester besucht werden. Die Platzvergabe der Übungen erfolgt immer zu Beginn des Wintersemesters.)
Reference text	Modul für **Lehramts-Studierende** und 2FB-Studierende ohne Lehramtsorientierung **mit Studienbeginn ab WiSe 23/24**. Lehramts-Studierende und 2FB-Studierende ohne Lehramtsorientierung mit Studienbeginn vor dem WiSe 23/24 studieren das Modul bio245 (Übergangsbestimmung bis zum Sommersemester 2025; auf Antrag und mit Zustimmung des Prüfungsausschusses ist auch ein Wechsel in die aktuelle Prüfungsordnung möglich)

Examination	Prüfungszeiten	Type of examination
Final exam of module	Written exams at the end of each part (flora and fauna)	1 written exam (botany 50 %), 1 written exam (zoology 50 %), The exam in botany consists in one half of a test of theoretical knowledge (theory part) and one half testing the practical skills in plant identification (practical part). In the latter, plants are identified using technical literature and, if necessary, optical aids (magnifying glass) and characterized with technical terms. In addition, there are ungraded excursion protocols. In addition, the general conditions set by the examination authorities apply, such as attendance and required ungraded performances.

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture			SoSe	0
Vorlesung und Übung (inkl. Geländeübung)		4	SoSe und WiSe	70
Präsenzzeit Modul insgesamt				70 h

Aufbaumodule

bio100 - Introduction into Didactics of Biology

Module label	Introduction into Didactics of Biology
Modulkürzel	bio100
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Dual-Subject Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Master of Education Programme (Special Needs Education) Biology (Master of Education) > Mastermodule
Zuständige Personen	• Hößle, Corinna (Module counselling) • Rathje, Wiebke (Module counselling) • Hößle, Corinna (module responsibility) • Hößle, Corinna (Prüfungsberechtigt) • Rathje, Wiebke (Prüfungsberechtigt) • Winkler, Holger (Prüfungsberechtigt)
Prerequisites	
Skills to be acquired in this module	Skills taught by this module: The students will be introduced to the basics of didactics of biology. In the beginning the focus will lie on the standards of education and school-curriculums. Afterwards scientific methods, different methods of education, media, social forms and the culture of problem solving in biological classes will be reflected and realized by concrete examples out of everydays practice (micro-teaching). During the second half of the module the students will be able to conceive and reflect own concepts of teaching. Furthermore the possibilities of studying in out-of-school-facilities will be fathomed, excursions planned, realized and reflected. Importance of this module during the studies: Teaching skills for all fields of study (compulsory subject for following degrees: teaching post in primary school (Grundschule), extended elementary school (Hauptschule) and secondary school (Realschule)).
Module contents	3. semester: seminar Introduction to curricular standards, media, methods, social forms, concepts of pupils, instruments of diagnosis, natural scientific methods, culture of exercises in biological classes. Construction of teaching that considers social matters and the environment of the pupils. 4. semester: seminar and excursions Forms and places for teaching biology, methods and media for teaching biological contents in different spheres of activity (scientific museums, botanical and zoological gardens, regional environmental centers, the Wadden Sea national park).
Literaturempfehlungen	Eschenhagen/Kattmann/Rodi: Fachdidaktik Biologie, Aulis, 2007. Spörhase-Eichmann, Ruppert (Hrsg.): Biologie Didaktik. Praxishandbuch für die Sekundarstufe I und II. Cornelsen Verlag Scriptor GmbH & Co. KG., Berlin (2004).
Links	
Language of instruction	German
Duration (semesters)	2 Semester
Module frequency	jährlich
Module capacity	unlimited

Examination	Prüfungszeiten	Type of examination
Final exam of module	Papers have to be presented or handed in: one week after the end of the course	1 portfolio

Form of instruction	Seminar
SWS	4
Frequency	

bio110 - Practical Biology Experiments for Science Education

Module label	Practical Biology Experiments for Science Education
Modulkürzel	bio110
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Dual-Subject Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Master of Education Programme (Gymnasium) Biology (Master of Education) > Mastermodule • Master of Education Programme (Special Needs Education) Biology (Master of Education) > Mastermodule
Zuständige Personen	• Rathje, Wiebke (module responsibility) • Hößle, Corinna (Module counselling) • Rathje, Wiebke (Module counselling) • Rathje, Wiebke (Prüfungsberechtigt) • Plewka, Isabelle (Prüfungsberechtigt) • Wübben, Anja (Prüfungsberechtigt)
Prerequisites	Voraussetzung an der Teilnahme ist der erfolgreiche Abschluss des Moduls bio100.
Skills to be acquired in this module	Die Studierenden erwerben folgende Kompetenzen: Studierende • lernen basale Arbeits-und Erkenntnismethoden der Biologie unter besonderer Berücksichtigung der Zoologie und Botanik kennen und wenden diese bei der Planung von Lernarrangements an • verfügen insbesondere über Kenntnisse und Fähigkeiten im hypothesengeleiteten Experimentieren, im kriteriengeleiteten Vergleichen, beim Nutzen von Modellen sowie im Handhaben von schulrelevanten Geräten • verfügen über grundlegende Kenntnisse allgemeiner Experimentiermethoden • können Unterrichtskonzepte und -medien fachgerecht gestalten und inhaltlich bewerten. • kennen Möglichkeiten zur Gestaltung von Lernarrangements insbesond ere unter Berücksichtigung heterogener Lernvoraussetzungen • verfügen über grundlegende Kenntnisse zu potentiellen Lernschwierigkeiten und zu der Vielfalt von Schülervorstellungen in den behandelten Themengebieten unter Inklusionsbedingungen sowie über Grundlagen Standard- und kompetenzorierentierten Vermittlungsprozesse in heterogenen Lerngruppen • können auf der Grundlagen ihrer fachbezogenen Expertise hinsichtlich Planung und Gestaltung eines inklusiven Unterrichts mit sonderpädagogisch qualifizierten Lehrkräften gemeinsame fachliche Lernangebote entwickeln. • können digitale Lernmittel in ihren Lernarrangements integrieren und sie zur Differenzierung und individuellen Förderung im Unterricht einsetzen. • sind in der Lage, Entwicklungen im Bereich Digitalisierung aus fachlicher und fachdidaktischer Sicht angemessen zu rezipieren sowie Möglichkeiten und Grenzen der Digitalisierung kritisch zu reflektieren. Sie können die daraus gewonnenen Erkenntnisse in fachdidaktischen Kontexten nutzen sowie in die Weiterentwicklung unterrichtlicher und c urricularer Konzepte einbringen. Sie sind sensibilisiert für die Chancend igitaler Lernmedien hinsichtlich Barrierefreiheit und nutzen digitale Medi en auch zur Differenzierung und individuellen Förderung im Unterricht
Module contents	Das Modul umfasst ein Seminar und eine Übung. Im Rahmen der praktischen Übung lernen die Studierenden klassische und innovative Schulversuche zur Botanik und Zoologie kennen. Sie werden aufgefordert die Versuche unter Einbezug digitaler Werkzeuge eigenständig vorzubereiten, durchzuführen und zu reflektieren. Die Studierenden erlernen dabei basale biologische Arbeits-Erkenntnismethoden und entwickeln Lernarrangements zum hypothesengeleiteten Experimentieren. Im Seminar entwickeln und verschriftlichen die Studierenden unter dem Einbezug sonderpädagogischer Fallbeispiele Unterrichtskonzepte für heterogene sowie inklusive Lerngruppen und diskutieren diese gemeinsam. Die Studierenden üben sich so in der Entwicklung von inklusiven

Lernarrangements, deren Ziel es ist, naturwissenschaftliche Arbeits- und Denkweisen in heterogenen Lerngruppen zu fördern.

Literaturempfehlungen

- Campbell Biologie, 11., aktualisierte Auflage, Hallbergmoos: Pearson, 2019
- Purves Biologie, David. Sadava ; Jürgen Markl, 10th ed. 2019., Berlin, Heidelberg: Springer Berlin Heidelberg : Imprint: Springer Spektrum, 2019
- Fachdidaktik Biologie, Harald Gropengießer ; Ute Harms, Hannover: Aulis Verlag in Friedrich Verlag GmbH, 2023
- Schülervorstellungen im Biologieunterricht : Ursachen für Lernschwierigkeiten Marcus Hammann; Roman Asshoff, 4. Auflage, Seelze: Klett/Kallmeyer, 2019
- Lernprozesse digital unterstützen : ein Methodenbuch für den Unterricht, Monika Heusinger, 2. Auflage, Weinheim Basel: Beltz, 2022
- Nerdel, C. (2017). Grundlagen der Naturwissenschaftsdidaktik. Berlin, Heidelberg, Germany: Springer Berlin Heidelberg.
- Weitzel, H., Schaal, S. (2016). Biologie unterrichten: planen, durchführen, reflektieren. Cornelsen Berlin

Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	jährlich
Module capacity	unlimited

Examination	Prüfungszeiten	Type of examination
Final exam of module		1 Portfolio zu einem ausgewählten Schulversuch; aktive Teilnahme in Seminar und Praktikum

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Seminar		2		28
Practical training		3		42
Präsenzzeit Modul insgesamt				70 h

bio245 - Flora and Fauna

Module label	Flora and Fauna
Modulkürzel	bio245
Credit points	9.0 KP
Workload	270 h
Verwendbarkeit des Moduls	• 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) > Mastermodule
Zuständige Personen	• Albach, Dirk Carl (module responsibility) • Will, Maria (Module counselling) • Wilke, Tanja (Module counselling) • von Hagen, Klaus Bernhard (Module counselling) • Albach, Dirk Carl (Prüfungsberechtigt) • Will, Maria (Prüfungsberechtigt) • Wilke, Tanja (Prüfungsberechtigt) • Donat, Frank Henrik (Prüfungsberechtigt) • von Hagen, Klaus Bernhard (Prüfungsberechtigt) • Plewka, Isabelle (Prüfungsberechtigt)
Prerequisites	
Skills to be acquired in this module	+ biological knowledge + knowledge of biological working methods + independent learning and (research-based) working + knowledge of safety and environmental issues To determine species-rich taxa and to verify the results independently using relevant literature
Module contents	Lecture: 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. Exercise: Applying literature to determine animal and plant species and to classify them systematically. Field Exercise: 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.
Literaturempfehlungen	Botany: Rothmaler - Exkursionsflora von Deutschland, Band 2 - Grundband, Spektrum Akademischer Verlag Zoology: M. Schaefer: Brohmer - Fauna von Deutschland, from 20th edition
Links	
Language of instruction	German
Duration (semesters)	1 oder 2 Semester
Module frequency	jährlich
Module capacity	unlimited (Die Übungen zur Fauna können entweder semesterbegleitend im Sommersemester oder im Wintersemester (März/April, als Blockveranstaltung) besucht werden. In beiden Fällen erfolgt die Platzvergabe zu Beginn des Wintersemesters.)
Reference text	Modul für - Studierende des **Fachbachelors mit Studienbeginn ab dem WiSe 23/24** sowie für - **Lehramts-Studierende** und 2FB-Studierende ohne Lehramtsorientierung **mit Studienbeginn vor dem WiSe 23/24**. (Übergangsbestimmung bis zum Sommersemester 2025; auf Antrag und mit Zustimmung des Prüfungsausschusses ist auch ein Wechsel in die aktuelle Prüfungsordnung möglich)

Examination	Prüfungszeiten	Type of examination
Final exam of module	Botany: Written examination before the end of the lecture Zoology: Written examination before the end of the lecture	1 written examination (Botany 50 %) 1 written examination (Zoology 50 %) ungraded minutes 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		1	SoSe	14

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Vorlesung und Übung (inkl. Geländeübung)		5	SoSe und WiSe	70
Präsenzzeit Modul insgesamt				84 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	• Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Aufbaumodule
Zuständige Personen	• Nolte, Arne (module responsibility) • Nolte, Arne (Prüfungsberechtigt)
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 ++ interdisciplinary knowledge & thinking ++ abstract, logical, analytical thinking ++ deepened expertise in biological specialist field 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.
Module contents	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. Excercise: Modern data sets and up to date methods in genomics and population genetics are introduced. The practical emphasizes computer based data analyses.
Literaturempfehlungen	
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	jährlich
Module capacity	30

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

bio265 - General Microbiology

Module label	General Microbiology
Modulkürzel	bio265
Credit points	9.0 KP
Workload	270 h ( )
Verwendbarkeit des Moduls	• Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Bachelor's Programme Environmental Science (Bachelor) > Wahlpflichtmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Aufbaumodule
Zuständige Personen	• Rabus, Ralf Andreas (module responsibility) • Wöhlbrand, Lars (Module counselling) • Rabus, Ralf Andreas (Prüfungsberechtigt) • Wöhlbrand, Lars (Prüfungsberechtigt)
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.
Literaturempfehlungen	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

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	• Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Aufbaumodule
Zuständige Personen	• Heyers, Dominik (module responsibility) • Köppl, Christine (Module counselling) • Dedek, Karin (Module counselling) • Heyers, Dominik (Prüfungsberechtigt) • Köppl, Christine (Prüfungsberechtigt) • Dedek, Karin (Prüfungsberechtigt)
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 + deepened expertise in biological specialist field ++ independent learning and (research-based) working + teamwork 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".
Module contents	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.
Literaturempfehlungen	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
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	jährlich
Module capacity	144

Examination	Prüfungszeiten	Type of examination
Final exam of module	within a few weeks after the winter term lecture period	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.

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**	2	WiSe	28

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
	Sie zu BEGINN des WiSe auf entsprechende Mitteilungen über Stud.IP.			
Präsenzzeit Modul insgesamt				84 h

bio295 - Genetics

Module label	Genetics
Modulkürzel	bio295
Credit points	9.0 KP
Workload	270 h
Verwendbarkeit des Moduls	• 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	• Claußen, Maike (module responsibility) • Hartmann, Anna-Maria (Module counselling) • Nothwang, Hans Gerd (Module counselling) • Ebbers, Lena (Module counselling) • Claußen, Maike (Prüfungsberechtigt) • Nothwang, Hans Gerd (Prüfungsberechtigt) • Hartmann, Anna-Maria (Prüfungsberechtigt) • Ebbers, Lena (Prüfungsberechtigt) • Schinzel, Friedrich (Prüfungsberechtigt)
Prerequisites	
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 ++ 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 Fundamentals of genetics, performing experiments, quantitative analyses.
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
Literaturempfehlungen	Campbell/Reece Biologie (latest edition, Pearson Verlag), Strachan & Read Molekulare Humangenetik (latest edition, Sprektrum Verlag); Purves Biologie (latest editdion, Spektrum Verlag).
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	jährlich
Module capacity	72

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
Lecture		1.5	WiSe	21
Exercises		3	WiSe	42
Seminar		1.5	WiSe	21
Präsenzzeit Modul insgesamt				84 h

bio218 - Learning biological Instruction in the Nature

Module label	Learning biological Instruction in the Nature
Modulkürzel	bio218
Credit points	3.0 KP
Workload	90 h
Verwendbarkeit des Moduls	• Dual-Subject Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule
Zuständige Personen	• Plewka, Isabelle (module responsibility) • Hößle, Corinna (Module counselling) • Plewka, Isabelle (Module counselling) • Weusmann, Birgit (Prüfungsberechtigt) • Plewka, Isabelle (Prüfungsberechtigt) • Knapp, Edgar (Prüfungsberechtigt) • Zietz, Anna (Prüfungsberechtigt) • Wölki, Dana (Prüfungsberechtigt)
Prerequisites	
Skills to be acquired in this module	Development or adaptation of learning units to the specific learning situation of pupils - testing of these learning units without and with pupils, subsequent reflection +biological knowledge +knowledge of biological working methods +biologically relevant knowledge in the natural sciences and mathematics +interdisciplinary knowledge & thinking +deepened expertise in biological specialist field +independent learning and (research-based) working +teamwork ++(scientific) communication skills +project and time management +knowledge of safety and environmental issues
Module contents	In the first phase, students accompany environmental educators from the Green School or other extracurricular learning locations (Regionales Umweltbildungszentrum Oldenburg, Park der Gärten) and learn about various action concepts in a self-test. These concepts are then adapted to selected learning groups and tested among themselves (phase 2). In the third phase, students can stimulate the learning processes of the pupils by team teaching. In a final reflection, the experiences are collected and classified (phase 4).
Literaturempfehlungen	Raith, A. & Lude, A. (2014): Startkapital Natur: Wie Naturerfahrung die kindliche Entwicklung fördert. München: oekom
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	
Module capacity	64
Type of module	Pflicht / Mandatory
Module level	BC (Basiscurriculum / Base curriculum)
Teaching/Learning method	Seminar
Previous knowledge	Experience in comunication with children / adolescents

Examination	Prüfungszeiten	Type of examination
Final exam of module	during the time of the seminar	Portfolio, ungraded

Form of instruction	Seminar
SWS	2
Frequency	SoSe

bio237 - Basics in Microbiology

Module label	Basics in Microbiology
Modulkürzel	bio237
Credit points	3.0 KP
Workload	90 h
Verwendbarkeit des Moduls	• Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule
Zuständige Personen	• Rabus, Ralf Andreas (module responsibility) • Rabus, Ralf Andreas (Prüfungsberechtigt)
Prerequisites	
Skills to be acquired in this module	++ biological knowledge ++ knowledge of biological working methods ++ biologically relevant knowledge in the natural sciences and mathematics + deepened expertise in biological specialist field + independent learning and (research-based) working The students acquire microbiological expertise
Module contents	introduction: History, principle of smallness, importance Fungi: Growth, forms of reproduction, life cycles, phytopathogens, mycorrhiza, lichens. Viruses: Technical handling, development, lytic/lysogenic cycle, structure, classification, examples. Prokaryotic cell: Microscopy, cell wall of Gram positive/negative bacteria, cytoplasmic membrane, cytoskeleton, compartments, storage substances, flagella, fimbriae, pili, cellulosome, endospores, heterocysts. Metabolism: Central metabolic pathways, degradation of organic compounds, oxidation of inorganic compounds (chemolithotrophy), microbial fermentations, anaerobic respiration, phototrophic lifestyle. Diversity, evolution and systematics: Diversity concept, components of systematics, evolutionary mechanisms, Archaea, deep branching Bacteria, Firmicutes, Actinobacteria, Cyanobacteria, Spirochaetae, PVC superphylum, Proteobacteria (alpha, beta, gamma, delta and epsilon), et al.
Literaturempfehlungen	Fuchs, Allgemeine Mikrobiologie, Thieme Verlag
Links	
Language of instruction	German
Duration (semesters)	1. Sommersemesterhäfte Semester
Module frequency	jährlich
Module capacity	unlimited

Type of module	Pflicht / Mandatory	
Module level	AC (Aufbaucurriculum / Composition)	
Examination	Prüfungszeiten	Type of examination
Final exam of module	im Anschluss an den Veranstaltungsteil	written exam
Form of instruction	Lecture	
SWS	2	
Frequency	SoSe	

bio303 - Flora and Fauna

Module label	Flora and Fauna
Modulkürzel	bio303
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Dual-Subject Bachelor's Programme Biology (Bachelor) > Aufbaumodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Basismodule • Master of Education Programme (Special Needs Education) Biology (Master of Education) > Mastermodule
Zuständige Personen	• Albach, Dirk Carl (module responsibility) • Will, Maria (Module counselling) • Wilke, Tanja (Module counselling) • Albach, Dirk Carl (Prüfungsberechtigt) • Will, Maria (Prüfungsberechtigt) • Wilke, Tanja (Prüfungsberechtigt) • von Hagen, Klaus Bernhard (Prüfungsberechtigt) • Plewka, Isabelle (Prüfungsberechtigt) • Donat, Frank Henrik (Prüfungsberechtigt)
Prerequisites	
Skills to be acquired in this module	
	+ Biological expertise for species and family knowledge and independent identification of native plant species (focus on angiosperms). + Biological knowledge of plant morphology and characteristics relevant to plant identification + Understanding of concepts of evolution of biological diversity and classification systems underlying plant systematics. + Knowledge of biological working techniques, especially the use of magnifying glasses and stereolenses + Independent learning and (research-oriented) work + Knowledge of safety and environmental issues + Sustainable handling of nature
Module contents	
	The module is designed to introduce students to the diversity of native flora and fauna and to animal and Plant identification. This is essential for all areas of biology that deal with plants and animals, indispensable. Especially for the education in the field of nature conservation and teaching profession this knowledge is essential. Topics and methods that are relevant for these professions are therefore emphasized. The students should get basic species knowledge and learn the working methods and skills of identification. This also involves providing a systemic basis of knowledge of Habitats in Northwest Germany. There will be a basic assessment competency in the biodiversity and nature conservation, in order to teach the students how to responsible handling of organisms. Ü1: Work with different literature for the identification of animal and plant species and their classification in the systematics. Ü2: Excursions to characteristic northern German habitats and to the botanical garden. During the excursions the emphasis is on the correct identification and classification of plants and animals according to the characteristics of the living organism.
Literaturempfehlungen	Botanik: Rothmaler - Exkursionsflora von Deutschland, Band 2 - Grundband, Spektrum, ab 21. Auflage Akademischer Verlag Zoologie: M. Schaefer: Brohmer - Fauna von

	Deutschland, ab 20. Auflage
Links	
Language of instruction	German
Duration (semesters)	1 oder 2 Semester
Module frequency	jährlich
Module capacity	unlimited (Die Übungen zur Fauna können bei zeitlichen Überschneidungen alternativ semesterbegleitend im Sommersemester besucht werden. Die Platzvergabe der Übungen erfolgt immer zu Beginn des Wintersemesters.)
Reference text	
	Modul für **Lehramts-Studierende** und 2FB-Studierende ohne Lehramtsorientierung **mit Studienbeginn ab WiSe 23/24**. Lehramts-Studierende und 2FB-Studierende ohne Lehramtsorientierung mit Studienbeginn vor dem WiSe 23/24 studieren das Modul bio245 (Übergangsbestimmung bis zum Sommersemester 2025; auf Antrag und mit Zustimmung des Prüfungsausschusses ist auch ein Wechsel in die aktuelle Prüfungsordnung möglich)

Examination	Prüfungszeiten	Type of examination
Final exam of module	Written exams at the end of each part (flora and fauna)	1 written exam (botany 50 %), 1 written exam (zoology 50 %), The exam in botany consists in one half of a test of theoretical knowledge (theory part) and one half testing the practical skills in plant identification (practical part). In the latter, plants are identified using technical literature and, if necessary, optical aids (magnifying glass) and characterized with technical terms. In addition, there are ungraded excursion protocols. In addition, the general conditions set by the examination authorities apply, such as attendance and required ungraded performances.

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture			SoSe	0
Vorlesung und Übung (inkl. Geländeübung)		4	SoSe und WiSe	70
Präsenzzeit Modul insgesamt				70 h

Akzentsetzungsmodule

bio300 - Evolutionary Biology

Module label	Evolutionary Biology
Modulkürzel	bio300
Credit points	15.0 KP
Workload	450 h
Verwendbarkeit des Moduls	• 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	• Bininda-Emonds, Olaf (module responsibility) • Bininda-Emonds, Olaf (Prüfungsberechtigt) • Ahlrichs, Wilko (Prüfungsberechtigt) • Albach, Dirk Carl (Prüfungsberechtigt) • Gerlach, Gabriele (Prüfungsberechtigt) • Nolte, Arne (Prüfungsberechtigt)
Prerequisites	Abschluss der Basismodule
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 + 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 Introduction to both microevolution (speciation and species concepts, adaptation and selection, behavioural ecology, reproduction systems) and macroevolution. Introduction to phylogenetics (phyloinformatics, molecular systematics, phylogeography).
Module contents	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.
Literaturempfehlungen	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. Mihulka. 2009. Evolution: ein Lese-Lehrbuch. Spektrum Akademischer Verlag. 493 pp
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	jährlich
Module capacity	unlimited

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: 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

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Exercises		6	WiSe	84
Seminar		2	WiSe	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	• 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	• Hillebrand, Helmut (module responsibility) • Zotz, Gerhard (Module counselling) • Schupp, Peter (Module counselling) • Striebel, Maren (Module counselling) • Rohde, Sven (Module counselling) • Hillebrand, Helmut (Prüfungsberechtigt) • Zotz, Gerhard (Prüfungsberechtigt) • Schupp, Peter (Prüfungsberechtigt) • Striebel, Maren (Prüfungsberechtigt) • Rohde, Sven (Prüfungsberechtigt) • Fernandez-Mendez, Mar (Prüfungsberechtigt)
Prerequisites	Abschluss der Basismodule
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 + 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
Module contents	**Vorlesung Allgemeine Ökologie:** 2 SWS im Wintersemester (Theoretische Grundlagen, Resourcen, Populationsökologie, biologische Interaktionen, Lebensgemeinschaften, Ökosysteme) **Praktika/Seminare:** 4 SWS im folgenden Sommersemester: Es sind 2 Praktika aus unterschiedlichen Praktikaangeboten zu wählen, z.B. • **PR/S Vegetationsökologie / Naturschutz**: Vegetationskundliche Aufnahmemethoden (Artenzusammensetzung, Struktur), Nährstoffverhältnisse des Oberbodens, Mikroklima, Naturschutzprojekte • **PR/S Zoo-Ökologie:** 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 • **PR/SE Funktionelle Ökologie der Pflanzen:** Analyse abiotischer Rahmenbedingungen (u.a. Mikroklima), Wasser-, Nährstoff-, Kohlenstoffhaushalt, Aspekte der Populationsbiologie, Analyse von Pflanzenbeständen (Struktur, Funktion), statistische Auswertung und Modellierung • **PR/S Aquatische Ökologie:** Experimentelle Analyse von Artwechselwirkungen, zum Beispiel Räuber-Beute und Konkurrenz. Experimentelles Design. Auswertung von Proben, Biomassebestimmungen, Auszählungen, Mikroskopie. Statistische Analyse. Schreiben unter wissenschaftlicher Publikationsnorm • **PR/S Benthische Ökologie:** Experimentelle Analyse abiotischer und biotischer Faktoren auf makrobenthische Organismen und Gemeinschaften. Salinitäts- und Temperatureinflüsse, Räuber-Beute Beziehungen, Konkurrenzeffekte, statistische Auswertung und Verfassung wissenschaftlicher Berichte. Gemeinsames Symposium zu den Praktikumsergebnissen (O-Woche des folgenden Wintersemesters), 4h.
Literaturempfehlungen	VL Allgemeine Ökologie Nentwig, W., Bacher, S., Brandl, R., 2007. Ökologie kompakt. Spektrum Akademischer Verlag, Heidelberg. Vorlesungsunterlagen (Stud-IP) Vegetationsökologie / Naturschutz 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. Funktionelle Ökologie der Pflanzen Lambers, H., F. S. Chapin , & T. L. Pons. 2008. Plant Physiological Ecology. New York, Springer Verlag. Aquatische Ökologie Lampert, Sommer 1999: Limnoökologie. Thieme Praktikumskript Benthische Ökologie Sommer, U., 2005. Biologische Meereskunde. Springer
Links	
Language of instruction	German
Duration (semesters)	2 Semester
Module frequency	jährlich
Module capacity	unlimited

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	WiSe	28
Seminar		2	SoSe	28
Practical training		6	SoSe	84
Präsenzzeit Modul insgesamt				140 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	• 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	• Albach, Dirk Carl (module responsibility) • von Hagen, Klaus Bernhard (Module counselling) • Will, Maria (Module counselling) • Albach, Dirk Carl (Prüfungsberechtigt) • von Hagen, Klaus Bernhard (Prüfungsberechtigt) • Will, Maria (Prüfungsberechtigt)
Prerequisites	bio256 Flora and Fauna
Skills to be acquired in this module	+ 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 Extended knowledge of biodiversity and evolution of plants focusing on reproduction, dispersal, germination and establishment of plants
Module contents	L: Pollination, dispersal, germination of plants, plant breeding S: Pollination and dispersal biology of plants in a systematic context
Literaturempfehlungen	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

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	• 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	• Albach, Dirk Carl (module responsibility) • von Hagen, Klaus Bernhard (Module counselling) • Will, Maria (Module counselling) • Albach, Dirk Carl (Prüfungsberechtigt) • von Hagen, Klaus Bernhard (Prüfungsberechtigt) • Will, Maria (Prüfungsberechtigt)
Prerequisites	bio325 Pollination and dispersal concepts bio256 Flora/Fauna
Skills to be acquired in this module	+ 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 Extended knowledge of biodiversity and evolution of plants focusing on reproduction, dispersal, germination and establishment of plants
Module contents	Pollination, fertilisation, dispersal and germination biological experiments in regard of adaptation to environmental factors
Literaturempfehlungen	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

Examination	Prüfungszeiten	Type of examination
Final exam of module		Portfolio

Form of instruction	Exercises
SWS	4
Frequency	SoSe

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	• 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	• Albach, Dirk Carl (module responsibility) • von Hagen, Klaus Bernhard (Module counselling) • Will, Maria (Module counselling) • Albach, Dirk Carl (Prüfungsberechtigt) • von Hagen, Klaus Bernhard (Prüfungsberechtigt) • Will, Maria (Prüfungsberechtigt)		
Prerequisites	bio325 Pollination and dispersal concepts bio256 Flora/fauna		
Skills to be acquired in this module	+ 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 Extended knowledge of biodiversity and evolution of plants focusing on reproduction, dispersal, germination and establishment of plants		
Module contents	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.		
Literaturempfehlungen	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	Das Modul findet alle zwei Jahre statt.		
Module capacity	12		
Examination	Prüfungszeiten	Type of examination	
Final exam of module		portfolio	
Form of instruction	Exercises		
SWS	6		
Frequency	SoSe		

bio330 - Marine Ecology

Module label	Marine Ecology
Modulkürzel	bio330
Credit points	15.0 KP
Workload	450 h
Verwendbarkeit des Moduls	• 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	• Moorthi, Stefanie (Module counselling) • Hillebrand, Helmut (module responsibility) • Hillebrand, Helmut (Prüfungsberechtigt) • Moorthi, Stefanie (Prüfungsberechtigt)
Prerequisites	Abschluss der Basismodule
Skills to be acquired in this module	[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] 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
Module contents	Lecture Biological Oceanography 2 SWS. Presence time 24 h, additional study time 66h, winter-term Abiotic environmental conditions in marine systems (light, temperature, chemical and physical proper-ties 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. Exercise Concepts in marine ecology 6 SWS. 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. Lecture Marine Ecology 2 SWS. Presence time 24 h, additional study time 66h, winter-term Ecology of marine systems: estuaries, rocky and sediment coasts, pelagial, shelfs, 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.
Literaturempfehlungen	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

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	• 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	• Bininda-Emonds, Olaf (module responsibility) • Ahlrichs, Wilko (Module counselling) • Bininda-Emonds, Olaf (Prüfungsberechtigt) • Ahlrichs, Wilko (Prüfungsberechtigt)
Prerequisites	Abschluss der Basismodule
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 + 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 Upon successful completion of the module the students will gain: 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	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)
Literaturempfehlungen	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

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
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	• 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	• Ahlrichs, Wilko (module responsibility) • Kieneke, Alexander (Module counselling) • Hoppenrath, Mona (Module counselling) • Ahlrichs, Wilko (Prüfungsberechtigt) • Hoppenrath, Mona (Prüfungsberechtigt) • Kieneke, Alexander (Prüfungsberechtigt)
Prerequisites	Abschluss der Basismodule
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) + teamwork ++ (scientific) communication skills + project and time management + knowledge of safety and environmental issues 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, trans-mission 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 sys-tems and will have the opportunity to have hands-on experience with a Leica photomicroscope as well as the Leica SP5 confocal laser scanning.
Module contents	Microscopy of protists and micro metazoans. Students are required plan and carry out a research pro-ject that exposes them to some of the challenges and problems encountered by microscopical anato-my - 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.
Literaturempfehlungen	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.)

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

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
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	• 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	• Martinez Arbizu, Pedro Miguel (module responsibility) • Hoppenrath, Mona (Module counselling) • Martinez Arbizu, Pedro Miguel (Prüfungsberechtigt) • Hoppenrath, Mona (Prüfungsberechtigt) • Wehrmann, Achim (Prüfungsberechtigt)
Prerequisites	Abschluss der Basismodule
Skills to be acquired in this module	++ 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 By active participation the students acquire the following knowledge/abilities/qualification: * 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	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.
Literaturempfehlungen	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. 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 - Datenbanken(DBIS) - Biologie - TOP-Datenbanken z. B. ASFA, Science Citation Index, Zoological Record hhtp://www.biodiversitylibrary.org/bibliogrphy/14107 externhttp://scholar.google.de/ externhttp://www.vifabio.de Open access journals: externhttp://www.doaj.org/ - externhttp://www.plosone.org
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	jährlich
Module capacity	unlimited

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	• 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	• Albach, Dirk Carl (module responsibility) • von Hagen, Klaus Bernhard (Module counselling) • Will, Maria (Module counselling) • Albach, Dirk Carl (Prüfungsberechtigt) • von Hagen, Klaus Bernhard (Prüfungsberechtigt) • Will, Maria (Prüfungsberechtigt)
Prerequisites	bio256 Flora and Fauna
Skills to be acquired in this module	+ biological knowledge + knowledge of biological working methods + deepened expertise in biological specialist field + independent learning and (research-based) working + data presentation and evidence-based discussion (written and spoken) + (scientific) communication skills + knowledge of safety and environmental issues 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 natuer conservation to sensibilize 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.
Module contents	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. The seminar is intended to let students study in-depth additional plant families with their typical characters.
Literaturempfehlungen	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

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	• 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	• Albach, Dirk Carl (module responsibility) • von Hagen, Klaus Bernhard (Module counselling) • Will, Maria (Module counselling) • Albach, Dirk Carl (Prüfungsberechtigt) • von Hagen, Klaus Bernhard (Prüfungsberechtigt) • Will, Maria (Prüfungsberechtigt)
Prerequisites	bio256 Flora and Fauna bio375 Flora - Advanced concepts
Skills to be acquired in this module	+ biological knowledge + knowledge of biological working methods + deepened expertise in biological specialist field + independent learning and (research-based) working + data presentation and evidence-based discussion (written and spoken) + (scientific) communication skills + knowledge of safety and environmental issues 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 natuer conservation to sensibilize 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.
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.
Literaturempfehlungen	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

Examination	Prüfungszeiten	Type of examination
Final exam of module		portfolio

Form of instruction	Exercises
SWS	4
Frequency	SoSe

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	• 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	• Albach, Dirk Carl (module responsibility) • von Hagen, Klaus Bernhard (Module counselling) • Will, Maria (Module counselling) • Albach, Dirk Carl (Prüfungsberechtigt) • von Hagen, Klaus Bernhard (Prüfungsberechtigt) • Will, Maria (Prüfungsberechtigt)
Prerequisites	bio375 Flora - Advanced Concepts bio256 Flora and Fauna
Skills to be acquired in this module	+ biological knowledge + knowledge of biological working methods + deepened expertise in biological specialist field + independent learning and (research-based) working + data presentation and evidence-based discussion (written and spoken) + (scientific) communication skills + knowledge of safety and environmental issues 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 natuer conservation to sensibilize 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.
Module contents	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.
Literaturempfehlungen	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

Examination	Prüfungszeiten	Type of examination
Final exam of module		portfolio

Form of instruction	Exercises
SWS	6
Frequency	SoSe

bio385 - Specific Microbiology

Module label	Specific Microbiology
Modulkürzel	bio385
Credit points	12.0 KP
Workload	360 h
Verwendbarkeit des Moduls	• 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	• Rabus, Ralf Andreas (module responsibility) • Rabus, Ralf Andreas (Prüfungsberechtigt) • Wünsch, Daniel (Prüfungsberechtigt)
Prerequisites	bio233 Basics in microbiology and genetics bio265 general microbiology
Skills to be acquired in this module	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
Module contents	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
Literaturempfehlungen	Schmauder HP (1994) Methoden der Biotechnologie, Kapitel 3.2.2. Gustav Fischer Verlag Jena Chmiel H, Briechle S (1991) Bioprozesstechnik. Gustav Fischer Verlag Stuttgart
Links	www.icbm.de/ammb
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	jährlich
Module capacity	8

Examination	Prüfungszeiten	Type of examination
Final exam of module		exam (50%) protocol (50%)

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

bio405 - Introduction to Neurobiology I

Module label	Introduction to Neurobiology I
Modulkürzel	bio405
Credit points	12.0 KP
Workload	360 h
Verwendbarkeit des Moduls	• 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	• Greschner, Martin (module responsibility) • Koch, Karl-Wilhelm (Module counselling) • Janssen-Bienhold, Ulrike (Module counselling) • Janssen-Bienhold, Ulrike (Prüfungsberechtigt) • Greschner, Martin (Prüfungsberechtigt) • Koch, Karl-Wilhelm (Prüfungsberechtigt) • Köppl, Christine (Prüfungsberechtigt) • Dömer, Patrick (Prüfungsberechtigt)
Prerequisites	Abschluss der Basismodule
Skills to be acquired in this module	++ deepened biological expertise ++ deepened knowledge of biological working methods + scientific/mathematical basic knowledge relevant for biology + critical and analytical thinking ++ data presentation and discussion in German (written and spoken) + teamwork
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.
Literaturempfehlungen	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

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	• 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	• Greschner, Martin (module responsibility) • Koch, Karl-Wilhelm (Module counselling) • Janssen-Bienhold, Ulrike (Module counselling) • Janssen-Bienhold, Ulrike (Prüfungsberechtigt) • Greschner, Martin (Prüfungsberechtigt) • Koch, Karl-Wilhelm (Prüfungsberechtigt) • Dömer, Patrick (Prüfungsberechtigt)
Prerequisites	Abschluss der Basismodule
Skills to be acquired in this module	[nop]++ biologische Fachkenntnisse ++ Kenntnisse biologischer Arbeitstechniken + biologierelevante naturwissenschaftliche/mathematische Grundkenntnisse + Abstraktes, logisches, analytisches Denken ++ Datenpräsentation und evidenzbasierte Diskussion in Wort und Schrift + Teamfähigkeit [/nop]
Module contents	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.
Literaturempfehlungen	Purves D. et al.: Neuroscience, Sinauer Associates, Sunderland USA, jeweils neueste Auflage.
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	Sommersemester
Module capacity	unlimited
Reference text	Aus bio405 und bio408 kann nur 1 Modul gewählt werden. Verknüpft mit den Modulen bio415 und bio416 Einführung in die Neurobiologie II im WS

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
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	• 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	• Greschner, Martin (module responsibility) • Thiel, Christiane Margarete (Module counselling) • Köppl, Christine (Module counselling) • Greschner, Martin (Prüfungsberechtigt) • Thiel, Christiane Margarete (Prüfungsberechtigt) • Köppl, Christine (Prüfungsberechtigt)
Prerequisites	Abschluss der Basismodule
Skills to be acquired in this module	++ deepened biological expertise ++ deepened knowledge of biological working methods + scientific/mathematical basic knowledge relevant for biology + critical and analytical thinking
Module contents	The lecture covers the basics of systemic neuroscience with a focus on propcessing in sensory systems, the plasticity of the nervous system and the mechanisms underlying cognitive pro-cessing. In the seminar, topics related to the lectures of the week are covered in more depth.
Literaturempfehlungen	Purves D. et al.: Neuroscience, Sinauer Associates, Sunderland USA, latest edition
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	Wintersemester
Module capacity	30

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

bio420 - Biochemistry of the Cell

Module label	Biochemistry of the Cell
Modulkürzel	bio420
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• 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	• Scholten, Alexander (module responsibility) • Scholten, Alexander (Prüfungsberechtigt)
Prerequisites	Abschluss der Basismodule
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) ++ (scientific) communication skills
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

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	• 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	• Koch, Karl-Wilhelm (module responsibility) • Scholten, Alexander (Module counselling) • Koch, Karl-Wilhelm (Prüfungsberechtigt) • Scholten, Alexander (Prüfungsberechtigt)
Prerequisites	Abschluss der Basismodule
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 + deepened expertise in biological specialist field ++ data presentation and evidence-based discussion (written and spoken) + teamwork 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.
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

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	• 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	• Ahlrichs, Wilko (module responsibility) • Kieneke, Alexander (Module counselling) • Hoppenrath, Mona (Module counselling) • Ahlrichs, Wilko (Prüfungsberechtigt) • Kieneke, Alexander (Prüfungsberechtigt) • Hoppenrath, Mona (Prüfungsberechtigt)
Prerequisites	Abschluss der Basismodule
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 ++ 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 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.
Module contents	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.
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.)

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	• 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	• Bininda-Emonds, Olaf (module responsibility) • Ahlrichs, Wilko (Module counselling) • Bininda-Emonds, Olaf (Prüfungsberechtigt) • Ahlrichs, Wilko (Prüfungsberechtigt)
Prerequisites	Abschluss der Basismodule
Skills to be acquired in this module	+ 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 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.
Module contents	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. 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).
Literaturempfehlungen	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)

Examination	Prüfungszeiten	Type of examination
Final exam of module		Portfolio (100%)

Form of instruction	Exercises
SWS	6
Frequency	SoSe

bio470 - Marine Biology Field Trip

Module label	Marine Biology Field Trip
Modulkürzel	bio470
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• 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	• Ahlrichs, Wilko (module responsibility) • Kieneke, Alexander (Module counselling) • Ahlrichs, Wilko (Prüfungsberechtigt) • Kieneke, Alexander (Prüfungsberechtigt)
Prerequisites	Abschluss der Basismodule
Skills to be acquired in this module	[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] Objective of the module/skills: 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.
Module contents	Content of the module: 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.
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 moti-vation decides on the admission.)
Reference text	Takes place alternately with Bio472 Marinbiologi-cal Course I. (Change between focus on rocky shore / mud flat & sand flat) If there are more applicants than places available, a letter of motivation decides on the acceptance.

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	• 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	• Ahlrichs, Wilko (module responsibility) • Kieneke, Alexander (Module counselling) • Ahlrichs, Wilko (Prüfungsberechtigt) • Kieneke, Alexander (Prüfungsberechtigt)
Prerequisites	Abschluss der Basismodule
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 ++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 In completion of this modul students will: have a basic knowledge of the diversity of marine life; un-derstand 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 ap-proach to scientific research; have developed skills in writing scientific reports and in oral communica-tion of scientific information.
Module contents	Content of the module: 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.
Literaturempfehlungen	Will be announced in Studt IP.
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	Sommersemester
Module capacity	14 (Bei mehr Bewerber_innen als Plätzen entscheidet ein Motivationschreiben über die Aufnahme.)
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.

Examination	Prüfungszeiten	Type of examination
Final exam of module		1 Portfolio

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Seminar		2	SoSe	28
Exercises		2	SoSe	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	• 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	• Ahlrichs, Wilko (module responsibility) • Ahlrichs, Wilko (Prüfungsberechtigt)
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.
Literaturempfehlungen	Will be announced in Studt IP.
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	Sommersemester
Module capacity	unlimited (Sind mehr BewerberInnen als Plätze vorhanden, entscheidet ein Motivationsschreiben über die Annahme.)

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	28

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Exercises		1	SoSe	14
Study trip		1	SoSe	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	• 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	• Zotz, Gerhard (module responsibility) • Einzmann, Helena (Module counselling) • Zotz, Gerhard (Prüfungsberechtigt) • Einzmann, Helena (Prüfungsberechtigt)
Prerequisites	Abschluss der Basismodule
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 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
Module contents	V: Functional Morphology of Plants (1 SWS) E: Mikroskopy, biomechanical Experiments, Form/Function Experiments regarding water uptake, storage and loss (2 SWS) S new studies in the field of functional morphology (1 SWS)
Literaturempfehlungen	Kadereit JW, et al (2014) Strasburger Lehrbuch der Botanik. 37. Aufl. Spektrum Akademischer Verlag Eschrich, W. (1995) Funktionelle Pflanzenanatomie. Springer
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	annually
Module capacity	8

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	• 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	• Greschner, Martin (module responsibility) • Beutelmann, Rainer (Module counselling) • Thiel, Christiane Margarete (Module counselling) • Köppl, Christine (Module counselling) • Langemann, Ulrike (Module counselling) • Rosemann, Stephanie (Module counselling) • Greschner, Martin (Prüfungsberechtigt) • Rosemann, Stephanie (Prüfungsberechtigt) • Beutelmann, Rainer (Prüfungsberechtigt) • Thiel, Christiane Margarete (Prüfungsberechtigt) • Köppl, Christine (Prüfungsberechtigt) • Langemann, Ulrike (Prüfungsberechtigt)
Prerequisites	Abschluss der Basismodule
Skills to be acquired in this module	++ deepened biological expertise ++ deepened knowledge of biological working methods ++ data analysis skills ++ data presentation and discussion in German and English (written and spoken) + teamwork + scientific/mathematical basic knowledge relevant for biology + critical and analytical thinking
Module contents	The lecture covers the basics of systemic neuroscience with a focus on propcessing in sensory systems, the plasticity of the nervous system and the mechanisms underlying cognitive pro-cessing. In the seminar, topics related to the lectures of the week are covered in more depth. The exercise immediately follows the lecture and the seminar. 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) an present these in a written report.
Literaturempfehlungen	Purves D. et al.: Neuroscience, Sinauer Associates, Sunderland USA, latest edition
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	Wintersemester
Module capacity	30

Examination	Prüfungszeiten	Type of examination
Final exam of module	end of semester	written exam (100%) practical exercise (ungraded)

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		3	WiSe	0
Seminar			WiSe	0
Exercises		4	WiSe	0
Präsenzzeit Modul insgesamt				0 h

Ergänzungsmodule

bio150 - Statistics for Biologists

Module label	Statistics for Biologists
Modulkürzel	bio150
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Bachelor's Programme Biology (Bachelor) > Naturwissenschaftliche Grundlagen • Dual-Subject Bachelor's Programme Biology (Bachelor) > Ergänzungsmodule
Zuständige Personen	• Kretzberg, Jutta (module responsibility) • Kretzberg, Jutta (Prüfungsberechtigt)
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
Literaturempfehlungen	A detailled 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
Type of module	je nach Studiengang Pflicht oder Wahlpflicht
Module level	---

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	SoSe	28
Exercises		2	SoSe	28
Präsenzzeit Modul insgesamt				56 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	• Bachelor's Programme Biology (Bachelor) > Naturwissenschaftliche Grundlagen • Dual-Subject Bachelor's Programme Biology (Bachelor) > Ergänzungsmodule
Zuständige Personen	• Scholten, Alexander (module responsibility) • Nolte, Arne (Module counselling) • Scholten, Alexander (Prüfungsberechtigt) • Nolte, Arne (Prüfungsberechtigt)
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
Literaturempfehlungen	Script
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	
Module capacity	unlimited

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

che101 - Basic Chemistry

Module label	Basic Chemistry
Modulkürzel	che101
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Bachelor's Programme Biology (Bachelor) > Naturwissenschaftliche Grundlagen • Bachelor's Programme Mathematics (Bachelor) > Nebenfachmodule • Dual-Subject Bachelor's Programme Biology (Bachelor) > Ergänzungsmodule
Zuständige Personen	• Wark, Michael (module responsibility) • Wark, Michael (Prüfungsberechtigt) • Bottke, Patrick (Prüfungsberechtigt)
Prerequisites	
Skills to be acquired in this module	Students have basic knowledge of the structure of atoms and molecules. They know the periodic table of chemical elements, the properties of important elements and their most important compounds and reactions. They are familiar with equilibria in aqueous solutions. They will be able to use equilibrium settings to solve small analytical tasks and describe these equilibria using formulas. They will be familiar with acids and bases as well as reduction and oxidation reactions. Students are familiar with selected methods for quantifying chemical compounds using spectroscopy. Students know the most important organic molecules and classes of natural substances.
Module contents	Lecture: General and inorganic chemistry (3 SWS) Structure of the periodic table; basics of chemical bonding; nomenclature of chemical compounds; stoichiometric laws; chemical equilibria; fundamental material chemistry; structure of important compounds; acids and bases; reductions and oxidations; introduction to methods of spectroscopy and chromatography. Exercise: Exercise for the lecture General and Inorganic Chemistry (1 SWS)
Literaturempfehlungen	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
Links	
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	jährlich
Module capacity	unlimited
Reference text	6 KP / WiSe: V 101, Ü 101Ü

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	• 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

Examination	Prüfungszeiten	Type of examination
Final exam of module		not graded

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		1	WiSe	14
Practical training		5	WiSe	70
Präsenzzeit Modul insgesamt				84 h

che190 - Basic Organic Chemistry

Module label	Basic Organic Chemistry
Modulkürzel	che190
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• 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	• Christoffers, Jens (module responsibility) • Christoffers, Jens (Prüfungsberechtigt) • Hilt, Gerhard (Prüfungsberechtigt) • Doye, Sven (Prüfungsberechtigt) • Hilt, Gerhard (Module counselling) • Doye, Sven (Module counselling) • Christoffers, Jens (Module counselling)
Prerequisites	
Skills to be acquired in this module	**Kenntnisse** Grundlegende Stoffsystematik der Organischen Chemie, Reaktionsweisen organischer Verbindungen, grundlegende Reaktionsmechanismen **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
Module contents	• 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.
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. Fachsemester (WiSe)

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

che290 - Experimental Organic Chemistry

Module label	Experimental Organic Chemistry
Modulkürzel	che290
Credit points	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• 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	• Doye, Sven (module responsibility) • Christoffers, Jens (Prüfungsberechtigt) • Doye, Sven (Prüfungsberechtigt) • Martens, Jürgen (Prüfungsberechtigt) • Hilt, Gerhard (Prüfungsberechtigt) • Christoffers, Jens (Module counselling) • Doye, Sven (Module counselling) • Hilt, Gerhard (Module counselling)
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	https://uol.de/oc-doye/lehre
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	jährlich
Module capacity	70
Reference text	SoSe: PR 204, S 205 / 4. FS / Doye

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
Seminar	Blockveranstaltung	3	SoSe	42
Practical training	Blockveranstaltung	3	SoSe	42
Präsenzzeit Modul insgesamt				84 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	• Bachelor's Programme Biology (Bachelor) > Naturwissenschaftliche Grundlagen • Dual-Subject Bachelor's Programme Biology (Bachelor) > Ergänzungsmodule
Zuständige Personen	• Vertman, Boris (module responsibility) • Werner, Tino (Module counselling) • Schöpfer, Frank (Module counselling) • Shestakov, Ivan (Module counselling)
Prerequisites	
Skills to be acquired in this module	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.
Module contents	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 Differetialgleichungen 1. Ordnung (linear homogen, logistisch), Richtungsfeld, stationäre Zustände und Stabilität, Anwendungen. Differentialgleichungen höherer Ordnung und Systeme (Schwingungsgleichung, Lotka-Volterra-Modell).
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 |

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

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	• 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	• Gütay, Levent (module responsibility) • Petrovic, Vlaho (module responsibility) • Petrovic, Vlaho (Prüfungsberechtigt) • Gütay, Levent (Prüfungsberechtigt)
Prerequisites	Keine
Skills to be acquired in this module	Die Studierenden erlangen die folgenden Fähigkeiten: 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
Module contents	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.
Literaturempfehlungen	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
Links	http://www.uni-oldenburg.de/physik/praktika/bio-che/bio/
Language of instruction	German
Duration (semesters)	1 Semester
Module frequency	jährlich
Module capacity	unlimited

Examination	Prüfungszeiten	Type of examination
Final exam of module	Modulende	1 written exam or 1 oral exam

Form of instruction	Comment	SWS	Frequency	Workload of compulsory attendance
Lecture		2	WiSe	2
Practical training		2	WiSe	2
Präsenzzeit Modul insgesamt				4 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	• Dual-Subject Bachelor's Programme Biology (Bachelor) > Abschlussmodul
Zuständige Personen	• Hößle, Corinna (module responsibility) • Winkler, Holger (Module counselling) • Plewka, Isabelle (Module counselling) • Wübben, Anja (Module counselling) • der Biologie, Lehrende (Prüfungsberechtigt)
Prerequisites	
Skills to be acquired in this module	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. ++ 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	Preparing the Bachelor thesis Active participation in the seminar of the research group, in which the Bachelor's thesis is written
Literaturempfehlungen	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

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	--