

Module Number: B 101/B 201	Module Title: Physics	Type of Module: BSc Mandatory	
Credits (ECTS)	12		
Workload -Contact Time -Private Study	Workload: 360 hr	Contact Time: 180 hr / 6 Credit Hours	Private Study: 180 hr
Module Duration Module Coordinator	2 semesters	Appel	
Regular Cycle	Offered each year, divided into winter and summer semesters (recommended to be taken in sequential order in the 1st and 2nd semester or as block courses during the semester breaks)		
Language	German		
Teaching/ Learning Techniques	The module consists of a lecture with integrated visual experiments, a practical physics laboratory course consisting of 5 experiments and a complimentary tutorial to deepen the students' understanding on physical subjects related to geoscience.		
Module Contents	<ul style="list-style-type: none"> • Basic principles of classical physics: basic terms, rigid and deformed body mechanics, mechanical oscillations and waves, thermodynamics, electricity, optics, atomic and nuclear physics - achieved through several experiments (Experimental Physics 1 and 2 taught by a lecturer from the Physics Department). • Deepening of chosen topics which are especially relevant to geoscience studies complemented with Experimental Physics 1 and 2 (taught by a lecturer from the Geoscience Department). • Physics practical course (implemented and assessed through 5 chosen individual experiments from the various disciplines of classical physics and taught by a lecturer from the Physics Department). The practical course is available both during the semester and as a block course during the semester break. 		
Qualification Goals	After completion of the course the students will possess basic knowledge in classical physics and will be able to work out physical experiments, interpret the results and present them in a report form. They will be able to link the physical principles and modes of action with different processes relevant to geoscience and apply them to appropriate areas and later assess the results quantitatively.		

Prerequisites for the allocation of credits/grades (if necessary weighting)	Course	Type of Lecture	Status	ECTS/Credit hours	Credits	Type of Exam/Study Requirement	Exam Duration	Grading System	Weighting
	Experimental Physics 1 & 2 for Environmental Scientists including the complementary lesson	L	c	8	8	WE	90	b	1
	Complementary lesson of Experimental physics 1 & 2 for Geoscientists	L	c	2	2	-	-	-	-
	Physics Lab Course for Environmental Scientists	LC	c	2	2	LP	-	ng	-
Availability	BSc Geoscience, BSc Geoecology, BSc Environmental Science								
Participation									
Prerequisites	None								

Module Number: B 102	Module Title: Mathematics for Environmental Scientists 1		Type of Module: BSc Mandatory						
Credits (ECTS)	6								
Workload -Contact Time -Private Study	Workload: 180 hr			Contact Time: 90 hr / 6 Credit Hours			Private Study: 90 hr		
Module Duration Module Coordinator	1 Semester				Nickel				
Regular Cycle	Every winter semester (recommended in the 1st semester)								
Language	German								
Teaching/ Learning Techniques	The Module consists of two imported events in relation to mathematics. The contents of the lectures are complemented with exercises performed in small groups, also in which homework will be discussed.								
Module Contents	<ul style="list-style-type: none"> • Complete induction, geometric series and binomial formula • Limit values, continuity differentiation, power series • vector spaces, linear systems of equations, scalar products, Norms •Matrices, determinants •Complex Numbers •Integration 								
Qualification Goals	The Students will become familiar with the fundamental principles and methods of higher mathematics. They will use these methods to compete exercises. The will understand the fundamental principles, how these principles function and learn how they can be applied and used.								
Prerequisites for the allocation of credits/ grades (if necessary weighting)	Course	Type of Lecture	Status	ECTS/Credit hours	Credits	Type of Exam/Study Requirement	Exam Duration	Grading System	Weighting
	Mathematics for Environmental Scientists 1	L	c	4	2	WE	60-120	b	1
	Assignments to Mathematics for Environmental Scientists 1	E	c	2	4	A	-	-	-
Availability	BSc Geoscience, BSc Geoecology, BSc Environmental Science								
Participation Prerequisites	None								

Module Number: B 103	Module Title: Chemistry 1 (General Chemistry)				Type of Module: BSc Mandatory				
ECTS Credits	6								
Total Work Hours -Contact hours -Self-instruction	Workload: 180 hr			Contact Time: 90 hr / 6 Credit Hours			Private Study: 90 hr		
Module Duration Module Coordinator	1 Semester				Nickel				
Regular Cycle	Every winter semester The practical course is offered as a block course (2.5 weeks) typically sometime in the 6 weeks before the winter semester is over.								
Language	German								
Teaching/ Learning Techniques	The module additionally consists of two imported lectures from the Chemistry Department. The Lecture includes general and inorganic chemistry for environmental scientists (CAN) and the chemistry practical lab course for environmental scientists. The lecture is supplemented with a tutorial.								
Module Contents	<ul style="list-style-type: none"> • Content description in the context of geoscience. • Fundamental principles of general, inorganic, and physical chemistry • Introduction to working in a chemistry laboratory • Fundamental experimental chemistry techniques 								
Qualification Goals	<p>The Students will:</p> <ul style="list-style-type: none"> • learn the fundamental principles of general, inorganic and physical chemistry • acquire understanding of the important chemical processes occurring in the Earth • master quantitative basic chemical concepts and chemical calculations • learn the basic principles of how to work in a chemistry laboratory, including lab safety. 								
Prerequisites for the allocation of credits/ grades (if necessary weighting)	Course	Type of Lecture	Status	ECTS/Credit hours	Credits	Type of Exam/ Study Requirements	Exam Duration	Grading System	Weighting
	General and Inorganic Chemistry for Environmental Scientists (CAN)	L	c	2	6	WE	60-120	b	1
	Chemistry Practical Course for Environmental Scientists	LC	c	4		SP	-	ng	-
	Chemistry Tutorial	E	op	1	-	-	-	-	-
Availability	BSc Geoscience, BSc Geoecology, BSc Environmental Science								
Participation Prerequis	None								

Module Number: B 108 (Bio 121)	Module Title: Fundamentals of Biology (Structure and Function of Plants and Animals)		Type of Module: BSc Mandatory						
Credits (ECTS)	3								
Workload -Contact Time -Private Study	Workload: 90 hr	Contact Time: 30 hr / 2 Credit Hours	Private Study: 60 hr						
Module Duration Module Coordinator	1 Semester		Foerster, Katharina, Prof. Dr.						
Regular Cycle	Every winter semester								
Language	German								
Teaching/ Learning Techniques	Lecture								
Module Contents	<p>Structure and Function of Plants Lecture: comparative microscopy of the transition from single to multicellular organisms, structural/functional relationships of typical plant cell and tissue types, basic knowledge of the construction and specific performance of typical plant organs and the role they play in regards to ecology.</p> <p>Structure and Function of Animals Lecture: Basics of zoology: the animal cell, tissues, blue prints of animals, development and ontogenesis, metabolism and circulatory systems, signal and information processing, reproduction, behavior, phylogenetic and evolution.</p>								
Qualification Goals	<p>The students will:</p> <ul style="list-style-type: none"> •become familiar with basic principles of the structure of plants and animals in regards to cells, tissues, and organs. •be able to independently determine and assign important animal species 								
Prerequisites for the allocation of credits/ grades (if necessary weighting)	Course	Type of Lecture	Status	ECTS/Credit hours	Credits	Type of Exam/Study Requirement	Exam Duration	Grading System	Weighting
	Structure and Function of Plants	L	c	1	3	K	-	b	1
	Structure and Function of Animals	L	c	1					
Availability	Those in the biology course of study and under certain circumstances those in the environmental science or medicine course of study.								
Participation Prerequisites	Basic Knowledge from Bio101								

Module Number: B 109	Module Title: Introduction to Geoecology		Type of Module: BSc Mandatory						
Credits (ECTS)	3								
Workload -Contact Time -Private Study	Workload: 90 hr		Contact Time: 45 hr / 2 Credit Hours			Private Study: 45 hr			
Module Duration Module Coordinator	1 Semester				Haderlein				
Regular Cycle	Every winter semester								
Language	German								
Teaching/ Learning Techniques	Lecture, seminar and course excursion								
Module Contents	<p>The student will get an initial insight into the important subdiscipline of Geoecology, how it is implemented in the degree program and subject-specific introduction into literature. References to further courses and specializations are given.</p> <ul style="list-style-type: none"> • Defining terminology relevant to Geoecology • Introduction into the Earth's hydro, pedo, and biosphere • Orientation on current and future questions of geoecology • Introduction to working in a seminar form • Illustrations 								
Qualification Goals	<ul style="list-style-type: none"> • Knowledge of basic geoecologic concepts • Knowledge of special terminology • Insight into the characteristics and key processes of the various spheres, their interactions and exchange processes • Research, assessment and citation of scientific publications • Working in a seminar form • Insight into field work 								
Prerequisites for the allocation of credits/ grades (if necessary weighting)	Course	Type of Lecture	Status	ECTS/Credit hours	Credits	Type of Exam/Study Requirement	Exam Duration	Grading System	Weighting
	Introduction to Geoecology	S, FC	c	1	3	R	-	b	1
		L	c	2		-	-	ng	-
Availability	BSc Geoecology								
Participation Prerequisites	None								

Module Number: B 202	Module Title: Mathematics for Environmental Scientists 2		Type of Module: BSc Mandatory						
Credits (ECTS)	3								
Workload -Contact Time -Private Study	Workload: 180 hr			Contact Time: 90 hr / 6 Credit Hours			Private Study: 60 hr		
Module Duration Module Coordinator	1 Semester				Keppeler/Cirpka				
Regular Cycle	Every summer semester (recommended in the 2nd semester)								
Language	German								
Teaching/ Learning Techniques	The Module consists of two imported events in relation to mathematics. The contents of the lectures are complemented with exercises performed in small groups, also in which homework is discussed.								
Module Contents	<ul style="list-style-type: none"> • Integration (continuation from the first semester) • Differential Equations • Eigenvalues and Eigenvectors from matrices, main axis transformation • Multidimensional analysis: Partial, directional and total derivative(s), Taylor's theorem, extreme values, multidimensional integration (path integrals, surface integrals, volume integrals). • Introduction to statistics: descriptive statistics, stochastic basics, inferential statistics (estimations, tests) 								
Qualification Goals	The students will become familiar with the basic methods and principles of higher mathematics. They will use these methods in explicit exercises. They will understand how and why these fundamental methods function and become familiar with the premises of their applicability.								
Prerequisites for the allocation of credits/ grades (if necessary weighting)	Course	Type of Lecture	Status	ECTS/Credit hours	Credits	Type of Exam/Study Requirement	Exam Duration	Grading System	Weighting
	Mathematics for Environmental Scientists 2	L	c	4	2	WE	90	b	1
	Exercises for Mathematics for Environmental	E	c	2	4	A	-	-	-
Availability	BSc Geoecology, BSc Geoscience, BSc Environmental Science								
Participation Prerequisites	None. Mathematics for Environmental Scientists 1 is recommended.								

Module Number: B 109	Module Title: Botany	Type of Module: BSc Mandatory	
Credits (ECTS)	6		
Workload -Contact Time -Private Study	Workload: 180 hr	Contact Time: 60 hr / 4 Credit Hours	Private Study: 120 hr
Module Duration Module Coordinator	1 Semester	Dietz, Sandra, Dr.	
Regular Cycle	Every summer semester		
Language	German		
Teaching/ Learning Techniques	Lecture, practical course, excursion		
Module Contents	<p>Lecture: Blueprints, developmental stages, propagation and reproduction systems of algae, mosses, ferns, seed-bearing plants and fungi. Main chemisms, ecological adaptation and vegetation related aspects of native species, interpretation of the particular examples in phylogenetic context.</p> <p>Practical course: Evolution, morphology and structural diversity of multicellular construction plans with examples of important plant groups. Basics plans of gymnosperms and angiosperms. Structure of the flowering organs and their evolution in local plant families. Construction and development pathways of fungi, including fungal interaction. Exercises to determine plant species in the laboratory and field. Special consideration is given to the relationships between evolution, phylogeny and diversity of species and their respective ecology.</p>		
Qualification Goals	<p>The students will</p> <ul style="list-style-type: none"> • learn the basic principles of botany, their ecology, biodiversity and evolution as well as the reproductive systems and phylogeny of plants and fungi. • learn and characterize the most important plant species. • have a first overview into the local flora and be able to determine unknown species independently. • be able to use microscopes and binoculars to analyze the structure and anatomy of plant and fungi species and represent them graphically. 		

Prerequisites for the allocation of credits/grades (if necessary weighting)	Course	Type of Lecture	Status	ECTS/Credit hours	Credits	Type of Exam/Study Requirement	Exam Duration	Grading System	Weighting
	Lecture	L	c	4	6	WE	-	b	1
	Practical course	LP/FC	c			SP	-	-	-
	Excursion	FC	c			SP	-	-	-
Course achievements include: successful participation in the laboratory course and excursions, and creation of a herbarium									
Availability	Those in the biology course of study and under certain circumstances those in the environmental science or medicine course of study.								
Participation Prerequisites	Bio 101, Bio 121								

Module Number: B 122	Module Title: Zoology	Type of Module: BSc Mandatory	
Credits (ECTS)	6		
Workload -Contact Time -Private Study	Workload: 180 hr	Contact Time: 92 hr / 8 Credit Hours	Private Study: 88 hr / 8 Credit hours
Module Duration Module Coordinator	13 Weeks	Betz	
Regular Cycle	Every second semester		
Language	German		
Teaching/ Learning Techniques	Lecture, practical course, excursion		
Module Contents	<p>Overview of the most important groups of protists and the animal kingdom. The focus being on the organisms' structure and their evolutionary relationship, including the morphology, function, behavior, ecology, and lifecycle of typical representative of the most important taxa. The practical course complementing the main lecture conveys in-depth knowledge of morphological, anatomical, histological or cytological characteristics to exemplary representative of the most important subgroups of the animal kingdom. This is achieved by observing or dissecting living organisms, histological specimens. The basic function of these features are further discussed. Questions on the phylogenetic significance of characteristics on the systematic organization and on the phylogenetic relationships of the groups are discussed on the basis of the theory of phylogenetic systematics. A field course accompanies the module in order for the students to become familiar with the native fauna of the region.</p>		
Qualification Goals	<p>Fundamental knowledge on the organization of the animal kingdom, morphology of the major groups and their relationships in evolutionary context. Scientific illustrations and microscopy, preparation techniques (sections of distributed animal material), translation of the direct view of the object into scientific basic knowledge (scientific illustrations, written answers to given exercises), independent development of teach content (preparatory reading of relevant book chapters), collection techniques and knowledge of form in the field.</p>		

Prerequisites for the allocation of credits/grades (if necessary weighting)	Course	Type of Lecture	Status	ECTS/Credit hours	Credits	Type of Exam/Study Requirement	Exam Duration	Grading System	Weighting
	Lecture	L	c	3	2	WE	80	b	50%
	Practical Course	LP	c	4	3	WE	85	b	50%
	Excursion	FC	c	1	1	SP	-	-	-
Availability	Complementing the botany module, this module provides a fundamental framework of knowledge about the structure, function, ecology and evolution of the animals. Therefore, it is a prerequisite for all other modules in the fields of zoology and animal ecology including parasitological oriented content.								
Participation Prerequisites	Preparatory readings from chapters out of the Kükenthal Zoological Practical Course								

Module Number: GEO 21	Module Title: Soil Science and Geomorphology	Type of Module: BSc Mandatory	
Credits (ECTS)	6		
Workload -Contact Time -Private Study	Workload: 180 hr	Contact Time: 60 hr / 4 Credit Hours	Private Study: 120 hr
Module Duration	1 Semester		
Regular Cycle	Every summer semester		
Language	German		
Group Size	No restriction		
Teaching/ Learning Techniques	Lecture (3 credit hours), tutorial (1 credit hour) Field exercises (2 days)		
Module Contents	<p>GEO 21 teaches physical, chemical and biological fundamentals of pedological processes. Furthermore, the geomorphological context of soil formation and distribution is explained.</p> <ul style="list-style-type: none"> • Lecture: introduction to the three-phase soil, mineral and organic soil constituent system; basics of soil physics, soil chemistry and soil biology; basic features of soil genesis, soil systematics and soil distribution; geomorphological process and forms of different climate. • Tutorial: selected topics of the lecture will be expanded and deepened in the tutorial through means of exercises, training exercises using sample solutions and worksheets. • Field course: Pedological and geomorphological basics are illustrated and discussed on a landscape scale using the model regions: Swabian Alps and Keuperbergland within the Ammer and Neckar valleys, respectively. 		
Qualification Goals	<ul style="list-style-type: none"> • Students will learn basic theoretical principles of soil science and geomorphology and how they are both related to the geocosystem of the Earth. • Students will be able to present and explain essential scientific principles and processes. • Students will be able to apply theoretical knowledge to simple, practice-relevant questions. • Students will independently critically evaluate and develop solutions for assignments; engaging in discussions during the tutorial. • Students will independently read scientific literature (also in English). • Students will create profile sketches of transections to analyze soil and relief properties (during the field exercises) 		
Examination	Assessment: regular practice exercises, 2 day field course (graded through a report) Examination: Written exam		
Availability	Those in the biology course of study and under certain circumstances those in the environmental science or medicine course of study.		
Prerequisites	None		
Module Coordinator	None		
Module Coordinator	Thomas Scholten		
Lecturers	Thomas Scholten, Joachim Eberle		
Literature/ Material	Announced at beginning of course		

Module Number: B 301	Module Title: Groundwater Hydrology		Type of Module: BSc Mandatory						
Credits (ECTS)	6								
Workload -Contact Time -Private Study	Workload: 180 hr		Contact Time: 75 hr / 5 Credit Hours			Private Study: 105 hr			
Module Duration Module Coordinator	1 Semester				Cirpka				
Regular Cycle	Every winter semester (recommended in the 3rd semester)								
Language	German								
Teaching/ Learning Techniques	Lecture with exercises, demo-trials, exercises, group work, homework with presentations								
Module Contents	<p>The module provides an introduction into the subject matter, references and delineation to neighboring disciplines and covers the following topics:</p> <ul style="list-style-type: none"> • Basic principles of hydrogeology (water balance, groundwater resources, aquifer and flow). • Basic principles of the physics of porous media and aquifers (pore space; storage density; water, mass and heat transport). • Basics of groundwater chemistry and groundwater protection (geogenic contents and pollutants). 								
Qualification Goals	<p>The students will have an overview of the working areas, methods, research directions and professional fields of groundwater hydrology as part of the Applied Geoscience. Upon attaining basic knowledge of general groundwater hydrology, a quantitative understanding of basic hydrochemical processes as well as groundwater flow and transport students will be able to understand groundwater systems and master the necessary basics of the corresponding work practice. They also qualify for further education in the field of aquatic and environmental sciences.</p>								
Prerequisites for the allocation of credits/ grades (if necessary weighting)	Course	Type of Lecture	Status	ECTS/Credit hours	Credits	Type of Exam/Study Requirement	Exam Duration	Grading System	Weighting
	Groundwater Hydrology	L	c	3	6	WE	90	b	1
		E	c	2					
Availability	This course is mandatory for BSc Geoscience, BSc Geoecology and BSc Environmental Science								
Participation Prerequisites	None								

Module Number: B 302	Module Title: System Analysis				Type of Module: BSc Mandatory				
Credits (ECTS)	6								
Workload -Contact Time -Private Study	Workload: 180 hr			Contact Time: 75 hr / 5 Credit Hours			Private Study: 105 hr		
Module Duration Module Coordinator	1 Semester				Zarfl				
Regular Cycle	Every winter semester (recommended in the 3rd semester)								
Language	German								
Teaching/ Learning Techniques	Lecture and computer exercises with MatLab								
Module Contents	<ul style="list-style-type: none"> • Introduction into systems theory and model design • Analysis of environmental systems with help from mathematical models, i.e.: compartment models, growth models, balanced equations, reaction kinetics, and oscillating systems. • Simulation and scenario analysis • Model calibration (sensitivity, variations, uncertainty) • Introduction into programming with MatLab (syntax, simple algorithms, and graphical applications) 								
Qualification Goals	The students will be able to independently develop and apply mathematical models to environmental processes. They will also be able to understand model behavior and be able to analyze it critically.								
Prerequisites for the allocation of credits/ grades (if necessary weighting)	Course	Type of Lecture	Status	ECTS/Credit hours	Credits	Type of Exam/Study Requirement	Exam Duration	Grading System	Weighting
	System Analysis	L	c	2	6	WE	90	b	1
		E	c	2					
MatLab	E	c	1						
Availability	This course is mandatory for BSc Geoscience, BSc Geoecology and BSc Environmental Science								
Participation Prerequisites	Mathematics for Environmental Scientists 1 and 2								

Module Number: B 303	Module Title: Geomicrobiology		Type of Module: BSc Mandatory						
Credits (ECTS)	6								
Workload -Contact Time -Private Study	Workload: 90 hr		Contact Time: 45 hr / 3 Credit Hours			Private Study: 45 hr			
Module Duration Module Coordinator	1 Semester			Kappler					
Regular Cycle	Every winter semester (recommended in the 3rd semester)								
Language	German								
Teaching/ Learning Techniques	Lecture								
Module Contents	<ul style="list-style-type: none"> The evolution of the earth, geochemical cycles and surface processes are very closely linked to the development of the biosphere. This module process an introduction into the basics of the biological process and the diversity of organism, focusing on the organisms that interact with both the geosphere and biosphere. The topics covered are the molecular basis of life, geomicrobiological processes, development and classification of living organisms and their geologic significance. 								
Qualification Goals	<p>The students will</p> <ul style="list-style-type: none"> gain an understanding of the basics of biology (biomolecular basics of life, biosynthesis, metabolism, bioenergetics, and theories on the origin of life) be given an overview of the interaction between the biological processes and geology learn about the metabolic diversity and the construction of microorganisms use different methods for cultivating and quantifying microorganisms learn the most important aspects of biogeochemical/element cycles (C, N, S) 								
Prerequisites for the allocation of credits/ grades (if necessary weighting)	Course	Type of Lecture	Status	ECTS/Credit hours	Credits	Type of Exam/Study Requirement	Exam Duration	Grading System	Weighting
		L	c	2	3	WE	90	b	1
		E	c	1	-				
Availability	This course is mandatory for BSc Geoscience, BSc Geoecology and BSc Environmental Science								
Participation Prerequisites	None								

Module Number: B 307	Module Title: Material Cycles				Type of Module: BSc Mandatory				
Credits (ECTS)	6								
Workload -Contact Time -Private Study	Workload: 90 hr			Contact Time: 45 hr / 3 Credit Hours			Private Study: 45 hr		
Module Duration Module Coordinator	1 Semester				Zwiener				
Regular Cycle	Every winter semester (recommended in the 3rd semester)								
Language	German								
Teaching/ Learning Techniques	The module uses lectures with accompanying tutorials for practical application and deepening of the theory								
Module Contents	<p>The module deals with the fundamentals of the elemental cycles and their dynamics in different environmental compartments with the following sub-areas:</p> <ul style="list-style-type: none"> • balances, scales, and parameters • Global cycles of elements such as C, N, O, P and S • Global and regional cycles of selected trace elements • Fugacity models 								
Qualification Goals	<p>The students will</p> <ul style="list-style-type: none"> • learn and understand the basic processes that are responsible for governing the elemental cycles • learn the issues and problems of substance distribution at a global and regional scale • will be capable of describing and analyzing the distribution of substances 								
Prerequisites for the allocation of credits/ grades (if necessary weighting)	Course	Type of Lecture	Status	ECTS/Credit hours	Credits	Type of Exam/Study Requirement	Exam Duration	Grading System	Weighting
		E	c	1	1				
Availability	This course is mandatory for BSc Geoscience, BSc Geoecology and BSc Environmental Science								
Participation Prerequisites	Basic knowledge in chemistry and physical chemistry, which can be acquired through the modules Chemistry 1 and Physical Chemistry for Environmental Scientists								

Module Number: B 308	Module Title: Chemistry 2 (Organic Chemistry)		Type of Module: BSc Mandatory						
Credits (ECTS)	6								
Workload -Contact Time -Private Study	Workload: 180 hr			Contact Time: 90 hr / 6 Credit Hours			Private Study: 90 hr		
Module Duration Module Coordinator	1 Semester				Zwiener				
Regular Cycle	Every winter semester (recommended in the 3rd semester)								
Language	German								
Teaching/ Learning Techniques	The module consists of two imported lectures from the Department of Chemistry. The lecture Organic Chemistry for Environmental Scientists (OCN) and the Chemistry								
Module Contents	The module will provide knowledge in the chemistry of important classes of synthetic and natural organic compounds as well as their reaction mechanisms								
Qualification Goals	<ul style="list-style-type: none"> • Knowledge of the nomenclature and properties of functional groups and organic compound classes • Understanding the relationships between structure and reactivity of organic compounds as well as important reaction mechanisms • Knowledge of the structure, function and role of important natural products and biomolecules • Familiarity with and use of experimental and instrumental working techniques of organic chemistry 								
Prerequisites for the allocation of credits/ grades (if necessary weighting)	Course	Type of Lecture	Status	ECTS/Credit hours	Credits	Type of Exam/Study Requirement	Exam Duration	Grading System	Weighting
	Organic Chemistry for Environmental Scientists	L	c	2	6	WE	60-120	b	1
	Chemistry Practical Course for Chemistry 2	LP	c	4		SP	-	ng	-
	Tutorial for the lecture: Chemistry 2	E	op	1		-	-	-	-
Availability	This course is mandatory for BSc Geoecology and BSc Environmental Science								
Participation Prerequisites	Chemistry 1								

Module Number: B 309	Module Title: Chemistry 3 (Analytical Chemistry 3 for Geoecologists and Environmental Scientists)		Type of Module: BSc Mandatory						
Credits (ECTS)	3								
Workload -Contact Time -Private Study	Workload: 90 hr		Contact Time: 45 hr / 3 Credit Hours			Private Study: 45 hr			
Module Duration Module Coordinator	1 Semester				Zwiener				
Regular Cycle	Every winter semester (recommended in the 3rd semester)								
Language	German								
Teaching/ Learning Techniques	The module consists of a lecture accompanied by exercises and a laboratory practical course								
Module Contents	The module proved theoretical and practical basics in analytical chemistry and the teaches the evaluation of measurement data for those in the fields of water and environmental analytical chemistry.								
Qualification Goals	Students will learn and apply the basic analytical and statistical terms. They will become familiar with the most important statistical methods for the evaluation of analytical procedures (including hypothesis tests and ANOVA, quantitative analysis). They will understand the basic structure of analytical process, samples, as well as enrichment, separation and detection methods of environmentally relevant compounds with particular emphasis on chromatography and mass spectrometry, mass spectrometry and thermal methods, and spectroscopy. They will also gain experience in the practical application of important analytical methods and evaluation methods.								
Prerequisites for the allocation of credits/ grades (if necessary weighting)	Course	Type of Lecture	Status	ECTS/Credit hours	Credits	Type of Exam/Study Requirement	Exam Duration	Grading System	Weighting
	Chemistry 3 (Analytical Chemistry 3 for Geoecologists and Environmental Scientists)	L	c	1	1	WE	90	b	0.6
		E	c	1		A	-	b	0.1
		LC	c	1		LP	-	b	0.3
Availability	This course is mandatory for BSc Geoecology and BSc Environmental Science								
Participation Prerequisites	Chemistry 1 and Chemistry 2								

Module Number: B 409	Module Title: Biogeochemistry		Type of Module: BSc Mandatory						
Credits (ECTS)	6								
Workload -Contact Time -Private Study	Workload: 180 hr			Contact Time: 90 hr / 6 Credit Hours			Private Study: 90 hr		
Module Duration Module Coordinator	1 Semester				Haderlein				
Regular Cycle	Every summer semester (recommended in the 4th semester)								
Language	German								
Teaching/ Learning Techniques	Lecture, exercises, seminar, group work, excursions followed by laboratory work								
Module Contents	<p>The module provides a foundation in chemical and thermodynamics for quantitative understanding of biogeochemical processes in aquatic and terrestrial systems as well as an insight into the corresponding natural process in the field.</p> <ul style="list-style-type: none"> • The lecture "Biogeochemistry" pertains to the topics: speciation of metals, redox chemistry, properties and significance of NOM and reactive minerals, and biogeochemical environments (1.5 ECTS) • Lecture exercises (0.5 ECTS) • Excursions involving hydrology and limnology (2 x 1 day) • Seminar (2 x 1/2 day) • Laboratory field course (2 x 1 day) 								
Qualification Goals	<p>The students will</p> <ul style="list-style-type: none"> • develop an understanding of the thermodynamic and chemical principles for biogeochemical processes • gain knowledge on relevant processes in natural and technical systems (wastewater treatment plants, contaminated sites) and be able to describe them quantitatively and predict equilibrium conditions • be able to discuss field and laboratory findings/results regarding biogeochemical processes in aquatic ecosystems. • write protocols and reports <p>In addition to acquiring the necessary theoretical foundation, the module aims to apply particular methods in regards to implementing practical competencies within the framework of a project on the topic of biogeochemistry.</p>								
Prerequisites for the allocation of credits/ grades (if necessary weighting)	Course	Type of Lecture	Status	ECTS/Credit hours	Credits	Type of Exam/Study Requirement	Exam Duration	Grading System	Weighting
	Biogeochemistry	L	c	1.5	3	WE	-	b	0.6
		E	c	0.5		A	-		
		S	c	1	1	SP	-	-	
		FC	c	2	2	A	-	b	0.4
LC	c	A	-						
Availability	This course is mandatory for BSc Geoecology and BSc Environmental Science								
Participation Prerequisites	Chemistry 1, Chemistry 2, Groundwater Hydrology, and Geomicrobiology								

Module Number: B 411	Module Title: Geoecology Field Course				Type of Module: BSc Mandatory				
Credits (ECTS)	6								
Workload -Contact Time -Private Study	Workload: 180 hr			Contact Time: 100 hr / 6 Credit Hours			Private Study: 80 hr		
Module Duration Module Coordinator	1 Semester				Junginger				
Regular Cycle	Every summer semester and during the semester break after the 2nd semester								
Language	German								
Teaching/ Learning Techniques	Field Course								
Module Contents	The module consists of an orientation followed by field work. Analysis of geological, pedological and vegetation-related facts and contexts in the field. Observation, recognition, interpretation and presentation of the interactions between the biosphere and the geosphere. Recording of geological data in the field, creating thematic maps. There will be excursion days which will consist of an 11-day field excursion (as a block course during the semester break) and 2 individual excursion days in the immediate vicinity of Tübingen during the summer semester on Fridays.								
Qualification Goals	The students will gain and develop knowledge and practical experience in: <ul style="list-style-type: none"> • geoecological terrain methods • data collection and interpretation techniques • processing of space-related data • Analysis of geoecological relationships using various case studies 								
Prerequisites for the allocation of credits/ grades (if necessary weighting)	Course	Type of Lecture	Status	ECTS/Credit hours	Credits	Type of Exam/Study Requirement	Exam Duration	Grading System	Weighting
	Geoecology Field Course and 2 Day Block Course Excursions	FC	c	6	6	A	-	b	1.0
Availability	This course is mandatory for BSc Geoecology								
Participation Prerequisites	Earth Dynamics, Botany, Soil Science and Geomorphology.								

Module Number: B 413	Module Title: Ecology and Biodiversity for Geoecologists	Type of Module: BSc Mandatory	
Credits (ECTS)	9		
Workload -Contact Time -Private Study	Workload: 270 hr	Contact Time: 90 hr / 6 Credit Hours	Private Study: 180 hr
Module Duration Module Coordinator	1 Semester	Köhler	
Regular Cycle	Every summer semester		
Language	German		
Teaching/Learning Techniques	<p>Four Lectures</p> <ul style="list-style-type: none"> • Evolutionary Biology (3 hours x 6 weeks) • Ecology (3 hours x 6 weeks) • Physiological Ecology and Systems Ecology of Animals (3 hours x 6 weeks) • Scientific Principles of Nature and Species Preservation (2 hours x 6 weeks) <p>Examinations</p> <ol style="list-style-type: none"> 1. For lectures 1-2 at the end of the first summer semester break 2. For lecture 3-4 at the end of the second summer semester break 		
Module Contents	<p>This module consists of lectures of the module Ecology and Biodiversity 1 and 2 for biologists. The module teaches foundations of ecology and evolutionary biology and dynamics of biodiversity as well as the importance of interactions between organisms.</p> <p>Lectures</p> <p>Evolutionary Biology</p> <ul style="list-style-type: none"> • evolutionary factors • coevolution • parasite-host interactions • sexuality • genetic conflicts <p>Ecology</p> <ul style="list-style-type: none"> • population ecology • species interactions • community ecology • biodiversity <p>Physiological Ecology</p> <ul style="list-style-type: none"> • Introductions into the physiological ecology of animals • terrestrial habitats • still water habitats • flowing water habitats • marine habitats <p>Scientific Principles of Nature and Species Protection</p> <ul style="list-style-type: none"> • External and internal threats to species and ecosystems • scientific analysis of management measures in nature conservation • current problems in nature and species protection: climate change, agricultural practices, natural resource depletion, invasive species • theoretical foundations of nature conservation: island biogeography, meta-populations, population principles • design of nature reserves 		

Qualification Goals	<p>The students will</p> <ul style="list-style-type: none"> • understand the foundation and principles of biodiversity and recognize the importance of interactions between organisms • gain insight into the general ecological principles and be able to assess their relevance to nature conservation • learn to enumerate general physiological adaptation mechanisms of organisms and interpret them under an environmentally relevant context • understand the ecological processes in soil and limnic systems and apply these theories to other habitats • understand the basics of population genetics as the basis for evolution/biodiversity and can draw conclusions based on this knowledge 									
Prerequisites for the allocation of credits/grades (if necessary weighting)	Course	Type of Lecture	Status	ECTS/Credit hours	Credits	Type of Exam/Study Requirement	Exam Duration	Grading System	Weighting	
	Evolutionary Biology/Ecology	L	c	3	4.5	WE	120	b	0.5	
	Physiological Ecology and Systems Ecology of Animals/Scientific Principles of Nature and Species Protection	L	c	3	4.5	WE	180	b	0.5	
Availability	<p>This module builds on the knowledge acquired from the Zoology and Botany modules. It provides a significant contribution to the understand of ecologically oriented building modules. In its illustrated form, the module is not the subject of other courses of study. However, the lectures attended are part of other modules from other programs (Biology).</p>									
Participation Prerequisites	<p>No specific prerequisites, but Zoology and Botany are recommended</p>									

Module Number: GEO 41	Module Title: Soil Science and Geoecology	Type of Module: BSc Mandatory	
Credits (ECTS)	6		
Workload -Contact Time -Private Study	Workload: 180 hr	Contact Time: 90 hr / 6 Credit Hours	Private Study: 90 hr
Module Duration	1 Semester		
Regular Cycle	Every summer semester		
Language	German		
Teaching/Learning Techniques	Lecture (2 ECTS), Field course, laboratory practical course, statistics exercises (altogether 4 ECTS)		
Module Contents	<p>Based on the module "Soil Science and Geomorphology" (GEO 21), the students will deepen their knowledge in soil science, geochemistry and geoecology, focusing on both classical and modern analytical and methodological technique. Laboratory, field and GIS works will be used for practical applications.</p> <ul style="list-style-type: none"> • Lecture: introduction to large-scale analytics, CFA, RFA, XRD, elemental analysis, clay minerals, soil texture, soil carbon, mineralized nitrogen, bioavailable phosphate, sorption and acidity, buffer and redox systems, heavy metals, and micromorphology. • Field Course: soil profile assessment, sampling procedures • Laboratory practical course: carrying out individual analysis, demonstrating further measuring technology and methods. • Statistics exercises: descriptive statistics with MS-Excel and R 		
Qualification Goals	<p>The students will</p> <ul style="list-style-type: none"> • become familiar with the fundamental scientific principles of soil science and geoecology and the methods of analysis used within the fields. • be able to analyze soils in the laboratory and in the field as well as to assess soil data using statistical methods and geographic information systems (GIS) • be able to assess soil chemistry-mineralogy analysis results and perform landscape mapping and further laboratory analysis • be able to perform functional process and mechanistic analyses, taking into consideration both spatial and temporal variations and scales • be able to analyze environmental questions, develop solutions independently, and present the results from a scientific point of view under defined time conditions • be able to understand and think critically on English-language scholarly literature • become familiar with the practical implementation of laboratory protocols and analyzes 		
Examination	Written report (100%)		
Availability	BSc Geography, BSc Geoecology		
Participation Prerequisites	Successful completion of GEO 21 or successful completion of two modules area of Physical Geography, Geoecology, Geoscience, Biology or Soil Science		
Module Coordinator	Thomas Scholten		
Lecturers	Thomas Scholten, Yvonne Oelmann, heifer Taubald, Peter Kühn		
Literature/Material	Provided at beginning of course		