

M.Sc. BIODIVERSITY, ECOLOGY AND EVOLUTION



UNIVERSITÄT GREIFSWALD
Wissen lockt. Seit 1456

Study program structure

- Basic module B1: Basics of Biodiversity, Ecology & Evolution
- Basic module B2: Research and Collection Management
- Basic module B3: Research Internship
- Basic module B4: Personal profiling
- 10 Elective modules: +/- free choice out of more than 40 modules
- International Excursion and/or optional stay abroad with the Mobility Module
- Master thesis & defense

Subject

- Research-oriented Master's program in Biodiversity, Ecology and Evolution
- open to qualified graduates of life science programs

BSc. Biologie
 BSc. Biowissenschaften
 BSc. Biodiversität und Ökologie
 BSc. BioGeowissenschaften
 BSc. Biologische Diversität und Ökologie
 BSc. Biological Sciences
 BSc. BioGeoAnalyse
 BSc. Geoökologie
 BSc. Landschaftsökologie und Naturschutz

BSc. Landschaftsökologie
 BSc. Landschaftsnutzung und Naturschutz
 BSc. Life Science
 BSc. Naturschutzbiologie
 BSc. Naturschutz und Landschaftsplanung
 BSc. Molecular Life Science
 BSc. Ökologie und Umweltschutz
 BSc. Umweltbiowissenschaften
 BSc. Umweltwissenschaften

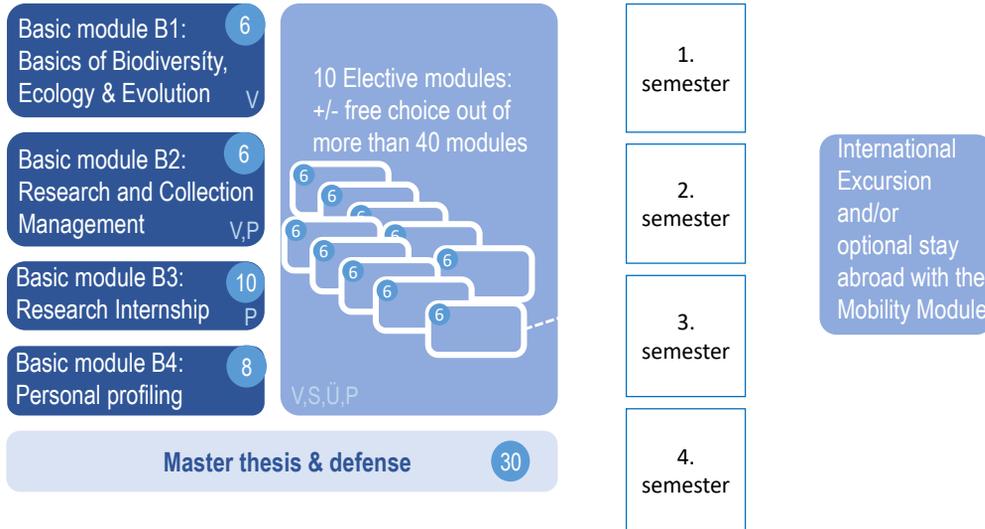
Subject

- Research-oriented Master's program in Biodiversity, Ecology and Evolution
- open to qualified graduates of life science programs
- Aim: Specialist knowledge in the fields of: Biodiversity, Ecology, Evolution, Morphology, Nature Conservation, Behavior, Microbiology and Physiology
- Special emphasis on methodological & conceptual aspects



Career prospects

- Science:
universities, universities of applied sciences, research institutes,
further qualification with a doctorate is possible after graduation
- Governmental sector:
environmental authorities, water management offices, political
consulting, museums, botanical and zoological gardens
- Economic sector:
expert and planning offices, plant protection and food industry

**Aims:**

Knowledge and competence in ...

- Biodiversity, Ecology, Morphology, Phylogeny, Behavior and Physiology
- Theoretical concepts and central experimental approaches
- Development of experimental designs, conduction of adequate statistical analyses
- Interpreting data, scientific literature: reading, writing, insights

→ scheduled as **2-week block course**
at the start of the first semester

Basic Module B1 - Summer Semester 2024 version 2.3 <small>(2024.02.04)</small>											
SoSe	1. week					2. week					
	08.04.2024	09.04.2024	10.04.2024	11.04.2024	12.04.2024	15.04.2024	16.04.2024	17.04.2024	18.04.2024	19.04.2024	
	Mon	Tue	Wed	Thu	Fri	Mon	Tue	Wed	Thu	Fri	
14:15	Wacker: Introduction, Basics in Ecology all lectures in Seminar Room 232, Soldmannstr. 23	Lehmann: Environmental Physiology and Adaptation to Environmental Changes	Uhl: Evolution, Natural and Sexual Selection	Uhl: Fitness, Phenotypic Plasticity, Heritability	Kerth: Conservation Behaviour	14:15	Haase: Molecular Phylogenetics	Michalik: Evolutionary Morphology	van Schaik: Conservation Genetics & Behavioural Biology	Wacker: Population Ecology	Wacker: Biodiversity & Synecology -& final remarks
15:00						15:00					
16:00		Ehrnsten: Marine Ecosystem Ecology		Harzsch: Ecological Developmental Biology and Epigenetics		16:00					
17:00						17:00		--- 17:00 Zoological Colloquium			
										Note: Reserve the following date for an essential progress test ??? May, 31 14:00 - 17:00	

→ scheduled as **2-week block course**
at the start of the first semester

Basic module B1: **6**
Basics of Biodiversity,
Ecology & Evolution

Basic module B2: **6**
Research and Collection
Management

Basic module B3: **10**
Research Internship

Basic module B4: **8**
Personal profiling

**Only in winter
semester,
always
Wednesday:**

Lecture „Biodiversity, Ecology and Physiology, Evolution, Morphology and Phylogeny”

- Introduction to population ecology & synecology
- Introduction to conservation ecology, conservation genetics & behavioural biology
- Environmental physiology, physiological of sensory information and adaptation to environmental change
- Evolution, natural and sexual selection, fitness, phenotypical plasticity, heritability
- Backbones of morphology
- Molecular phylogenetics

Lecture & Exercises „Experimental Design & Analysis ”

- Experimental designs such as block designs, split plot designs, coordinated distributed experiments, gradient experiments
- ANOVA and regression analyses in linear and mixed models

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Aims: Competent knowledge

- Collecting, managing study organisms, obtaining research data addressing the following :
 - Permits needed to collect and use study organisms
 - Ethical regulations
 - Storing and labelling
 - Documentation and digitization
 - Requirements for morphological, molecular and behavioral studies
 - Basic knowledge in collection-based techniques and data management

→ scheduled for the summer semester !

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Lecture/Exercises: „Basic Principles in Research and Collection Management“

Theoretical

- collecting of study organisms: permits (collection, import/export), sampling methods and its impacts, quantities
- access – benefit sharing for collected material: basics of Nagoya regulations and how to apply for permits
- ethics involved in using collected organisms | animal welfare for laboratory experiments
- voucher management: short- and long-term storage, labelling (e.g. what information needs to be on a scientific label), digitization of vouchers (introduction in collection management software and metadata, introduction into georeferencing, introduction into imaging of specimens)
- E-Lab: Documenting and managing laboratory experiments
- DNA-analyses, management of sequence data, tissue storage, etc
- Museum: collection types, outreach
- Citizen science

Practical

- Voucher management | Natural History collections in Greifswald and Stralsund: Imaging of different types of organisms, Introduction into the Database for voucher management
- E-Lab and its implementation in laboratory experiments
- Animal welfare: applications for lab- and field-based research
- Outreach: excursion to the German Oceanographic Museum (Meeresmuseum) Stralsund

Lecture: „Scientific Approaches to Knowledge“

Acquisition of knowledge, data interpretation, literature search, publication process, scientific writing and presenting



Scientific Approaches to Knowledge

Zoologisches Institut und Museum Greifswald

takes place Mondays, 8:15-9:00 am

(Zoological Institute and Museum, HS Zoologie/Botanik, Loitzer Straße 26)

Date	Topic	Lecturer
15.04.2024	Historical fundamentals of science	Prof. Dr. Michael Schmitt
22.04.2024	Hypothetico-Deductivism	Prof. Dr. Michael Schmitt
29.04.2024	Ways to acquire knowledge	Prof. Dr. Michael Schmitt
06.05.2024	Practicing statistics 1: Basics of experimental design	Prof. Dr. Gabriele Uhl
13.05.2024	Practicing statistics 2: R: Data inspection and visualisation	Dr. Andreas Fischer
27.05.2024	Practicing statistics 3: R. How to pick the correct test	Dr. Alexander Scheuerlein
03.06.2024	Practicing statistics 4: R. Useful tests	Dr. Alexander Scheuerlein
10.06.2024	Practicing statistics 5: R. GLMs	Dr. Alexander Scheuerlein
17.06.2024	Scientific writing	Prof. Dr. Alexander Wacker
24.06.2024	How to conclude (e.g., by analogy): limits and risks	Prof. Dr. Gerald Kerth
01.07.2024	Publishing in science, bibliometrics	Prof. Dr. Steffen Harzsch
08.07.2024	Animals as study object: ethics and legal questions	PD Dr. Christian Müller

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Aims:

Advanced knowledge

- ... with regard to a concrete case study/research task
- ... and skills for independent scientific working, writing

including:

- Designing a study to solve a given task
- Introduction to the study of literature
- Independent implementation of a research project of limited scope
- Evaluation, presentation, discussion, writing of own results

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Possible courses for your personal profiling

- Visit of the colloquium series of the Department of Biology, e.g. "Planet Earth 3.0" or the Summer Colloquium of the Institute of Zoology
- Courses in:
 - scientific writing, presentation, and rhetoric
 - science management
 - statistics
 - law (e.g. environmental law)
 - nature conservation economics
 - nature ethics
 - sustainability
- Nature conservation internships, internships abroad in the life sciences
- Attendance of national/international scientific workshops/conferences
- Courses from the BSc Biology, BSc or MSc Landscape Ecology of the University Greifswald, thematically related to the MSc Biodiversity, Ecology and Evolution
- Language courses in the major world languages (English, French, Spanish, Chinese) please see Language centre: <https://sprachzentrum.uni-greifswald.de/en/>

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Personal profiling

10 Elective modules:
+/- free choice out of
more than 40 modules

V,S,Ü,P

1.
semester

2.
semester

3.
semester

4.
semester

International
Excursion
and/or
optional stay
abroad with the
Mobility Module

Master thesis & defense 30

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10 Elective modules:
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 more than 40 modules

Σ 60

 V,S,Ü,P

Master thesis & defense 30

Knowledge in the following fields is imparted:

- Ecological field and laboratory methods
- Recording and analysis of biodiversity
- Modelling, GIS analyses
- Behavioral analysis, telemetry
- Morphological analyses (histology, TEM, REM, µCT, CLSM)
- Phylogenetic analyses
- Population Genetics
- Environmental analytical methods (HPLC, GC, GC-MS)
- Microbiological analyses, immunology
- Quantitative and molecular genetics
- Protein biochemical analyses
- Database Management
- Statistical analyses

Elective Modules	Type	Sem
International Excursion	1 E	SoSe/ WiSe
Mobility Module		SoSe/ WiSe
Microbiomes and biodiversity 1: Lectures	3 V	WiSe
Microbiomes and biodiversity 2: Seminar and Lab Course	1 S, 1 P	SoSe
Botanical Species		
Conservation 1: Lecture and Seminar	1 V, 1 S	SoSe
Botanical Species		
Conservation 2: Lecture and Field Experiment	1 V, 1 P	SoSe
Conservation Genetics of Plants 1: Lecture and Seminar	1 V, 1 S	SoSe
Conservation Genetics of Plants 2: Lecture and Lab Course	1 V, 1 P	SoSe
Conservation and Behaviour 1: Lecture and Seminar	1 V, 1 of 2 S	SoSe
Conservation and Behaviour 2: Exercise	1 Ü	SoSe
Conservation Genetics 1: Lecture and Seminar	1 V, 1 of 2 S	WiSe
Conservation Genetics 2: Exercise	1 Ü	WiSe
Sustainability	2 S	SoSe

Aquatic and Marine Microbiology 1: Basics	2 V, 1 S, 1 Ü	WiSe
Aquatic and Marine Microbiology 2: Advanced	2 V, 1 S	SoSe
Aquatic and Marine Microbiology 3: Practical	1 P	SoSe
Microbial Ecology 1: Microbial Processes, Energy Fluxes and Elemental Cycles	1 V	WiSe
Microbial Ecology 2: Microbial biodiversity, interactions and molecular ecology	2 V	SoSe
Theoretical Ecology	1 V	WiSe
Experimental Animal Ecology	1 V/S, 1 Ü	WiSe
Functional Animal Ecology 1: Lecture and Seminar	1 V, 1 S	SoSe
Functional Animal Ecology 2: Exercises	1 Ü	SoSe
Experimental Plant Ecology	1 Ü, 1 S	WiSe
Evolutionary Ecology 1: Lecture and Exercise	1 V/S, 1 Ü	SoSe
Evolutionary Ecology 2: Exercises	2 Ü	SoSe
Vegetation Ecology 1: Lecture and Seminar	1 V/Ü, 1 S	WiSe
Vegetation Ecology 2: Case Study	1 P	SoSe
Ornithology 1: Lecture and Seminar	1 V, 1 P	SoSe
Ornithology 2: Exercise	1 Ü	SoSe

Climate Change	1 V, 1 S	SoSe
Dendrochronology	1 P	SoSe/ WiSe
General and Applied Aquatic Ecology	2 V, 1 S	WiSe
Aquatic Ecology – Summer course	1 P	SoSe
Remote Sensing	1 V/Ü	WiSe
Applied Remote Sensing/Geoinformation Science with field work	1 P	SoSe
Evolutionary Morphology	1 V, 1 S	WiSe
Making the invisible visible – Introduction to imaging methods	1 V, 1 Ü	WiSe
Molecular Phylogenetics 1: Theory	1 V/Ü, 1 S	SoSe/ WiSe
Molecular Phylogenetics 2: Practice	2 Ü	SoSe
Animal Physiology 1: Lecture and Seminar	1 V, 1 S	SoSe
Animal Physiology 2: Lab Course	1 P	WiSe
Plant Stress Physiology: Lecture and Seminar	2 V, 1 S	WiSe
Experimental Plant Stress Physiology	1 P, 1 S	WiSe
Parasitology 1: Lecture and Seminar	1 V, 1 S	SoSe
Parasitology 2: Lab Course	1 P	SoSe

V: lecture, S: seminar, Ü: exercise, P: practical, E: excursion

Sum: 60 ETCS