Modulhandbuch Masterstudiengang Paleontology

Version: 25.06.2025

Obligatory Modules

Pflichtmodule

Stand: 25.06.2025

Modul: Geowissenschaftlich-Paläontologische Forschung

Module: Geoscientific-paleontological research

Modulnr./-code: MP 01

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	This compulsory module requires students to present and discuss their Bachelor's thesis findings in a 15-minute seminar talk during the first semester. In addition, active participation in five geoscientific or biological research colloquia is mandatory. Students must also submit a 6 to10-page report on a chosen colloquium topic. The module concludes in the fourth semester with a 15-minute presentation by students on the progress and initial results of their Master's thesis.
Learning outcomes	At the beginning of the Master's program, this module offers the opportunity to get to know the various paleontological disciplines. The first-year students become familiar with the subject areas and scientific standards of the MSc program through the presentations of the Master's theses of future graduates. The independent literature research, in-depth study and early presentation of current palaeontological, geoscientific and biological topics also introduces students to current research and modern presentation techniques. Prospective graduates learn to present and discuss scientific papers in a scientifically sound manner. Participation in the public colloquium lectures in the geosciences and biosciences familiarizes participants with new research work.

2. Teaching and learning methods

Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
K	Bachelor's thesis presentation	dt/en	70	2	60
K	Geoscientific or Biological research colloquium	dt/en	70	2	60
K	Master's thesis presentation	dt/en	70	2	60

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

Study program	compulsory/ elective	Semester
M.Sc. Paleontology	compulsory	1 o. 4

5. Requirements for the award of credits (ECTS) / 6. ECTS-LP

Required achievements	-	
Assessment (incl. weighting) and examination language	Oral presentation – Bachelor's thesis (dt/en) Oral presentation – Master's thesis (dt/en)	3 3

7. Frequency				8. Workload	9. Duration
Winter semester	☐	Winter- and Summer semester	☒	180 h	2 Semester
Summer semester	☐				

Module coordination

Teacher	Prof. Dr. Martin Langer
Module coordinator	Prof. Dr. Martin Langer
Institute/Department	BIOB

Further information

Modul: Geowissenschaftlich-paläontologische Geländearbeiten

Module: Paleontological and Geological Field Work

Modulnr./-code: M 02

UNIVERSITÄT BONN

1. Content and intended learning outcomes	
Content	Field work and excursions are a fixed component of the MSc Paleontology program. The paleontological-geological field trips lead to various regions and take place during the lecture-free period. **Major Excursion:** Before the 10-day excursion, students receive detailed information about the excursion areas, the rocks, fossils, and geological structures found there. Participants are encouraged to familiarize themselves with relevant specialist literature. The preparation or follow-up for the excursion includes a topic-related seminar and/or the creation of a detailed excursion report. The excursion protocols are independently structured, compiled, and designed by the participants.
Learning outcomes	From the second Master's semester onwards, students take part in a major 10-day geoscientific field event (excursion) with the aim of learning about challenging paleontological and geoscientific issues and discussing the resulting questions. Under the guidance of the lecturers, excursion points, museums and outcrops are visited and discussed. Students learn how to apply and deepen the theoretical knowledge acquired in lectures and seminars directly in the field and how to search for, recover and provisionally identify fossils. Students acquire the ability to classify the diversity of fossil life and the significance of fossils for the understanding of evolution and earth history in their spatial and temporal context. In palaeontology, this is a central qualification for research and the profession, which is deepened in this way in the compulsory area.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	GÜ	Field trip	dt	5 x 20	5	120
	S	Field work	dt	5 x 20	2	60

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	compulsory	1., 2. o. 3.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	
Assessment (incl. weighting) and examination language	Field trip report (en) Seminar talk (ent)	3 3

7. Frequency		8. Workload	9. Duration
Winter semester ☐ Summer semester ☐	Winter- and Summer semester ☒	180 h	1 Semester

Module coordination	
Teacher	All lecturers
Module coordinator	Prof. Dr. Martin Langer, Prof. Dr. Thomas Martin
Institute/Department	BIOB

Further information	
Literature	Will be provided before the start of the module.

Modul: Paläontologische Projektarbeit

Module: Paleontological project work

Modulnr./-code: MP 08

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1. Content and intended learning outcomes

Content	Preparation of a detailed exposé for the Master's thesis ioncluding the formulation of a research question or problem, explanations of the current state of research, a concept for the thesis with a timetable and an initial bibliography. In the exposé for the Master's thesis, students should formulate clear research questions and critically examine the current state of research. They should also define the objectives of the thesis, select suitable methods and structure the thesis logically. A realistic timetable for all work phases is just as important as compiling a correct bibliography. Finally, the entire research project must be presented concisely and convincingly in scientific language.
Learning outcomes	The preparation of a detailed Exposé for a Master's thesis is a crucial step in the research process. It serves as a roadmap for the entire thesis and shows that students are able to plan and carry out a scientific project independently.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	P	Exposé: Written Report	en./dt	-	6	180

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paläontologie	compulsory	4. Semester
	OEP Biology	elective	4. Semester

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	6
Assessment (incl. weighting) and examination language	Written report (Exposé) (en).	

7. Frequency		8. Workload	9. Duration
Winter semester ☐ Summer semester ☐	Winter- and Summer semester ☒	180 h	1 Semester

Module coordination

Teacher	All lecturers
Module coordinator	Prof. Dr. Martin Langer, Prof. Dr. Thomas Martin
Institute/Department	BIOB

Further information

Literature	Will be provided before the start of the Master’s thesis.

Modul: Masterarbeit
Module: Master's Thesis
Modulnr./-code: MP 09

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1. Content and intended learning outcomes	
Content	The topics for the Master's thesis can be assigned from the middle of the 3rd semester and have a maximum processing time of eight months. A one-page work concept is submitted with the application. Once the application has been approved, the research question is worked on in accordance with the concept and a result is achieved. The content of the Master's thesis may include paleontological questions and investigation methods in connection with sampling and analysis of fossil and Recent organisms, field surveys, processing of fossil sites, computer-aided modeling of paleobiological processes etc.
Learning outcomes	Students should work independently on a paleontological question, taking into account the current state of research, and write up and publicly present the results in accordance with the requirements of natural science.

2. Teaching and learning methods

	LV-Art	Topic	Language of instruction	Gruppen-größe	SWS	Workload [h]
	AS	Master's thesis	En/dt	n/a	n/a	900

3. Prerequisites for the module	
compulsory	60 CP from modules of first three semesters (1-3)
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Fachsemester
	M.Sc. Paleontology	compulsory	4. Semester

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	30
Assessment (incl. weighting) and examination language	Masterarbeit (dt/en)	

7. Frequency		8. Workload	9. Duration
Winter semester ☐ Summer semester ☐	Winter- and Summer semester ☒	900 h	1 Semester

Module coordination	
Teacher	All Professors/Lecturers in Paleontology
Module coordinator	Prof. Dr. Thomas Martin, Prof. Dr. Martin Langer
Institute/Department	BIOB/Paleontology

Further information	

Elective Modules (Paleontology)

Wahlpflichtmodule (Paläontologie)

Stand: 25.06.2025

Modul: Praktische Berufserfahrung
Module: Practical work experience
Modulnr./-code: MP 03

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	The work placement is carried out in paleontological non-university research institutions. The students then prepare a report and present their experiences in a seminar. Internship report: The report (8-10 pages) can be submitted to all lecturers and must include the following points: - paleontolical fields of activity of the internship provider - Own activities during the internship - Reference to own studies - Career prospects and market situation in this field of activity - Conclusion (positive/negative) The report is evaluated according to content and formal criteria. The activity during the internship, documented by the certificate, is not assessed. Presentation: The internship is presented to younger semesters in presentations (15 minutes) followed by a discussion. The assessment is carried out by the lecturer. Abstract: A one-page abstract is filed in eCampus.
Learning outcomes	To become familiar with the implementation of theoretical knowledge in the working world, work processes and paleontological issues in a non-university (e.g., museum) environment.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	P	Internship (4 weeks)	en/dt	-	-	90
	S	Oral report research seminar	en/dt		2	90

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	compulsory	1., 2. o. 3. Semester
	OEP Biology	elective	1., 2. o. 3. Semester

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	Minimum 4 weeks paleontological internship; Oral report (en/dt)	6
Assessment (incl. Weighting) and examination language	Written report (en/dt)	

7. Frequency		8. Workload	9. Duration
Winter semester ☐ Summer semester ☐	Winter- and Summer semester ☒	180 h	1 Semester

Module coordination

Teacher	All lecturers
Module coordinator	Prof. Dr. Thomas Martin, Prof. Dr. Martin Langer
Institute/Department	BIOB

Further information

Modul: Wirbeltierpaläontologie I

Module: Vertebrate paleontology I

Modulnr./-code: MP 10

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	Theoretical background of the evolutionary history of the vertebrates. Occurrence of major vertebrate groups in time and space, historical biogeography and dispersal. Phylogeny of major clades of vertebrates, presentation of competing hypotheses. Functional morphology and adaptation. Practical course in comparative osteology of the tetrapods with fossil and Recent material. Discussion of the phylogenetic background and functional adaptations that can be recognized from the analysis of the skeleton. Drawing and labelling of selected specimens.
Learning outcomes	General understanding of the evolutionary history, phylogeny, and historical biogeography of the vertebrates. Detailed knowledge of the comparative anatomy and functional morphology of the skeletal system of the tetrapods.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	Vertebrate Paleontology and Evolution	dt/en	30	3	90
	V/Ü	Osteology of the Tetrapods	dt/en	30	3	90

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

Study program	compulsory/ elective	Semester
M.Sc. Paleontology	elective	1. o. 3.
M.Sc. Geowissenschaften	elective	1. o. 3.
OEP Biology	elective	1. o. 3.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	6
Assessment (incl. weighting) and examination language	Exam (dt/en)	

7. Frequency				8. Workload	9. Duration
Winter semester	☒	Winter- and Summer semester	☐	180 h	1 Semester
Summer semester	☐				

Module coordination

Teacher	Prof. Dr. Thomas Martin
Module coordinator	Prof. Dr. Thomas Martin
Anbietende Organisationseinheit	BIOB

Further information

Literature	Will be provided before the start of the module.

Modul: Wirbeltierpaläontologie II

Module: Vertebrate paleontology II

Modulnr./-code: MP 11

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	List of discussed fossil deposits: Devonian: Hunsrück Slate/ (Germany), Gogo-Formation (Australia) Carboniferous: Bear Gulch (USA) Permian: Bromacker (Germany) Triassic: Krasiejow (Poland) Jurassic: Holzmaden/Solnhofen (Germany), Guimarota (Portugal) Cretaceous: Kem Kem Group (Morocco) Tertiary: Messel (Germany), Enspel (Germany), other volcanogenic deposits Quaternary: Rancho La Brea (USA), Permafrost, Caves
Learning outcomes	Familiarization with the most important fossil deposits in the Earth's history from collection material, literature and experience on a field trip to southern germany. Familiarization with the faunal content, the sedimentary context, taphonomy, palaeogeography and the significance of the respective deposit for our understanding of the development of life on earth. Insights into current research topics at the institute in the research seminar, getting to know softskills etc.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	Fossil deposits	en	20	1	30
	S	Research Seminar Vertebrate Paleontology	en	20	2	60
	GÜ	Fossil deposits (6 days)	en	20	3	90

3. Prerequisites for the module

compulsory	-
recommended	MP 10 Vertebrate paleontology I

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	2. Semester
	M.Sc. Geowissenschaften	elective	2. Semester
	OEP Biology	elective	2. Semester

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	Talk (en)	
Assessment (incl. weighting) and examination language	Exam (dt/en) Field trip report (dt(en)	3 3

7. Frequency			8. Workload	9. Duration
Winter semester	☐	Winter- and Summer semester ☐	180 h	1 Semester
Summer semester	☒			

Module coordination

Teacher	Prof. Dr. Thomas Martin
Module coordinator	Prof. Dr. Thomas Martin
Institute/Department	BIOB

Further information

Literature	Will be provided before the start of the module.

Stand: 25.06.2025

Modul: Vertiefung Wirbeltierpaläontologie (Säugetiere)

Module: Specialization in Vertebrate Paleontology (Mammals)

Modulnr./-code: MP 13

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	History of fauna and distribution of the most important mammal groups. Relationships between plate tectonics and paleobiogeography of mammals. Evolution of synapsids, ecomorphology and phylogeny of Mesozoic mammals. Comparative odontology and functional morphology of mammalian dentitions. Studies on extensive fossil and extant tooth and skull material, different tooth categories of the dentition and the different tooth types modified from the basic tribosphenic pattern. Drawing of selected pieces.
Learning outcomes	In-depth knowledge of Mesozoic mammal evolution, the paleobiogeography of mammals, mammalian dentitions and the comparative odontology of mammals.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	Paleobiogeography of mammals	dt/en	30	1	30
	V	Non-mammalian Synapsids	dt/en	30	1	30
	V	Mammals of the Mesozoic	dt/en	30	1	30
	PrÜ	Odontology of Mammals	dt/en	30	3	90

3. Prerequisites for the module

compulsory	-
recommended	MP 10 Vertebrate Paleontology I MP 11 Vertebrate Paleontology II

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	2. Semester
	M.Sc. Geowissenschaften	elective	2. Semester
	OEP Biology	elective	2. Semester

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	6
Assessment (incl. weighting) and examination language	Exam (dt/en)	

7. Frequency		8. Workload	9. Duration
Winter semester ☐ Summer semester ☒	Winter- and Summer semester ☐	180 h	1 Semester

Module coordination

Teacher	Prof. Dr. Thomas Martin
Module coordinator	Prof. Dr. Thomas Martin
Institute/Department	BIOB

Further information

Literature	Will be provided before the start of the module.

Stand: 25.06.2025

Module: Advanced Course in Combining Field and Lab Techniques and Methods in Paleontology

Modulnr./-code: MP 14

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	This module offers students an in-depth exploration of Earth's historical fossil communities. Students will study the diverse fossil records from classic deposits across vertebrate and invertebrate paleontology, paleobotany, and micropaleontology. Through field exercises, they learn essential subject-specific methods, including identification, recording, and interpretation of paleontological data, fossil recovery, excavation techniques, laboratory methods, and preparation. These hands-on experiences will also cultivate an evolutionary understanding of life through space and time, allowing you to directly engage with fossils, preservation forms, and geological structures found in the field.
Learning outcomes	In this module, students explore paleontological topics by integrating field data collection with laboratory analysis. The goal is to equip you with the skills to effectively gather information in the field and process it in a laboratory setting.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	GÜ	Paleontological field trip (6 - 10 days)	en	15	5	180
	PrÜ	Evaluation of paleontological field and lab work	en	15	1	60

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	2. o. 3.
	M.Sc. Geowissenschaften	elective	2. o. 3.
	OEP Biology	elective	2. o. 3.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	10
Assessment (incl. Weighting) and examination language	Protocoll (en)	

7. Frequency				8. Workload	9. Duration
Winter semester	☐	Winter- and Summer semester	☐	180 h	1 Semester
Summer semester	☒				

Module coordination

Teacher	All lecturers
Module coordinator	Prof. Dr. Martin Langer
Institute/Department	BIOB

Further information

Literature	Will be provided before the start of the module.

Module: Advanced methods in Organismic Biology, Evolutionary Biology or Paleobiology

Modulnr./-code: MP 15

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	This module cultivates methodological expertise within a specific area of paleontology—be it micropaleontology, invertebrate paleontology, paleobotany, or vertebrate paleontology. Through hands-on laboratory practicals, you'll gain essential skills in paleontological data analysis, including laboratory techniques and software proficiency.
Learning outcomes	This specialized laboratory module is designed to equip you with crucial experimental skills for analyzing paleontological and paleobiological data. You'll gain hands-on experience working with data from both extinct animals, plants or protists, developing a deep understanding of how to interpret their remains. The core objective is to build your methodological competence, providing you with the practical expertise needed for rigorous scientific investigation in paleontology.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V,Ü	Paleontological lab work	en	15	6	240

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	2. o. 3.
	M.Sc. Geowissenschaften	elective	2. o. 3.
	OEP Biology	elective	2. o. 3.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	10
Assessment (incl. Weighting) and examination language	Protocoll (en)	

7. Frequency				8. Workload	9. Duration
Winter semester	☐	Winter- and Summer semester	☐	180 h	1 Semester
Summer semester	☒				

Module coordination

Teacher	All lecturers
Module coordinator	Prof. Dr. Martin Langer
Institute/Department	BIOB

Further information

Literature	Will be provided before the start of the module.

Modul: Praktische Lehrerfahrung
Module: Practical Teaching Experience
Modulnr./-code: MP 16

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	In the Practical Teaching Experience module, students deepen their specialist knowledge by preparing content for others in an understandable way and training their teaching skills. Students prepare lectures, accompany learning processes and prepare content for tutorials (exercises or case studies). They explain difficult issues and provide individual or group feedback. As tutors, they act as contact persons for the students, moderate discussions and promote exchange between students.
Learning outcomes	Development of pedagogical and didactic skills through the creation of learning materials and the active monitoring of learning processes. Tutors take on organizational tasks and act as a bridge to the lecturer. Their communication and social skills are strengthened through interaction with fellow students. The organization and implementation of tutorials also promotes organizational and time management skills. Tutors acquire their first leadership and mentoring skills by guiding and supporting fellow students. This practical experience provides valuable insights into teaching and learning processes that go beyond pure subject application. Overall, tutoring prepares students comprehensively for a wide range of career paths and promotes important interdisciplinary skills.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	AS	Student Assistant for Lectures and Seminars	en.	-	6	180

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	compulsory	1.-4. Semester
	OEP Biology	elective	1.-4. Semester

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	6
Assessment (incl. Weighting) and examination language	Written report on tutorial teaching work (en)	

7. Frequency		8. Workload	9. Duration
Winter semester ☐ Summer semester ☐	Winter- and Summer semester ☒	180 h	1 Semester

Module coordination

Teacher	All lecturers
Module coordinator	Prof. Dr. Thomas Martin, Prof. Dr. Martin Langer
Institute/Department	BIOB

Further information

Stand: 25.06.2025

Modul: Industrielle Mikropaläontologie
Module: Industrial micropaleontology
Modulnr./-code: MP 20

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1. Content and intended learning outcomes	
Content	Marine micropaleontology and biostratigraphy are integral tools in the exploration for oil and gas. Provided that the global population and economy will continue to grow at the current rate, the demand for fossil fuel energy resources will remain at a high level for at least another 60 to 80 years. This provides the economic incentive to sustain and reinvigorate training programs in the university community to meet the future demand of stratigraphic (micro)-paleontologist in the next several decades. The course is designed to give the participants an introduction to, and an understanding of, the methods that have been developed to apply micropaleontology to the requirements of the hydrocarbon industry. The various techniques employed by industrial micropaleontologists from collecting sample material to applying the analytical results will be discussed and demonstrated in practical exercises. The course units also explore the biological and physical history, processes and events that have shaped the past 4 billion years of the earth. Applications include case studies in global climate change, ocean circulation, geologic history, paleobiology, paleoceanography, paleoecology and evolutionary history. The purpose of the course is to learn how microfossils are applied to study the history of the earth and biology of marine protists. The module Marine Micropaleontology is divided into two units that build upon each other: The first unit (2 hours per week) includes an exhaustive and detailed treatment of all-important microfossil groups. We will examine the morphology, biology, biogeography and ecology of planktic and benthic foraminifera, dinoflagellates, diatoms, radiolarians, chitinozoans, silicoflagellates, ebridians, ostracodes, conodonts, acritarchs, calcareous nannoplankton, pteropods, bryozoa and calpionellids. This includes exercises in age determination and advanced biostratigraphic correlation, paleoenvironmental analysis, paleobathymetry, and biofacies assemblage analysis using cluster techniques in addition to quantitative high-resolution methods. Particular emphasis will be placed on a deep and detailed knowledge of Paleozoic, Mesozoic and Cenozoic larger foraminifera. Larger foraminifera are significant components of modern and fossil reef environments and may serve as prominent reservoirs rocks (e.g. Eocene nummulit shoals, Cretaceous alveolinid reefs, Permian fusulinid reefs, etc.). They have short stratigraphic ranges and are therefore of utmost stratigraphic importance in carbonate dominated systems. The second unit (Industrial Micropaleontology, 1hours/week) places its emphasis on stratigraphic applications in petroleum exploration and other commercial uses. This includes case studies and worked examples from hydrocarbon exploration (petroleum, gas) in local, regional and interregional studies both in clastic as well as carbonate systems. The examples provide a wide geographic, geological and stratigraphic coverage: The geographic range covers marginal, shallow and deep marine environments from tropical, temperate and polar latitudes. The geological range includes active compressional and passive extensional basins. The stratigraphical coverage includes the Late Proterozoic and the entire Phanerozoic history. Applications include biostratigraphic correlation methods, the evaluation of the thermal maturation of source rocks using microfossils (conodonts, chitinozoans, pollen and spores, ostracodes, graptolites), horizontal drilling exercises, biosteering, and the analysis of genetically related facies using sequence stratigraphy. The appoaches and excercises also include new methods and techniques from stable isotope stratigraphy ($^{18}O/^{16}O$ - $^{87}Sr/^{86}Sr$) and molecular fossils (sterols, phytanyl glycerol ethers, carotenoids, ketones, and alkenes). Analyses of additional commercial applications outside petroleum explorations will also be discussed and include sections on environmental monitoring, coal mining, mineral exploration and applications in the field of forensic criminology, archaeology and aerobiology.

Learning outcomes	This course is designed to acquaint students with advanced applications of microfossil groups, records of geologic time and the use of microfossil data in applied and industrial studies. Participants will use a variety of microfossil groups as biostratigraphic chronometers of the Proterozoic and Phanerozoic history of the earth and as paleoenvironmental and paleogeographic indicators. The courses will give participants insight into applied micropaleontological methods that will aid the understanding and application of analytical results when they are dealing with drilled material for academic or industrial purposes and in this respect, it should be particularly useful for academic researchers who undertake work for oil companies and students contemplating working in oil exploration and production. The module "Applied Micropaleontology" is intended for geology/ paleontology students at advanced, undergraduate or early postgraduate level who have a keen interest, but little experience, in industrial and applied micropaleontology.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	Ü	Advanced Marine Micropaleontology	en	14	2	60
	Ü	Applied and Industrial Micropaleontology	en	14	2	60
	Ü	Sequence Stratigraphy	en	14	2	60

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	1. Semester
	M.Sc. Geowissenschaften	elective	1. Semester
	OEP Biology	elective	1. Semester

5. Requirements for the award of credits (ECTS)		**6. ECTS-LP**
Required achievements	-	6
Assessment (incl. Weighting) and examination language	Protocoll with excercises (en).	

7. Frequency				**8. Workload**	**9. Duration**
Winter semester	☒	Winter- and Summer semester	☐	180 h	1 Semester
Summer semester	☐				

Module coordination

Teacher	Prof. Dr. Martin Langer
Module coordinator	Prof. Dr. Martin Langer
Institute/Department	BIOB

Further information

Literature	Will be provided before the start of the module.

Modul: Mikropaläontologie im Gelände und Labor
Module: Micropaleontology in the field and lab

Modulnr./-code: MP 21

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	Analysis of marine habitats for microfossils in the field and laboratory to understand selected geological processes and ecological concepts
Learning outcomes	Field trips are an integral part of the MSc Paleontology and constitute a vital component for the Marine Micropaleontology course module. To determine what physical and biological patterns can reliably indicate processes in the fossil record, students will be trained in field studies on living microorganisms at a marine biological station. Participants will explore habitats of modern microorganisms by diving or snorkeling to understand selected geological processes and ecological concepts relevant for industrial applications. Fossil microfossil communities will be studied as ancient counterparts. This includes field trips to classic Mesozoic and Tertiary localities This includes field trips to the research laboratory and the core repository of the hydrocarbon research exploration company RWE-Dea in Wietze, a visit to the German Petroleum Museum or to the processing facilities of a petroleum refinery.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	E	Excursion and field training at a Marine Biological Station	en	14	5	150
	V/S	Marine Habitats of modern Microorganisms	en	14	2	30

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	3. Semester
	M.Sc. Geowissenschaften	elective	3. Semester
	OEP Biology	elective	3. Semester

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	6
Assessment (incl. Weighting) and examination language	Protocoll	

7. Frequency		8. Workload	9. Duration
Winter semester ☐ Summer semester ☒	Winter- and Summer semester ☐	180 h	1 Semester

Module coordination

Teacher	Prof. Dr. Martin Langer
Module coordinator	Prof. Dr. Martin Langer
Institute/Department	BIOB

Further information

Literature	Will be provided before the start of the module.

Stand: 25.06.2025

Modul: Hochauflösende Bio- und Sequenzstratigraphie

Module: High-resolution Biostratigraphy and structural analyses of larger foraminifera

Modulnr./-code: MP 23

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	Marine micropaleontology and biostratigraphy are integral tools in the exploration for oil and gas. The various techniques employed by hydrocarbon industrial micropaleontologists from collecting sample material to applying the analytical results will be discussed and demonstrated in practical exercises. The purpose of the course is to learn how microfossils are applied to study the history of the earth and biology of marine protists. Their analysis requires additional fundamentals: For example, changes in biogeography (patterns) are used to infer climate change (process). The module places particular emphasis on a deep and detailed knowledge of Paleozoic, Mesozoic and Cenozoic larger foraminifera (LBF) and their identification in thin sections.
Learning outcomes	This module explores the intricate internal architecture of larger symbiont-bearing foraminifera, a group of organisms that plays an important role for high-resolution biostratigraphy, paleobiogeography, for the exploration of hydrocarbons and the carbonate production in modern oceans. Despite being unicellular, they can grow to sizes of several centimeters (and rarely up to 20 cm). Unlike their smaller benthic counterparts, LBF classification heavily relies on their complex internal structures, making a detailed structural analysis crucial for their study and application in geology. The module comprises an introduction to foraminifera and larger foraminifera, a detailed analyses of the morphology and test architecture, an introduction to the techniques used for structural analysis (thin sections, microscopy, imaging techniques, morphometrics), detailed information on the taxonomy and classification based on structural features, and information on industrial application including biostratigraphy. A significant portion of the module involves hands-on practical sessions in the lab, where students analyze prepared thin sections of various LBF species under microscopes, draw detailed diagrams of their internal structures, and practice identifying different taxonomic groups based on these features. Students engage in exercises involving morphometric and analytical measurements.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V, Ü	Classification of LBF	en	14	1	30
	V, Ü	Structural analysis of LBF	en	14	3	90
	Ü	High-resolution biostratigraphy and industrial applications	en	14	2	60

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

Study program	compulsory/ elective	Semester
M.Sc. Paleontology	elective	3. Semester
M.Sc. Geowissenschaften	elective	3. Semester
OEP Biology	elective	3. Semester

5. Requirements for the award of credits (ECTS)				6. ECTS-LP
Required achievements	-			6
Assessment (incl. Weighting) and examination language	Protocoll with excercises (en)			
7. Frequency		**8. Workload**	**9. Duration**	
Winter semester ☒ Summer semester ☐	Winter- and Summer semester ☐	180 h	1 Semester	
Module coordination				
Teacher	Prof. Dr. Martin Langer			
Module coordinator	Prof. Dr. Martin Langer			
Institute/Department	BIOB			
Further information				
Literature	Will be provided before the start of the module.			

Modul: Terrestrische Paläoökologie und -klimatologie

Module: Terrestrial paleoecology and climatology

Modulnr./-code: MP 30

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	– Quaternary paleoecology – Outline of vegetation history – Climate dynamics and causes of climate change in space and time – How can climate be reconstructed in Earth's history? – Palaeoclimatological proxy data (biotic and abiotic) – Paleoclimatological archives – Paleolimnology: lakes as archives of continental paleoecology and climatology – Paleoecological laboratory methods and interpretation
Learning outcomes	This module aims to give students an insight into multidisciplinary working methods in terrestrial paleoecology and paleoclimatology. Basic theoretical knowledge is taught in two lectures. In a block course with practical training, the methods for the reconstruction of paleoclimate and paleoenvironmental conditions are applied and corresponding data sets are collected, processed and analyzed.

2. Teaching and learning methods

Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
V	Terrestrial Paleoecology	dt	15	1	30
V	Terrestrial Paleoclimatology	dt	15	1	30
PrÜ	Paleoecology/ -botany/ -limnology	dt	15	3	120

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

Study program	compulsory/ elective	Semester
M.Sc. Paläontologie	elective	1. o. 3.
M.Sc. Geowissenschaften	elective	1. o. 3.
OEP Biology	elective	1. o. 3.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	6
Assessment (incl. Weighting) and examination language	Exam (en)	

7. Frequency				8. Workload	9. Duration
Winter semester	☒	Winter- and Summer semester	☐	180 h	1 Semester
Summer semester	☐				

Module coordination

Teacher	Prof. Dr. Thomas Litt
Module coordinator	Prof. Dr. Thomas Litt
Institute/Department	BIOB

Further information

Literature	Will be provided before the start of the module.

Stand: 25.06.2025

Modul: Paläobiologie der Invertebraten

Module: Paleobiology of Invertebrates

Modulnr./-code: MP 40

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	The students will learn how much of the evolution, palaeoecology, and palaeobiology of invertebrate organisms is written in the stone. They will gain knowledge of the treatment of fossils in phylogenetic systematics, of different adaptations of all important in- vertebrate fossil taxa to a broad range of various environmental parameters, and of the effect of mass extinctions, climate changes, and other environmental perturbations on the history of invertebrates. The lectures will provide an overview on the body plans, evolution, phylogeny and fossil record of all major fossil invertebrate taxa. In the practical excercises the fossils are represented with original material from worldwide localities and with a broad range of preservational peculiarities.
Learning outcomes	Relevant methods in the practicals are comparative morphology, comparison of fossil and living taxa, palaeobiological and -ecological reconstructions, and foundations of phylogenetics. Different techniques for the analysis of invertebrate fossils will be applied ranging from light microscopy to confocal laser microscopy and X-ray examination. In the lecture the students will learn to extend their knowledge using important classical as well as recently published scientific articles.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	Palaeobiology of Invertebrates	en	16	3	120
	PrÜ	Palaeobiology of Invertebrates	en	16	2	60

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	2. Semester
	M.Sc. Geowissenschaften	elective	2. Semester
	OEP Biology	elective	2. Semester

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	6
Assessment (incl. Weighting) and examination language	Exam (en)	

7. Frequency		8. Workload	9. Duration
Winter semester ☐ Summer semester ☒	Winter- and Summer semester ☐	180 h	1 Semester

Module coordination

Teacher	Prof. Dr. Jes Rust
Module coordinator	Prof. Dr. Jes Rust
Institute/Department	BIOB

Further information

Literature	Will be provided before the start of the module.

Elective Modules (interdisciplinary)

Wahlpflichtmodule (fachübergreifend)

Stand: 25.06.2025

Geodynamics

Modulnr./-code: M 85

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	Wärmetransport, Wärmeflüsse, Geothermen, Mantelkonvektion, Mantle Plumes, Phasenübergänge, Struktur, Zusammensetzung und thermischer Zustand der Lithosphäre und des Mantels und deren Entwicklung in verschiedenen Zeitskalen, Fluidmechanik, Magnetohydrodynamik, Elastizität, Biegung, Subduktion. Heat transport, heat flows, geotherms, mantle convection, mantle plumes, phase transitions, structure, composition and thermal state of the lithosphere and the mantle and their evolution in different time scales, fluid mechanics, magnetohydrodynamics, elasticity, bending, subduction.
Learning outcomes	Verständnis der physikalischen Grundlagen, die den dynamischen Prozessen der Erde zugrunde liegen, sowie entsprechender Modelle. Understanding of the physical principles underlying the dynamic processes of the earth and the corresponding models.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	Geodynamics	en	30	1	30
	Ü	Geodynamics	en	30	2	120
	S	Geodynamics	en	30	1	30

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	1. o. 2.
	M.Sc. Geologie	elective	1. o. 2.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	
Assessment (incl. Weighting) and examination language	Klausur (exam) Seminarvortrag (Seminar talk)	4 2

7. Frequency			8. Workload	9. Duration
Winter semester	☐	Winter- and Summer semester ☒	180 h	1 Semester
Summer semester	☐			

Module coordination

Teacher	Prof. Dr. Marcel Thielmann
Module coordinator	Prof. Dr. Marcel Thielmann
Institute/Department	Institut für Geowissenschaften

Further information

Modul: GIS-Anwendungen in den Geowissenschaften

Modulnr./-code: M 88

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	Studierende werden in die vertiefende Nutzung von Geografischen Informationssystemen (ArcGIS) eingeführt. Hierbei liegt der Fokus auf interdisziplinären Anwendungsbeispielen aus dem gesamten Bereich der Geowissenschaften. Auf Basis grundlegender Fähigkeiten, wie Datenintegration und -darstellung, werden vertiefende Analysemethoden und entsprechende ArcGIS-Tools eingeführt. Hierbei liegt der Fokus sowohl auf der qualitativen als auch quantitativen Analyse und Interpretation der Daten. Es werden interaktive Übungen und selbstständige Projektbearbeitung kombiniert und durch regelmäßige Hausaufgaben ergänzt.
Learning outcomes	Die Teilnehmenden sollen vertiefende Kenntnisse in der Struktur und den Funktionen von GIS-Softwaresystemen (ArcGIS) eigenständig erarbeiten. Anhand von angewandt-geowissenschaftlichen Projektfragestellungen werden Dateneingabe und Datenbearbeitung sowie insbesondere die Datenanalyse und Dateninterpretation interaktiv und eigenständig durchgeführt. Die Studierenden sollen auf die Anwendung von GIS im Arbeitsmarkt vorbereitet werden.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	GIS in den Geowissenschaften	dt	30	2	90
	PÜ	GIS in den Geowissenschaften	dt	30	2	90

3. Prerequisites for the module

compulsory	-
recommended	Nachweisbare GIS-Kenntnisse (z.B. BW 37 oder BW 57 aus BSc Geow.; oder Short-Course zu Beginn des Moduls)

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	1. o. 3.
	M.Sc. Geologie	elective	1. o. 3.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	6
Assessment (incl. Weighting) and examination language	Projektarbeit (dt)	

7. Frequency				8. Workload	9. Duration
Winter semester	☒	Winter- and Summer semester	☐	180 h	1 Semester
Summer semester	☒				

Module coordination

Teacher	Dr. Gerwin Wulf
Module coordinator	Dr. Gerwin Wulf
Institute/Department	Institut für Geowissenschaften

Further information

Literature	Will be announced before start of course

Stand: 25.06.2025

Modul: Sedimentgeochemische Arbeitsmethoden

Modulnr./-code: MG 20

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	Im Rahmen einer Exkursion werden die Arbeitsmethoden im Gelände erläutert und Proben für die weitere Untersuchung im Labor genommen. Im Labor werden die wichtigsten Verfahren zur Probenvorbereitung und Sedimentanalyse (z.B. Bestimmung der Mineralzusammensetzung und des Tonmineralspektrums mittels Röntgendiffraktometrie, Bestimmung der chemischen Haupt- und Spurenelementzusammensetzung mittels Röntgenfluoreszenz, CNS-Analytik, Bestimmung des Glühverlustes, Bestimmung des Karbonatgehaltes) vorgestellt und durchgeführt. Eine begleitende Vorlesung erläutert die entsprechenden Laborverfahren und die Interpretation der gewonnenen Daten mit dem Ziel, z. B. der Paläomilieurekonstruktion oder der Erfassung anthropogener Kontaminationen.
Learning outcomes	Die Studierenden sollen in die gängigen sedimentgeochemischen Arbeitsmethoden im Gelände und im Labor sowie in die Interpretation der Daten eingearbeitet werden.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	Sedimentgeochemie: Methoden, Auswertung und Interpretation	dt	24	2	60
	P	Sedimentgeochemische Labormethoden	dt	24	3	90
	GÜ	Profilaufnahme und Probennahme (1 Tag)	dt	24	0.5	30

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	1. o. 3.
	M.Sc. Geologie	elective	1. o. 3.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	6
Assessment (incl. Weighting) and examination language	Projektarbeit (dt)	

7. Frequency				8. Workload	9. Duration
Winter semester	☒	Winter- and Summer semester	☐	180 h	1 Semester
Summer semester	☐				

Module coordination

Teacher	Dr. Sven Oliver Franz
Module coordinator	Dr. Sven Oliver Franz
Institute/Department	Institut für Geowissenschaften

Further information

Literature	Will be announced before start of course

Modul: Sedimentpetrologische Labormethoden

Modulnr./-code: MG 21

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	Im Rahmen einer Exkursion werden die Arbeitsmethoden im Gelände erläutert und Proben für die weitere Untersuchung im Labor genommen. Im Labor werden die wichtigsten Verfahren zur Probenvorbereitung und Sedimentanalyse (z.B. Geröllanalyse, Bestimmung der Korngröße, Bestimmung des Schwermineralspektrums) vorgestellt und durchgeführt. Eine begleitende Vorlesung erläutert die entsprechenden Laborver-fahren und die Interpretation der gewonnenen Daten.
Learning outcomes	Die Studierenden sollen in die gängigen sedimentpetrologischen Arbeitsmethoden im Gelände und im Labor sowie in die Interpretation der Daten eingearbeitet werden.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	Sedimentpetrologie: Methoden, Auswertung und Interpretation	dt	24	2	60
	P	Sedimentpetrologische Labormethoden	dt	24	3	90
	GÜ	Profilaufnahme und Probennahme (1 Tag)	dt	24	0.5	30

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	2.
	M.Sc. Geologie	elective	2.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	6
Assessment (incl. Weighting) and examination language	Projektarbeit (dt)	

7. Frequency			8. Workload	9. Duration
Winter semester	☐	Winter- and Summer semester ☐	180 h	1 Semester
Summer semester	☒			

Module coordination

Teacher	Dr. Sven Oliver Franz
Module coordinator	Dr. Sven Oliver Franz
Institute/Department	Institut für Geowissenschaften

Further information

Literature	Will be announced before start of course

Modul: Marine Sedimente als Umweltarchive

Modulnr./-code: MG 22

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	In diesem Modul sollen die der physikalischen, chemischen und biologischen Grundlagen sowie Anwendungen der Paläoumwelt-Rekonstruktion anhand mariner Sedimente vermittelt werden. Schwerpunkte sind ein Überblick moderner und paläo-ozeanographischer Prozesse und Zustände; das Auffinden und Gewinnen geeigneter mariner Umweltarchive; die Datierung mariner Umweltarchive; verschiedene physikalische, biologische und geochemische Proxies; sowie ausgesuchte Fallstudien. Der Inhalt der Vorlesung wird in einem Seminar vertieft.
Learning outcomes	Die Studierenden kennen nach erfolgreichem Abschluss die wichtigsten physikalischen, chemischen und biologischen Grundlagen zum Verständnis mariner Ablagerun-gen sowie deren Eignung als Umweltarchive. Sie sind in der Lage, marine Ablagerungsräume auf deren Eignung als Umweltarchiv zu bewerten, passende Untersuchungsansätze bzw Proxies vorzuschlagen, sowie publizierte Paläoumwelt-Rekonstruktionen zu verstehen und auf deren Qualität zu bewerten. Sie können Ihre Ansichten und Interpretationen in einem wissenschaftlich fundierten Vortrag einem fachkundigen Auditorium erläutern, sowie einen wissenschaftlichen Projektantrag in Grundzügen formulieren.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	Marine Sedimente als Umweltarchive	dt/en	30	2	120
	S	Oberseminar Marine Sedimente	dt/en	30	2	60

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	1. o. 3.
	M.Sc. Geologie	elective	1. o. 3.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	
Assessment (incl. Weighting) and examination language	Klausur (dt/en) Forschungsantrag (dt/en)	4 2

7. Frequency				8. Workload	9. Duration
Winter semester	☒	Winter- and Summer semester	☐	180 h	1 Semester
Summer semester	☐				

Module coordination

Teacher	Prof. Dr. Christian März
Module coordinator	Prof. Dr. Christian März
Institute/Department	Institut für Geowissenschaften

Further information

Literature	Will be announced before start of course

Modul: Sedimentäre Fazies und Faziesarchitektur

Modulnr./-code: MG 30

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	Sedimentary facies & architecture of alluvial, lacustrine, fluvial, shallow (both clastic & carbonate) & deep-marine systems.
Learning outcomes	Sediments, sedimentary successions and the fossil biological systems contained within them, provide us with an unparalleled view of the past. Understanding the complexity of interlinked sedimentary and biological systems is the key to interpreting this history. Using a combination of sedimentary and paleontological approaches, this course aims to provide the student with the skills to better understand the Earth and its history.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	Sedimentary facies and facies architecture	dt/en	14	1	90
	S	Sedimentary facies and facies architecture	dt/en	14	1	90

3. Prerequisites for the module

compulsory	-
recommended	Suitable background in both sedimentology & palaeontology

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	1. o. 3.
	M.Sc. Geologie	elective	1. o. 3.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	6
Assessment (incl. Weighting) and examination language	Semesterbegleitende Aufgaben (dt/en)	

7. Frequency				8. Workload	9. Duration
Winter semester	☒	Winter- and Summer semester	☐	180 h	1 Semester
Summer semester	☐				

Module coordination

Teacher	McCann, Rust
Module coordinator	Prof. Dr. Tom McCann
Institute/Department	Institut für Geowissenschaften

Further information

Literature	Will be announced before start of course

Modul: Einführung in die geologische 3D Modellierung

Modulnr./-code: MG 41

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	Das Modul ist gegliedert in Vorlesung, Übungen am Computer und 3 Tagen im Gelände zur Datenaufnahme. Zunächst werden Grundlagen zu unterschiedlichen geologischen Datenstrukturen und digitalen 3D-Analyseverfahren vermittelt. Hier steht besonders die Erfassung von Schichtgrenzen und-orientierungen im Mittelpunkt. In einem Testgebiet werden von den Teilnehmenden Gesteinsaufnahme, Kompass-messungen GPS-gestützt durchgeführt, um die tektonische Situation zu erfassen. Die Ergebnisse des ersten Geländetages werden in einem GIS-System visualisiert und die weitere Planung der Geländeaufnahme konzipiert. Zwei weitere Geländetage geben die Möglichkeit die Strukturmessungen zu vervollständigen, um bei entsprechender Datenlage ein einfaches Raummodell zu erstellen.
Learning outcomes	Im Rahmen dieses Moduls werden Techniken zur digitalen Erhebung von Daten im Ge-lände, deren Analyse und GIS-gestützter Darstellung vermittelt. Ziel ist es geologische Raumstrukturen vor Ort zu verstehen, in geeigneter Weise zu erheben und durch die Wahl geeigneter 3D-Modellierungs- und geostatistischer Analyseverfahren geologisch sinnvoll auszuwerten. Auf diese Weise wird eine Einschätzung und Wertung schon vorhandener Datensätze erlernt. Als Ergebnis wird in 2er-Gruppen von einem Arbeitsgebiet ein einfaches Raummodell konzipiert.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	3D-Modellierung in der Geologie	dt	20	1	30
	PrÜ	Geologische Strukturen und ihre 3D-Modellierung	dt	20	2	90
	GÜ	Digitale 3D-Aufnahme geologischer Strukturen (3 Tage)	dt	20	1,5	60

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	2.
	M.Sc. Geologie	elective	2.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	5
Assessment (incl. Weighting) and examination language	Projektarbeit (dt.)	

7. Frequency				8. Workload	9. Duration
Winter semester	☐	Winter- and Summer semester	☐	150 h	1 Semester
Summer semester	☒				

Module coordination

Teacher	Dr. Mario Valdivia Manchego
Module coordinator	Dr. Mario Valdivia Manchego
Institute/Department	Institut für Geowissenschaften

Further information

Literature	Will be provided before the start of the module.

Stand: 25.06.2025

Modul: Geologische Naturgefahren

Modulnr./-code: MG 53

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	In diesem Modul sollen die Auswirkungen geologischer Prozesse auf den Menschen ebenso wie Veränderungen der Umwelt, insbesondere der lithosphärischen und hydro- sphärischen Kompartimente durch anthropogene Aktivitäten vorgestellt werden. Geologische Prozesse führen, wenn sie unkontrolliert ablaufen, zur unmittelbaren Bedrohung des Menschen. Als wichtige, geologiebürtige Naturrisiken spielen Erdbeben, Vulkanausbrüche, Tsunamis, Massenbewegungen (u.a. Bergrutsche), sowie die natürliche Strahlenbelastung eine wichtige Rolle. Einen wichtigen Teil des Stoffes nehmen die Vorhersage natürlicher Gefährdungspotentiale und ihre mögliche Verhinderung ein. Im Teil zur geogenen Radioaktivität wird in die Grundlagen natürlicher Strahlung und der Messverfahren eingeführt. Die theoretischen Kenntnisse werden im Rahmen der Geländeübung umgesetzt. Dort werden an verschiedenen Gesteinsschichten, die zuvor bestimmt werden, Gamma-Messungen, Bodenluftmessungen (Radon) und Alpha-Strahlung bestimmt.
Learning outcomes	Den Studierenden werden Grundlagenkenntnisse zu geologischen Naturgefahren und -risiken vermittelt. Sie sollen dazu beitragen, die Beziehungen Mensch-geologische Umwelt zu verstehen, mit dem Ziel Vorhersagen zu machen sowie Vermeidungs- und Handlungsstrategien aufzeigen zu können.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V/S	Geogene Radioaktivität	dt	20	2	60
	GÜ	Geogene Radioaktivität (2 Tage)	dt	20	1	30
	V	Geogefahren	dt	20	2	60
	GÜ	Geogefahren (2 tage)	dt	20	1	30

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	2.
	M.Sc. Geologie	elective	2.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	
Assessment (incl. Weighting) and examination language	Protokoll zur GÜ Geogene Radioaktivität (dt) Protokoll zur GÜ Geogefahren (dt)	3 3

7. Frequency		8. Workload	9. Duration
Winter semester ☐ Summer semester ☒	Winter- and Summer semester ☐	180 h	1 Semester

Module coordination

Teacher	Hoffmann, Valdivia Manchego
Module coordinator	Dr. Mario Valdivia Manchego
Institute/Department	Institut für Geowissenschaften

Further information

Literature	Will be announced before start of course

Stand: 25.06.2025

Modul: Isotopengeochemie

Modulnr./-code: MGP 12

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	Das Modul besteht aus einer Vorlesung mit begleitenden Übungen zur Isotopengeochemie. Das Modul ist eine Vertiefung des Wahlpflichtmoduls BW 42 (Geochemie) im Bachelorstudiengang.
Learning outcomes	Das Modul vermittelt vertiefte Kenntnisse in Isotopengeochemie. Im Vordergrund ste-hen quantitative Aspekte. Die dazu gehörenden Übungen legen besonderen Wert auf selbständiges Lösen von Problemen.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	Isotopengeochemie	en	12	3	75
	PrÜ	Isotopengeochemie	en	12	2	60
	P	Isotopengeochemie	en	12	1	45

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	1. o. 3.
	M.Sc. Geologie	elective	1. o. 3.

5. Requirements for the award of credits (ECTS) / 6. ECTS-LP

Required achievements	-	6
Assessment (incl. Weighting) and examination language	Klausur (en)	

7. Frequency				8. Workload	9. Duration
Winter semester	☒	Winter- and Summer semester	☐	180 h	1 Semester
Summer semester	☐				

Module coordination

Teacher	Prof. Dr. Ambre Luguet
Module coordinator	Prof. Dr. Ambre Luguet
Institute/Department	Institut für Geowissenschaften

Further information

Literature	Will be announced before start of course

Modul: Vulkanologie

Modulnr./-code: MGP 21

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	This module consists of a lecture as well as seminar on topics related to volcanology processes or historical eruptions. The seminars will be organized depending on the amount of participants. In addition, students will have to participate in a 1-2 day excursion in the volcanic provinces of the Eifel or of the Kaiserstuhl.
Learning outcomes	This module aims at a better knowledge of the concepts of volcanology. Seminars will help the students to better understand those concepts while reviewing literature on a specific theme. The field excursion will provide training for better recognition of volcanic deposits or the interpretations/understanding of volcanic processes/provinces.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	Vulkanologie	en	30	3	90
	S	Vulkanologie	en	30	1	30
	GÜ	Vulkanologie	en	30	2	60

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	2.
	M.Sc. Geologie	elective	2.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	
Assessment (incl. Weighting) and examination language	Klausur zur Vorlesung (dt/en) Klausur zur Geländeübung (dt/en)	3 3

7. Frequency				8. Workload	9. Duration
Winter semester	☐	Winter- and Summer semester	☐	180 h	1 Semester
Summer semester	☒				

Module coordination

Teacher	Prof. Dr. Ambre Luguet
Module coordinator	Prof. Dr. Ambre Luguet
Institute/Department	Institut für Geowissenschaften

Further information

Literature	Will be announced before start of course

Module: Fundamentals of Evolutionary Biology

Modulnr./-code: MP 26

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	The module consist of lectures, practicals, and seminars. It covers largely the response of animals and plants to environmental constraints, introduces into terrestrial and marine systems, climate, population and community ecology as well as the theory of evolution and the role of natural and sexual selection during evolution. The lectures on phylogenetics and Paleobiology provide insight into the ancient situation of our planet, extinct ecosystems, animal and plant groups and mass extinctions.
Learning outcomes	Basic knowledge in aminal and plant ecology, biological answers to physiological contraints evolution of physiological properties in animals, evolutionary theory and current toics of phylogenetics

2. Teaching and learning methods

Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
V	Evolutionary Physiology	en	50	2	60
S	Evolutionary Physiology	en	50	2	60
V	Ecology and Evolution	en	50	2	60
V	Phylogenetics & Paleobiology	en	50	2	60
prÜ	Character Coding & Cladistics	en	50	1	30
PS	Paleontology	en	50	1	30

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

Study program	compulsory/ elective	Semester
M.Sc. Paleontology	elective	1
OEP Biology	compulsory	1

5. Requirements for the award of credits (ECTS) / 6. ECTS-LP

Required achievements	Oral presentation	10
Assessment (incl. Weighting) and examination language	Written exam (en)	

7. Frequency				8. Workload	9. Duration
Winter semester	☒	Winter- and Summer semester	☐	300 h	1 Semester
Summer semester	☐				

Module coordination

Teacher	PD Dr. L. Podsiadlowski, Prof. Dr. L. Schreiber, Prof. Dr. T. Bartolomaeus, Dr. M. Koch, Prof. Dr. D. Quandt, PD Dr. V. Schlüssel, Prof. Dr. T. Martin, Prof. Dr. J. Rust, Prof. Dr. Nicolas Gompel, Prof. Dr. Alexander Suh
Module coordinator	N.N.
Institute/Department	BIOB, LIB, IZMB

Further information

Literature	Recommended Readings will be deposited on ecampus. The seminar will be held in two consecutive groups

Module: Scientific Communication

Modulnr./-code: MP 27

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	Students train the practice and theory of communication in the evolutionary sciences, they learn how to write abstracts and publications and how to design posters and presentations
Learning outcomes	Different ways to communicate in science, like talks, abstracts, papers, reviews are taught and trained

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	Scientific Communication	en	50	1	30
	S	Scientific Communication	en	50	1	30
	PrÜ	Scientific Communication	en	50	4	90

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	1
	OEP Biology	compulsory	1

5. Requirements for the award of credits (ECTS) / 6. ECTS-LP

Required achievements	-	5
Assessment (incl. Weighting) and examination language	oral presentation (Referat) 50%, en. assignment (wiss. Schreibübung), 25%, en. abstract (wiss. Zusammenfassung) 10%, en. 2 methods sheets (Methodik-Arbeitsblätter) 7.5% each, en	

7. Frequency / 8. Workload / 9. Duration

7. Frequency	8. Workload	9. Duration
Winter semester ☒ Summer semester ☐ Winter- and Summer semester ☐	150 h	1 Semester

Module coordination

Teacher	Prof. Dr. T. Bartolomaeus, Prof. Dr. M. Weigend, teachers of the OEP-Biology program
Module coordinator	Prof. Dr. T. Bartolomaeus
Institute/Department	BIOB

Further information

Literature	Recommended Readings will be deposited on ecampus. The seminar will be held in two consecutive groups

Module: Analysis of form and function in living systems

Modulnr./-code: MP 28

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	
Learning outcomes	

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V		en			
	S		en			
	Ü		en			

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	2. o 3.
	OEP Biology	elective	2. o 3.

5. Requirements for the award of credits (ECTS) / 6. ECTS-LP

Required achievements	Scientific exposé (data sheet)	10
Assessment (incl. Weighting) and examination language	Oral exam (Mündliche Prüfung) (100%), en.	

7. Frequency				8. Workload	9. Duration
Winter semester	☐	Winter- and Summer semester	☒	300 h	1 Semester
Summer semester	☐				

Module coordination

Teacher	Prof. Dr. A. Blanke
Module coordinator	Prof. Dr. A. Blanke
Institute/Department	BIOB

Further information

Module: Phenotypisation and cladistic analysis of morphological characters

Modulnr./-code: MP 29

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	The course is composed of two parts. During the first part students will learn how to quantify and analyse shape variation in biology using geometric morphometrics (= phenotyping). Various zoological samples will be studied. Phenotyping is an important concept in research (e.g. organismic variation in relation to climate change; Phenotypic macro- and microevolution), medical development (e.g. plastic surgery), and industry (e.g. crop science). The second part introduces into pertinent software for Maximum Parsimony analyses and improves understanding of its applications. Published character matrices are provided to test for reproducibility, robustness and sensitivity under various weighting regimes, to infer implications of alternative topologies (e.g., by mapping on molecular trees), and to evaluate the explanatory strength of a given data set. The results of the exercises are summarized by the students at the end of each session in oral presentations.
Learning outcomes	Conceptualization, sample dissection, imaging, shape analysis,

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	Morphometrics and morphological character analysis	en	16	1	60
	P	Morphometrics and morphological character analysis	en	16	4	240

3. Prerequisites for the module

compulsory	-
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	2. o 3.
	OEP Biology	elective	2. o 3.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	oral presentation (Präsentation), en. scientific exposé (data sheet), en.	10
Assessment (incl. Weighting) and examination language	written exam (Klausur), (100%) en.	

7. Frequency			8. Workload	9. Duration
Winter semester	☐	Winter- and Summer semester ☐	300 h	1 Semester
Summer semester	☒			

Module coordination

Teacher	Dr. M. Koch, Prof. A. Blanke
Module coordinator	Dr. M. Koch, Prof. A. Blanke
Institute/Department	BIOB

Further information

Literature	Zelditch M.L., Swiderski D.L., Sheets H.D., Fink W.L. 2004. Geometric Morphometrics for Biologists: A Primer. Elsevier. Wägele JW (2005) Foundations of Phylogenetic Systematics. Verlag Dr. Friedrich Pfeil.

Stand: 25.06.2025

Module: Geographic Information Systems (GIS) for Plant Biogeography and Conservation

Modulnr./-code: MP 31

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	Understanding the spatial distribution of biodiversity is crucial for its further exploration, use, and conservation. This module combines an introduction in mapping and spatial data analysis using GIS with theory and excercises from the fields of macroecology and biogeography. A special focus will be conservation biogeography including priority setting and analyses of the impact of global environmental change on biodiversity. By the end of the module, students should be able to design and perform analyses in the fields of macroecology, biogeography, and nature conservation using GIS and spatial data analyses
Learning outcomes	The use of Geographic Information Systems (GIS) for mapping and spatial analyses; skills for planning, performing, documentation, and presentation of scientific analyses.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	P	GIS for Plant Biogeography and Conservation	en	6+6	4	150

3. Prerequisites for the module

compulsory	OEP-M1, OEP-M2
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	3.
	OEP Biology	elective	3.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	5
Assessment (incl. Weighting) and examination language	oral presentation (Präsentation), 60%, en. written reports (Protokolle), 40%, en.	

7. Frequency				8. Workload	9. Duration
Winter semester	☒	Winter- and Summer semester	☐	150 h	1 Semester
Summer semester	☐				

Module coordination

Teacher	Dr. J. Mutke, Prof. Dr. M. Weigend, scientists of the BIOB / Section I
Module coordinator	Dr. J. Mutke
Institute/Department	BIOB

Further information

Literature	Recommended Reading LOMOLINO, RIDDLE, WHITTAKER & BROWN. Biogeography, Sinauer. MILLINGTON, BLUMLER & SCHICKHOFF (eds.). Handbook of Biogeography. Sage Publications: London PRIMACK: Essentials of Conservation Biology.Sinauer. WEGMANN et al.: Remote Sensing and GIS for Ecologists. Pelagic Publishing

Module: Biodiversity Informatics: Data Analyses for Ecology and Biogeography

Modulnr./-code: MP 32

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	This course provides an overview of methods commonly used to analyse and model data in the field of ecology (incl. macroecology) and biogeography. This includes analyses and modelling of spatial data in a geographic context (e.g. bioclimatic modelling / environmental niche models) – thus some background in the context of geographic information systems is of advantage. By the end of the module, students should be able to design and perform analyses in the fields of (macro-) ecology and biogeography using mainly code based analysis software such as R or Julia.
Learning outcomes	Code based data analysis, skills for planning, performing, documentation, and presentation of scientific analyses.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	P		en	6+6	4	150

3. Prerequisites for the module

compulsory	OEP-M1, OEP-M2
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	3.
	OEP Biology	elective	3.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	5
Assessment (incl. Weighting) and examination language	oral presentation (Präsentation), 60%, en. written reports (Protokolle), 40%, en.	

7. Frequency				8. Workload	9. Duration
Winter semester	☒	Winter- and Summer semester	☐	150 h	1 Semester
Summer semester	☐				

Module coordination

Teacher	Dr. J. Mutke, Prof. Dr. M. Weigend, scientists of the BIOB / Section I
Module coordinator	Dr. J. Mutke
Institute/Department	BIOB

Further information

Literature	Recommended Reading GUISAN et al.: Habitat Suitability and Distribution Models. Cambridge. S. QIAN: Environmental and Ecological Statistics with R, Second Edition.. CRC. WEGMANN et al.: Remote Sensing and GIS for Ecologists. Pelagic Publishing.

Module: Palaeobotany and Palynology

Modulnr./-code: MP 33

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	Palaeobotany and palynology play a fundamental role to understand the evolution of plants from the earliest forms to the development of our present flora. Based on fossil material the plant evolution will be placed in the context of time, climate change and mass extinction. The course focuses on periods when major evolutionary changes occurred and addresses the rates and timing of the evolutionary change seen in the plant fossil records.
Learning outcomes	Participants should gain an understanding of the evolution of land plants based on macro- and micropalaeobotanical data, and the application of this information to phylogenetic and evolutionary analysis. Aims include to develop skills in (1) morphological analysis of fossil plants, (2) introduction into the pollen morphology and pollen analysis (3) using SEM and Confocal Laser-Scanning Microscop (4) evaluation of palaeobotanical data in comparison with current research on ancient DNA and other biomolecular markers.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	Palaeobotany and terrestrial palaeoecology	en	50	1	30
	P	Palaeobotany and Palynology	en	15	4	120

3. Prerequisites for the module

compulsory	OEP-M1
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	2. o. 4.
	OEP Biology	elective	2.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	5
Assessment (incl. Weighting) and examination language	Written exam (Klausur) (50%), en. Written report (Protokoll) (50%), en.	

7. Frequency				8. Workload	9. Duration
Winter semester	☐	Winter- and Summer semester	☐	150 h	1 Semester
Summer semester	☒				

Module coordination

Teacher	Prof. Dr. T. Litt
Module coordinator	Prof. Dr. T. Litt
Institute/Department	BIOB

Further information

Literature	Moore, Webb, Collinson: Pollen Analysis Steward, Rothwell: Paleobotany and the Evolution of Plants Steward, Rothwell: Paleobotany and the Evolution of Plants Taylor, Taylor: The Biology and Evolution of Fossil Plants Willis, McElwain: The Evolution of Plants

Module: Evolution and Biodiversity of Lower Vertebrates

Modulnr./-code: MP 36

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	More than two-thirds of the vertebrate species known are fishes, amphibians or reptiles. Lectures and seminars of this module will provide an overview on patterns of diversity, systematics and evolution of these “lower vertebrates”. Comparative anatomical studies will be performed in the practical part to explore morphological traits relevant in context of adaptation or systematics. Methods taught comprise those relevant for collection-based research, key “tools” relevant for evolutionary and systematic studies, and applied aspects relevant to zoos.
Learning outcomes	The participants will gain insight into evolution and diversity of lower vertebrates (fishes, amphibians and reptiles). Morphological adaptation and geographical distribution are discussed in context of ecological and biogeographical concepts. Lectures and seminars will provide a general overview on patterns and processes related to lower vertebrate diversity, but will also allow deeper insight into some relevant key groups.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	Lower Vertebrates	en	20	1	60
	S	Lower Vertebrates	en	20	1	60
	P	Lower Vertebrates	en	20	6	180

3. Prerequisites for the module

compulsory	OEP-M1, OEP-M2
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	2. o. 3.
	OEP Biology	elective	2. o. 3.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	10
Assessment (incl. Weighting) and examination language	Oral presentation (Referat) (50%), en. Written report (Protokoll) (50%), en.	

7. Frequency				8. Workload	9. Duration
Winter semester	☒	Winter- and Summer semester	☐	300 h	1 Semester
Summer semester	☒				

Module coordination

Teacher	PD Dr. F. Herder, PD Dr. D. Rödder
Module coordinator	PD Dr. F. Herder, PD Dr. D. Rödder
Institute/Department	LIB

Further information

Literature	Will be announced before start of course

Module: Evolution, Diversity, and Biology of Arthropods

Modulnr./-code: MP 37

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	Arthropods (Insects, millipedes, centipedes, crustaceans, arachnids) are the most diverse animal group on our planet containing three quarters of all known species. This module aims to give students a general overview of the evolution and diversity of arthropods with a combination of field excursions and lab work. In particular, students will learn: • How to collect, dissect and conserve/mount arthropods • How to identify major arthropod lineages and species • How to extract morphological characters and to infer differences between different character states with computer-tools (morphometrics) Based on self-collected material and additional specimens the students will study the external morphology of selected taxa with light- microscopic methods to gain a deeper understanding of arthropod taxonomy. The module will also focus on phylogenetic systematics based on morphology with example data. The field excursions around Bonn will also serve to gain a deeper understanding of ecological niches of selected arthropod species (mainly millipedes and insects).
Learning outcomes	In-depth understanding of the evolution, diversity, and biology of arthropods in general and of some groups in particular (millipedes, beetles, flies & wasps). In addition, students will learn how to identify and study arthropods, i.e. how to infer characters, to understand their evolutionary history etc. by means of comparative and phylogenetic analyses.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	Evol., Div., Biol. of Arthropods	en	14	2	60
	S	Evol., Div., Biol. of Arthropods	en	14	2	60
	P	Evol., Div., Biol. of Arthropods	en	14	4	180

3. Prerequisites for the module

compulsory	OEP-M1, OEP-M2
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	2. o. 3.
	OEP Biology	elective	2. o. 3.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	10
Assessment (incl. Weighting) and examination language	Two oral presentations (Referate) (40%), en. One divided exam (60%), en.	

7. Frequency		8. Workload	9. Duration
Winter semester ☐ Summer semester ☒	Winter- and Summer semester ☐	300 h	1 Semester

Module coordination

Teacher	Dr. T. Wesener, Prof. Dr. A. Blanke, Dr. D. Ahrens, Dr. X. Mengual, Dr. R. Peters, B.Rulik
Module coordinator	Dr. T. Wesener
Institute/Department	LIB

Further information

Literature	Will be announced before start of course

Module: Vertebrate Comparative Anatomy and Functional Morphology

Modulnr./-code: MP 38

UNIVERSITÄT BONN

1. Content and intended learning outcomes

Content	• Laboratory course: Comparative Vertebrate Anatomy • Dissection of representatives of all vertebrate classes. As 1/4 Block (1 week) or alternatively 2h (+ introduction) per week. Hard- and soft part histology • Lecture and Lab: Structural skeletal adaptation in fossil and recent vertebrates. • Function and special adaptations with respect to swimming, terrestrial locomotion , digging and flying
Learning outcomes	Goal is to understand the basic vertebrate body plan and the specializations in different major groups. Fixed specimens of representatives of all major groups will be dissected and selected tissue will be processed for histology. Differences in the organization and morphology of major organs will be discussed in the context of functional implications. We will discuss different requirements for respiration, nutrition, heat exchange, locomotion, metabolism, reproduction und much more.

2. Teaching and learning methods

	Type of instruction	Topic	Language of instruction	Group size	SWS	Workload [h]
	V	Comp. Vert. Anat. and Hist.	en	50	2	90
	P	Comp. Vert. Anat. and Hist.	en	50	4	210

3. Prerequisites for the module

compulsory	OEP-M1, OEP-M2
recommended	-

4. Degree program allocation

	Study program	compulsory/ elective	Semester
	M.Sc. Paleontology	elective	2. o 3.
	OEP Biology	elective	2. o 3.

5. Requirements for the award of credits (ECTS)		6. ECTS-LP
Required achievements	-	10
Assessment (incl. Weighting) and examination language	Written exam (100%), en.	

7. Frequency		8. Workload	9. Duration
Winter semester ☐ Summer semester ☐	Winter- and Summer semester ☒	300 h	1 Semester

Module coordination

Teacher	Prof. Dr. M. Hofmann
Module coordinator	Prof. Dr. M. Hofmann
Institute/Department	BIOB

Further information

Literature	*Vertebrates: Comparative Anatomy, Function, Evolution*, 4th ed. by Kardong, McGraw-Hill 2006

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