June 2025

Master courses in English for Incoming students

The following courses are open for incoming exchange students of the Faculty of Biology. They are given in English; a language proof of is not required but we highly recommend English knowledge of at least level B2, better still C1, in order to be able to follow the courses sufficiently well.

You can select the courses as Master student if you meet subject specific requirements indicated under 'remarks'.

Information to the modules (content, workload, prerequisites etc.) can be found in the module catalogue below. Inform yourself carefully before choosing a module.

In addition, check the semester dates using our Course Catalogue “EXA” whilst choosing a module in order to avoid overlap of lectures and courses. Our "Guide for exchange students" contains information on using EXA. In case the semester dates are not available yet, simply contact us.

University Course Catalouge (EXA)

Guide for exchange students of biology

Courses available in winter term				
Acronyms for course type: L = lecture, P = practical course, T = tutorial, S = seminar				
Module-No.	Title	ECTS	Type	Remarks
M.Bio.141	General and applied microbiology	3	L	
M.Bio.142	Molecular genetics and microbial cell biology	3	L	
M.Bio.172	Molecular genetics and microbial cell biology	6	L, S	
M.Bio.158	Enzyme catalysis and biological chemistry	3	L	
M.Bio.344	Neurobiology 1	3	L	
M.Bio.348	Human genetics	6	L, S	
M.Bio.359	Development and plasticity of the nervous system	3	L	
M.Bio.360	Development and plasticity of the nervous system	3	S	requires M.Bio.359
M.Bio.366	Introduction to behavioral biology	3	L	
M.Bio.369	Human genetics	3	L	
M.Bio.392	Current Developmental Biology	6	L, T, S	
M.Bio.393	Current Developmental Biology	3	L, T	
M.Biodiv.402	Plant ecology and ecosystem research	6	L, S	
M.Biodiv.403	Vegetation ecology and vegetation history	6	L, S	
M.Biodiv.404	Animal ecology	6	L, S	
M.Biodiv.412	Conservation biology	6	L, S	
M.Biodiv.425	Evolution of embryophyta	6	L, S	
M.Biodiv.441	Animal ecology: Evolutionary ecology	6	L, P	as block course in March
M.Biodiv.447	Biodiversity, ecology and evolution of terrestrial invertebrates	6	L, S	block course in December

M.Biodiv.450	Plant Ecology: Impact of global climate change on plant communities and their functional traits	6	L, P	as block course in Sep/Oct
M.Biodiv.470	Morphology of animals: Microscopical methods in comparative morphology	6	L, P	as block course in Oct/Nov
M.Biodiv.479	Phylogenomics	6	L, P	as block course in January
M.Biodiv.491	Next generation sequencing for evolutionary biology	6	L, S, P	as block course in September
M.Biodiv.492	Molecular methods for "Next Generation Sequencing" in evolutionary biology and systematics	6	L, P	as block course in February
M.Biodiv.610	Science Communication in Biodiversity research	6	L, S, P	as block course in February
M.INC.1003	Animal Conservation	6	L	
M.CoBi.541	Bioinformatics and its areas of application	4	L	

Courses available in summer term				
Acronyms for course type: L = lecture, P = practical course, T = tutorial, S = seminar				
Module-No.	Title	ECTS	Type	Remarks
M.Bio.144	Cellular and molecular biology of plant-microbe interactions	3	L	
M.Bio.156	Structural biochemistry	3	L	
M.Bio.176	Structural biochemistry	6	L, S	
M.Bio.394	Frontiers in Neural Development	6	L, T, S	
M.Bio.395	Frontiers in Neural Development	3	L, T	
M.Biodiv.434	Introduction to the history of cultivated plants	6	L, S	as block course
M.Biodiv.437	Methods in paleoecology	6	L, P	
M.Biodiv.441	Animal ecology: Evolutionary ecology	6	L, P	as block course in March
M.Biodiv.442	Community ecology of animals	6	L, P	as block course
M.Biodiv.445	Molecular analysis of tropic interactions in soil food webs	6	L, P	as block course
M.Biodiv.446	Molecular zoology and insect biotechnology	6	L, S, P	as block course
M.Biodiv.450	Plant Ecology: Impact of global climate change on plant communities and their functional traits	6	L, P	as block course in Sep/Oct
M.Biodiv.491	Next generation sequencing for evolutionary biology	6	L, S, P	as block course in September
M.Biodiv.611	Biodiversity research in the museum	6	L, S, P	as block course
M.CoBi.541	Bioinformatics and its areas of application	4	L	

Georg-August-Universität
Göttingen

Directory of Modules

Courses for Incomings

Index by areas of study

I. Courses for Incomings - Master courses in English

Georg-August-Universität Göttingen **Module M.Bio.141: General and applied microbiology**	3 C 3 WLH

Learning outcome, core skills: **Learning outcome:** Evolution and phylogenetic system; morphology and cell biology; communities and biocoenosis of bacteria and archaea; gene expression and molecular control (transcription, translation); posttranslational control, protein stability and proteomics; genetic networks; molecular switches and signal transduction; microbial developmental biology; mechanisms of pathogenicity of important pathogens; development of new antimicrobial agents; diversity of the metabolism in bacteria and archaea as basis for biotechnological applications; industrial microbiology. **Core skills:** Knowledge of microorganisms relevant for biotechnology and medicine, ability to identify these organisms and to analyse them with molecular methods.	**Workload:** Attendance time: 42 h Self-study time: 48 h

Course: lecture: General and applied microbiology (Lecture)	3 WLH
Examination: Written examination (90 minutes)	3 C

Examination requirements: detailed knowledge in cell biology, biochemistry and genetics of procaryotic microorgansims	

Admission requirements: can't be combined with core module M.Bio.101	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Jörg Stülke
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 10	

Georg-August-Universität Göttingen **Module M.Bio.142: Molecular genetics and microbial cell biology**	3 C 3 WLH

Learning outcome, core skills: Advanced knowledge of Molecular Genetics and microbial cell biology through case studies of model systems of molecular mycology (yeasts and filamentous fungi). Acquisation of knowledge up to the "Review" level in one topic.	**Workload:** Attendance time: 42 h Self-study time: 48 h

Course: Molecular genetics and microbial cell biology (Lecture)	3 WLH
Examination: Written examination (90 minutes)	3 C

Examination requirements: detailed knowledge in cell biology, biochemistry and genetics of eucaryotic microorgansims	

Admission requirements: Can´t be combined with core module M.Bio.102 or key competence module M.Bio.172.	**Recommended previous knowledge:** • Watson, Molecular Biology of the Gene, Pearson, 7th Edition • Alberts, Molecular Biology of the Cell, Garland, 5th Edition
Language: English	**Person responsible for module:** Prof. Dr. Gerhard Braus
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 10	

Georg-August-Universität Göttingen **Module M.Bio.144: Cellular and molecular biology of plant-microbe interactions**	3 C 3 WLH

Learning outcome, core skills: Introduction into theory and methods for the analysis of plant-microbe interactions on the cell biological and molecular level.	**Workload:** Attendance time: 42 h Self-study time: 48 h

Course: lecture: Plant-microbe-interactions (Lecture)	3 WLH
Examination: Written examination (54 minutes)	3 C

Examination requirements: knowledge of basic concepts in plant-microbe-interactions	

Admission requirements: Can´t be combined with core module M.Bio.104	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Volker Lipka
Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 10	

Georg-August-Universität Göttingen **Module M.Bio.156: Structural biochemistry**	3 C 3 WLH

Learning outcome, core skills: Methods in Structural Biology,structure and function of biological macromolecules. Structure and folding of proteins, structure-function relationships, protein-protein and protein-nucleic acid complexes. Structure-based drug-design	**Workload:** Attendance time: 42 h Self-study time: 48 h

Course: lecture: Structural Biology (Lecture)	3 WLH
Examination: Written examination (90 minutes)	3 C

Examination requirements: The students show that they know the basics of structural biology. They are familiar with biochemical and analytical methods in protein and macromolecular complex- analysis. They have deepened knowledge about selected proteins and protein complexes. The students know the basics in structural resolution and structural characteristics of proteins.	

Admission requirements: can't be combined with M.Bio.105	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Ralf Ficner
Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 10	

Georg-August-Universität Göttingen **Module M.Bio.158: Enzyme catalysis and biological chemistry**	3 C 3 WLH

Learning outcome, core skills: Catalytic mechanisms of enzymes, mechanisms of macromolecular complexes, biocatalysis, kinetics und thermodynamics of biochemical reactions, chemical model systems of enzymes, synthesis of biooligomers, synthesis of ligands, ligation techniques, array technologies	**Workload:** Attendance time: 42 h Self-study time: 48 h

Course: lecture: Enzyme Catalysis and Chemical Biology (Lecture)	3 WLH
Examination: Written examination (90 minutes)	3 C

Examination requirements: • knowledge about kinetics and thermodynamics of biochemical reactions • knowledge about different organic synthesis mechanisms • knowledge about catalytic mechanisms of enzyme	

Admission requirements: can't be combined with M.Bio.107	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Kai Tittmann
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 10	

Georg-August-Universität Göttingen **Module M.Bio.172: Molecular genetics and microbial cell biology**	6 C 4 WLH

Learning outcome, core skills: Advanced knowledge of molecular genetics and microbial cell biology through case studies of model systems of molecular mycology (yeasts and filamentous fungi). Acquisation of knowledge up to the "Review" level in one topic.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Molecular genetics and microbial cell biology (Lecture)	3 WLH
Examination: Written examination (90min, 80% of grade), oral presentation within seminar (15min, 20% of grade) **Examination prerequisites:** regular attendance in seminar	6 C

Course: Molecular genetics and microbial cell biology (Seminar)	1 WLH

Examination requirements: • detailed knowledge in cell biology, biochemistry and genetics of eucaryotic microorgansims • deepened knowledge of molecular biological, genetic and biochemical techniques to analyze eucaryotes • ability to reflect and present scientific paper	

Admission requirements: can't be combined with M.Bio.102 or M.Bio.142	**Recommended previous knowledge:** • Watson, Molecular Biology of the Gene, Pearson, 7th Edition; • Alberts, Molecular Biology of the Cell, Garland, 5th Edition
Language: English	**Person responsible for module:** Prof. Dr. Gerhard Braus
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 6	

Georg-August-Universität Göttingen **Module M.Bio.176: Structural biochemistry**	6 C 4 WLH

Learning outcome, core skills: methods in Structural Biochemistry, structure and function of biological macromolecules, structure and folding of proteins, structure-function relationships, protein-protein and protein-nucleic acid complexes, Structure-based drug-design, molecular recognition. Critical dealing with current biochemical topics. Independent acquisition of professional knowledge from publications by active participation in the seminar.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Structural biochemistry (Lecture)	3 WLH
Examination: Written examination (90min, 80% of grade), oral presentation within seminar (15min, 20% of grade) **Examination prerequisites:** regular participation in seminar	6 C

Course: Structural biochemistry (Seminar)	1 WLH

Examination requirements: knowledge of the basics in structural biochemistry, especially: • biochemical and analytic methods used in the characterization of proteins and macromolecular complexes • characteristics of selected proteins and protein complexes • the basics of structural resolution and the structural characteristics of proteins and nucleic acids	

Admission requirements: can't be combined with M.Bio.106 and M.Bio.166	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Ralf Ficner Dr. Achim Dickmanns
Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 5	

Georg-August-Universität Göttingen **Module M.Bio.344: Neurobiology 1 (key competence module)**	3 C 2 WLH

Learning outcome, core skills: Profound knowledge of essential techniques in molecular, cellular and systemic neuroscience and their application.	**Workload:** Attendance time: 28 h Self-study time: 62 h

Course: From gene to behavior (Lecture)	2 WLH
Examination: Written examination (60 minutes)	3 C

Examination requirements: Theoretical knowledge of the basic methods in neuroscience based on the contents of the lecture.	

Admission requirements: can't be combined with module M.Bio.304	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Martin Göpfert
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 27	

Georg-August-Universität Göttingen **Module M.Bio.348: Human genetics**	6 C 4 WLH

Learning outcome, core skills: Profound knowledge of specific human genetic aspects and principles of research in human genetics. Understanding of the methods for identification, analysis and manipulation of genes and gene functions. Basic insights into the structure and function of the human genome. Critical analysis of results from scientific publications. Scientific presentation and discussion of data.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Human genetics (Lecture)	2 WLH

Course: Modern Aspects of Human Genetics (Seminar) *Course frequency:* each semester	1 WLH
Course: Tumor genetics (Seminar) active participation in both seminar series	1 WLH

Examination: written examination (60 min) and two oral presentations (ca. 45 min)	6 C

Examination requirements: Profound knowledge of specific aspects and the basic principles in human genetic research. Analysis and presentation of scientific data.	

Admission requirements: can't be combined with key competence module M.Bio.369	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** PD Dr. rer. nat. Anja Uhmann
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 12	

Georg-August-Universität Göttingen **Module M.Bio.359: Development and plasticity of the nervous system (lecture)**	3 C 2 WLH

Learning outcome, core skills:	**Workload:**
The basics of the development and plasticity of the vertebrate nervous system are presented. Special emphasis is on the 3 following subjects: i) early development of the nervous system (induction and pattern formation, formation and survival of nerve cells, development of specific axonal projections, synaptogenesis), ii) developmental plasticity (experience- and activity-dependent development of the brain, critical periods) and iii) adult plasticity and regeneration (learning-induced plasticity, cellular mechanisms of plastic changes, neurogenesis, therapies after brain lesions). Deepened knowledge, up-to-date research results and understanding of scientific approaches in the field of the development and plasticity of the nervous system.	Attendance time: 28 h Self-study time: 62 h

Course: lecture: Development and plasticity of the nervous system (Lecture)	2 WLH
Examination: Oral examination (approx. 15 minutes)	3 C

Examination requirements:	
Profound knowledge of recent reserach and understanding of scientific methods in the field of development and plasticity of the nervous system.	

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Siegrid Löwel
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 35	

Georg-August-Universität Göttingen **Module M.Bio.360: Development and plasticity of the nervous system (seminar)**	3 C 2 WLH

Learning outcome, core skills: The students learn to present up-to-date publications on the development and plasticity of the nervous system and to discuss the results critically in a seminar report. Deepened knowledge, up-to-date research results and understanding of scientific approaches in the field of the development and plasticity of the nervous system. Critical discussion of up-to-date literature, scientific debate, sharpening of critical thought, promotion of multidisciplinarity. Training in presentation techniques and scientific writing.	**Workload:** Attendance time: 28 h Self-study time: 62 h

Course: seminar: Development and plasticity of the nervous system (Seminar)	2 WLH
Examination: oral presentation (~ 20 min) and essay (~ 8 pages)	3 C

Examination requirements: Profound knowledge of recent research and scientific methods in the field of development and plasticity of the nervous system.	

Admission requirements: attendance of M.Bio.359	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Siegrid Löwel
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 15	

Georg-August-Universität Göttingen **Module M.Bio.366: Introduction to behavioral biology (key competence module)**	3 C 3 WLH

Learning outcome, core skills: Profound knowledge of basic concepts in behavioral biology with special emphasis on behavioral ecology, sociobiology and cognition. Special consideration of the quantitative aspect of behavioral research. Students are able to present and discuss scientific issues in written form.	**Workload:** Attendance time: 42 h Self-study time: 48 h

Course: Introduction to behavioral biology (Lecture)	2 WLH
Examination: Written examination (90 minutes)	3 C

Examination requirements: Profound knowledge of basic concepts and the quantitative aspect of behavioral research	

Admission requirements: can't be combined with core module M.Bio.306 or key competence module M.Bio.346	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Julia Ostner
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 4	

Georg-August-Universität Göttingen **Module M.Bio.369: Human genetics (key competence module)**	3 C 2 WLH

Learning outcome, core skills: Profound knowledge of specific human genetic aspects and principles of research in human genetics. Understanding of the methods to identify, analyze and manipulate genes and their function. Basic insights into the structure and function of the human genome.	**Workload:** Attendance time: 28 h Self-study time: 62 h

Course: Human genetics (Lecture)	2 WLH
Examination: Written examination (60 minutes)	3 C

Examination requirements: Profound knowledge of specific aspects and the basic principles in human genetic research.	

Admission requirements: can't be combined with key competence module M.Bio.348	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** PD Dr. rer. nat. Anja Uhmann
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 10	

Georg-August-Universität Göttingen **Module M.Bio.392: Current Developmental Biology**	6 C 4 WLH

Learning outcome, core skills: Learning objectives: In depth knowledge of theoretical principles in developmental genetics, biochemistry, and biology as well as of practical methodology in analyzing morphogenetic and pattern formation processes. Understanding of methods to identify and analyze gene function as well as manipulate embryos. Knowledge of databases for *in silico* sequence analysis and model system specific databases. Insights into the evolution of developmental processes.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Developmental biochemistry, genetics, and biology (Lecture)	2 WLH
Examination: Written examination (90 minutes) **Examination prerequisites:** Oral presentation of a publication (ca. 20 min)	6 C

Course: Exercises to and consolidation of lecture contents (tutorial)	1 WLH

Course: Current Topics in Developmental Biology (Seminar)	1 WLH

Examination requirements: Advanced knowledge of principles in developmental genetics, biochemistry, and biology with emphasis on morphogenetic and pattern formation processes as well as focus on signal cascades and gene networks that control developmental processes. Understanding of techniques to identify, analyze, and manipulate the function of developmental genes as well as developmental processes. Knowledge of diverse model organisms with their strength and weaknesses. Application of this knowledge to new scientific questions.	

Admission requirements: cannot be combined with M.Bio.321 or M.Bio.393	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Ernst Anton Wimmer
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 5	

Georg-August-Universität Göttingen **Module M.Bio.393: Current Developmental Biology**	3 C 3 WLH

Learning outcome, core skills: In depth knowledge of theoretical principles in developmental genetics, biochemistry, and biology as well as of practical methodology in analyzing morphogenetic and pattern formation processes. Understanding of methods to identify and analyze gene function as well as manipulate embryos.	**Workload:** Attendance time: 42 h Self-study time: 48 h

Course: Developmental biochemistry, genetics, and biology (Lecture)	2 WLH
Course: Exercises to and consolidation of lecture contents (tutorial)	1 WLH
Examination: Written examination (90 minutes)	3 C

Examination requirements: Advanced knowledge of principles in developmental genetics, biochemistry, and biology with emphasis on morphogenetic and pattern formation processes as well as focus on signal cascades and gene networks that control developmental processes. Understanding of techniques to identify, analyze, and manipulate the function of developmental genes as well as developmental processes. Knowledge of diverse model organisms with their strength and weaknesses. Application of this knowledge to new scientific questions.	

Admission requirements: cannot be combined with M.Bio.321 or M.Bio.392	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Ernst Anton Wimmer
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 5	

Georg-August-Universität Göttingen **Module M.Bio.394: Frontiers in Neural Development**	6 C 4 WLH

Learning outcome, core skills: **Learning outcome:** In-depth knowledge of neural development of insects. In-depth knowledge of principles and mechanisms of neural development of vertebrates and insects (among others: regionalization of the neuroectoderm, axon guidance, synaptogenesis, neural stem cells, glia). Knowledge of the most important model systems for neuro-developmental biology. Basic insights into the evolution of neural development. In-depth knowledge of the most important experimental approaches in neuro-developmental biology. **Core skills:** Conception of experiments to answer scientific questions using modern methods.	**Workload:** Attendance time: 50 h Self-study time: 130 h

Course: Development and Evolution of the Nervous system (Lecture)	2 WLH
Examination: Written examination (90 minutes) **Examination prerequisites:** Presentation and discussion of self-developed experimental approaches	6 C

Course: Exercises and consolidation of lecture ‚Development and Evolution of the Nervous system' (tutorial)	1 WLH

Course: Conception of experiments with modern methods (Seminar)	1 WLH

Examination requirements: Knowledge of the neural development of vertebrates and invertebrates. Knowledge of different model systems and their respective strengths and disadvantages. Knowledge of modern methods for the analysis of neural development. Applying this knowledge to new scientific questions (for example, designing experiments and discussing possible outcomes).	

Admission requirements: can't be combined with M.Bio.322 or M.Bio.395	**Recommended previous knowledge:** Basics in developmental biology (e.g. module M.Bio.321 or respective textbook chapters) Basics of vertebrate neural development (e.g. module M.Bio 359 or respective textbook chapters)
Language: English	**Person responsible for module:** Prof. Dr. Gregor Bucher
Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students:	

5	

Georg-August-Universität Göttingen **Module M.Bio.395: Frontiers in Neural Development**	3 C 3 WLH

Learning outcome, core skills: In-depth knowledge of neural development of insects. In-depth knowledge of principles and mechanisms of neural development of vertebrates and insects (among others: regionalization of the neuroectoderm, axon guidance, synaptogenesis, neural stem cells, glia). Knowledge of the most important model systems for neuro-developmental biology. Basic insights into the evolution of neural development. In-depth knowledge of the most important experimental approaches in neuro-developmental biology.	**Workload:** Attendance time: 42 h Self-study time: 48 h

Course: Development and Evolution of the Nervous system (Lecture) can't be combined with M.Bio.322 or M.Bio.392	2 WLH
Course: Exercises and consolidation of lecture ‚Development and Evolution of the Nervous system' (tutorial)	1 WLH
Examination: Written examination (90 minutes)	3 C

Examination requirements: Knowledge of the neural development of vertebrates and invertebrates. Knowledge of different model systems and their respective strengths and disadvantages. Knowledge of modern methods for the analysis of neural development.	

Admission requirements: can't be combined with M.Bio.322 or M.Bio.394	**Recommended previous knowledge:** Basics in developmental biology (e.g. module M.Bio.321 or respective textbook chapters) Basics of vertebrate neural development (e.g. module M.Bio 359 or respective textbook chapters)
Language: English	**Person responsible for module:** Prof. Dr. Gregor Bucher
Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 5	

Georg-August-Universität Göttingen **Module M.Biodiv.402: Plant ecology and ecosystems research**	6 C 4 WLH

Learning outcome, core skills: The students • acquire an overview of the most important habitats all over the world and their respective vegetation and ecology • acquire profound knowledge of the habitats of exemplarily selected climate zones and their ecology • know basic correlations between climate, soil and vegetation on different continents • acquire a global overview of the anthropogenous causes of ecosystem burdens and biodivesity loss	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Vegetation and ecology of the world (Lecture)	2 WLH
Examination: Written examination (90 minutes) **Examination prerequisites:** Seminar talk (max. 25 minutes)	6 C

Course: Plant ecology and ecosystems research (Seminar) One seminar from following options: • M.Biodiv.402.4: Current topics in plant ecology and nature conservation • M.Biodiv.402.6: Anthropogenic impacts on biodiversity loss: an example from tropical intertidal wetlands	2 WLH

Examination requirements: Understanding of the ecosystems' and global perspectives of plant ecology and of consequences of anthropogenic impacts on ecosystems' biodiversity and conservation issues.	

Admission requirements:	**Recommended previous knowledge:** none
Language: English, German	**Person responsible for module:** Dr. Dietrich Hertel
Course frequency: each winter semester; 402.6 each summer semester	**Duration:** 1-2 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 20	

Georg-August-Universität Göttingen **Module M.Biodiv.403: Vegetation ecology and vegetation history**	6 C 4 WLH

Learning outcome, core skills: The students acquire knowledge and a profound understanding of temporal and spatial vegetation patterns; one focus lies on biomes, climate zones and other large-scale vegetation areas, another focus lies on biological and geobotanical principles and basics on different scale levels and in different natural environments. Perception and knowledge in basic and applied fields of advanced vegetation ecology, vegetation history, sociology and chorology of plants, conception and reception of scientific papers; presentation skills.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Vegetation ecology and vegetation history (Lecture) One lecture from following options: • M.Biodiv.402.1 Vegetation & ecology of the earth • M.Biodiv.403.2 General vegetation history of the earth	2 WLH
Course: Modern issues of vegetation science in agricultural landscapes (Seminar)	2 WLH
Examination: Seminar talk (ca. 30 minutes)	6 C

Examination requirements: Knowledge of temporal and spatial vegetation patterns with focus on biomes, climate zones and other large-scale vegetation areas.	

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Hermann Friedrich Behling
Course frequency: each winter semester	**Duration:** 1-2 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 16	

Additional notes and regulations: The seminars in modules M.Biodiv.403 and M.Biodiv.406 are mutually exclusive.

Georg-August-Universität Göttingen **Module M.Biodiv.404: Animal ecology**	6 C 4 WLH

Learning outcome, core skills: The lecture presents principles and theories of ecology and introduces current topics of ecological research. Topics include population ecology, interactions in animal communities, food webs, biodiversity and ecological theories. The seminar covers current topics of ecological and evolutionary research. In the seminar the students acquire advanced knowledge of methods and strategies to analyze ecological communities. Knowledge of ecological theories and modelling. Principles of animal populations and food webs. Experimental and statistical methods for the analysis of animal communities. Knowledge of current topics of animal ecological and evolutionary biology research.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Animal ecology (Lecture)	2 WLH
Examination: Written examination (90 minutes) **Examination prerequisites:** Oral presentation (ca. 20 minutes) **Examination requirements:** Knowledge of ecological principles and theories, population models. Functional responses, analysis and modelling of biotic interactions and food webs. Biodiversity and ecosystem functioning.	6 C

Course: Topics of animal ecology and evolution (Seminar)	2 WLH

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Stefan Scheu
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Georg-August-Universität Göttingen **Module M.Biodiv.412: Conservation biology**	6 C 4 WLH

Learning outcome, core skills: In 412-1, we provide a comprehensive overview of the foundation and history of conservation science, including underlying theories and principles in ecology and biodiversity research. In 412-2, we cover an introduction to trends in biodiversity and illustrate drivers of biodiversity decline such as habitat loss, fragmentation and degradation, overexploitation, climate change, and invasive species. We introduce methods to monitor biodiversity and ecosystem services. We conclude with international approaches to counteract biodiversity loss and critically discuss the role of protected areas, conservation management and ecosystem restoration. The seminars complement the lecture topics and cover recent debates in conservation biology, conservation in agricultural landscapes and global policies in environmental protection and conservation. **Core skills acquired:** By the end of the lecture, students will have understood the state of global biodiversity, major threats and mitigation measures. They will be able to develop conservation strategies, to critically judge conservation initiatives, and to advise decision makers.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Conservation biology (Lecture) One lecture of the following options: • M. Biodiv. 412-1: Origins of Conservation Biology • M. Biodiv. 412-2: International Nature Conservation	2 WLH

Course: Conservation biology (Seminar) One seminar from the following options: • M.Biodiv.412-3: Current topics in Conservation Biology • M.Agr.0089: Ecological Seminar • M.FES.312.1: Global Environmental and Forest Policy	2 WLH

Examination: Written examination, M.Biodiv.412-1 or M.Biodiv.412-2 (90 minutes) **Examination prerequisites:** Seminar talk (20 minutes)	6 C

Examination requirements: Participants understand the state of biodiversity, drivers of declines and mitigation measures in various habitats, globally. They have a comprehensive understanding of the methods used in conservation science, both for the natural and social science. They are able to make informed judgements on conservation management, actions and policies. They are able to connect different topical areas of conservation conceptually.	

Admission requirements: none	**Recommended previous knowledge:** none
Language:	**Person responsible for module:**

English	Prof. Dr. Johannes Kamp
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Additional notes and regulations:
The seminar M.Agr.0089 in M.Biodiv.412 and module M.Agr.0089 are mutually exclusive.

Georg-August-Universität Göttingen **Module M.Biodiv.425: Evolution of embryophyta**	6 C 4 WLH

Learning outcome, core skills: The students get to know the current state of research in the field of the organismic evolution of embryophyta through study, presentation and discussion of latest case studies concerning speciation, history of evolution, chromosomal and genomic evolution, reproduction biology, evolution of traits and coevolution. They get an overview of novel theoretical and methodical research approaches to the comprehension of plant evolution. They acquire the ability to develop evolutionary hypotheses and are able to choose appropriate model systems and methods for their validation. The students acquire practical skills in presentation, interpretation and discussion of results (in scientific English). They are able to describe and understand evolutionary processes, hypotheses and methods and to give examples for case studies on terrestrial plants. They can discuss scientific results in English.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Plant systematics and phycology (Seminar) *Course frequency:* each semester	2 WLH
Course: Speciation and evolution of land plants (Lecture) *Course frequency:* each winter semester	2 WLH
Examination: Written examination (60 minutes) **Examination prerequisites:** participation in the seminar and oral presentation (45 minutes) **Examination requirements:** In the written examination students demonstrate their abilities to understand and discuss evolutionary processes and hypotheses as well as their knowledge of case studies of land plants. In the seminar they must give a talk in scientific English and present the new results of research from the literature or from their own Master thesis.	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Elvira Hörandl
Course frequency: lecture: each winter semester, seminar: each semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 30	

Georg-August-Universität Göttingen **Module M.Biodiv.434: Introduction to the history of cultivated plants**	3 C 4 WLH

Learning outcome, core skills: The students acquire knowledge about the emergence of cultivated plants from wild plants (from wildtype to high-yielding crop plant): morphological changes, genetic principles, chronological processes of the dispersal history starting from the centers of origin/ manifolds. The students become acquainted with the tasks, methods and results related to research in vegetation history and archaeobotany (agricultural history). Upon completion of the module, students have the professional expertise to (microscopically) identify and address fossil plant remains or macro-remains (charred, not charred) and are able to microscopically identify wood species (carbonized, not caronized). They possess the ability to ecologically interpret species spectra for the reconstruction of the palaeo-environment.	**Workload:** Attendance time: 56 h Self-study time: 34 h

Course: Introduction to the history of cultivated plants (Lecture)	1 WLH
Course: Practical course of the history of cultivated plants - microscopic identification of subfossil plant remains (Exercise,Seminar)	3 WLH
Examination: Minutes / Lab report (max. 10 pages) **Examination requirements:** Knowledge of the emergence of high-yielding crops from wild plants. Skills for the identification of fossil plant residues or macro-remains and the ecological interpretation of species spectra for the paleo-environmental reconstruction.	3 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Hermann Friedrich Behling
Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 10	

Georg-August-Universität Göttingen **Module M.Biodiv.437: Methods in palaeoecology**	6 C 8 WLH

Learning outcome, core skills: The students learn various palaeoecological methods: analysis of annual rings, charcoal, algae, diatoms, ostracods, dinoflagellates, non-pollen palynomorphs (NPPs), amoebae, sediment parameters etc.. They acquire knowledge of different palaeoecological parameters regarding environment, vegetation, climate and human settlement history and their evaluation in the context of the global change research. They learn presentation and analysis methods and how to use modern software. The students get to know the broadness of possible applications using examples from current palaeoecological topics. Skills for the assessment of applications of palaeoecological analyses during environmental, vegetation and climate historical as well as archaeological studies. Independent realization of small problem and research oriented palaeoecological studies in the field of environmental, vegetation or climate history. Scientific examination of palaeoecological topics from global change research, presentation of results.	**Workload:** Attendance time: 112 h Self-study time: 68 h

Course: Methods in palaeoecology (Lecture)	1 WLH
Course: Methods in palaeoecology (Exercise)	5 WLH
Course: Current research results in palaeoecology and palynology (Seminar)	2 WLH
Examination: Oral Presentation (approx. 20 minutes) **Examination requirements:** Presentation of results of a practical work.	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Hermann Friedrich Behling
Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 15	

Georg-August-Universität Göttingen **Module M.Biodiv.441: Animal ecology: Evolutionary ecology**	6 C 8 WLH

Learning outcome, core skills: Students will learn basic techniques in phylogenetics. Oribatid mites (Chelicerata: Arachnida: Oribatida) serve as a model group. Phylogenetic relationships and biogeographical distribution patterns will be analyzed utilizing various molecular markers (18S rDNA, 28S rDNA, elongation factor 1 alpha, cytochrome oxidase I). In addition to this, the age of various taxa of oribatid mites will be studied. There is also the possibility to study the intraspecific variance of sexual and parthenogenetic species. Software includes IQ-Tree, MrBayes, and Geneious. Basic knowledge of molecular biology and bioinformatics is helpful but not mandatory to attend this course. Core skills: Modern techniques and procedures including statistical analyses for the discovery of phylogenetic relationships and biogeographical distribution patterns of animal groups. Knowledge of the intraspecific variance of sexual and parthenogenetic species.	**Workload:** Attendance time: 112 h Self-study time: 68 h

Course: Evolutionary ecology (Lecture)	2 WLH
Course: Evolutionary ecology - experiments (Exercise)	6 WLH
Examination: Protocol (max. 15 pages) and oral presentation (ca. 15 minutes)	6 C

Examination requirements: Knowledge of phylogenetic relationships and biogeographical distribution patterns of animal groups using the example of oribatid mites. Phylogenetic dating of animal species and determination of the intraspecific variance of sexual and parthenogenetic species.	

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Dr. Bastian Heimburger Prof. Dr. Stefan Scheu
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 12	

Georg-August-Universität Göttingen **Module M.Biodiv.442: Community ecology of animals**	6 C 8 WLH

Learning outcome, core skills: After completing this module, students can • analyse animal communities in ecological studies. The focus is on soil animal taxa. • ask scientific questions and posit hypotheses that can be tested. • sample animals and determine on species level, including taxa such as earthworms, spiders, beetles, diplopods, isopods, mites and collembolans. • collect environmental data from the study regions. • analyse animal and environmental data using univariate and multivariate techniques such as NMDS, DFA, PCA, DCA in R. • explain their findings in an oral presentation. Eventually, they summarize their findings in a ‘paper’ which has the same style as a scientific publication in an international journal.	**Workload:** Attendance time: 112 h Self-study time: 68 h

Course: Community ecology (Lecture)	2 WLH
Course: Community ecology - experiments (Practical course)	6 WLH
Examination: oral presentation (ca. 15 minutes) and protocol (max. 10 pages) **Examination requirements:** Knowledge of the invertebrate fauna of Germany, especially soil animals, such as earthworms, spiders, beetles, diplopods, isopods, mites and collembolans. Knowledge on univariate and multivariate statistical methods. Knowledge on scientific writing and data presentation.	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English, German	**Person responsible for module:** Prof. Dr. Mark Maraun
Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 12	

Georg-August-Universität Göttingen **Module M.Biodiv.445: Molecular analysis of trophic interactions in soil food webs**	6 C 8 WLH

Learning outcome, core skills: The students learn: • Techniques for the molecular analysis of tropic interactions in soil food webs. The preyspectra of ground-dwelling arthropods (collembolans, mites) from forests are determinedby using PCR based gut content analysis with specific DNA markers. • Design and realization of laboratory feeding experiments. • Methods of field sampling of soil animals, DNA extraction, PCR, gel electrophoresis,capillary electrophoresis, lipid analysis. • Statistical analysis with R. • Theoretical and practical knowledge on the structure of food webs and trophic interactions. • Structure of soil animal communities	**Workload:** Attendance time: 112 h Self-study time: 68 h

Course: Molecular analysis of trophic interactions in soil food webs (Lecture)	2 WLH
Course: Molecular analysis of trophic interactions in soil food webs - experiments (Practical course)	6 WLH
Examination: Protocol (max. 15 pages) and oral presentation (ca. 15 minutes)	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge of molecular biology
Language: English	**Person responsible for module:** Prof. Dr. Stefan Scheu Dr. Andre Junggebauer, Dr. Melanie Pollierer
Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: once	**Recommended semester:**
Maximum number of students: 12	

Georg-August-Universität Göttingen **Module M.Biodiv.446: Molecular zoology and insect-biotechnology**	6 C 8 WLH

Learning outcome, core skills: The module is aimed at students who want to gain in-depth knowledge of molecular genetic work in theory and practice. Relevant methods and experimental planning are taught theoretically and practically. Selected topics of molecular zoology are treated in depth in lectures and on the basis of current publications. Current developments of molecular methods in pest control and insect biotechnology will be covered. Learning objectives: • Application, experimental strategies and evaluation of different molecular biological methods. • Gene function analysis in zoology: how to identify relevant genes and how to study their function in model and non-model organisms? (including genetic screens, reverse genetics (RNAi), genome editing (CRISPR/Cas9), transgenesis) • Identification of orthologous genes in different species • Establishment of new molecular genetic model systems for zoological questions • Advanced discussion of current research topics in molecular zoology • Advanced discussion of recent approaches in insect biotechnology using molecular genetic methods (including pest control). Students should be able to: • design experimental strategies for the identification and analysis of gene function in non-model organisms • design the establishment of new molecular genetic model systems • be able to present and assess scientific questions on selected topics of molecular zoology.	**Workload:** Attendance time: 112 h Self-study time: 68 h

Course: Gene function analysis in diverse animals and applications in pest control (Lecture) *Contents*: molecular genetic methods; gene fuction analysis; selected topics from molecular zoology; most recent developments in insect biotechnology	2 WLH
Course: Topics of molecular zoology and insect biotechnology (Seminar)	2 WLH
Course: Molecular zoology and insect biotechnology (Exercise)	4 WLH
Examination: Oral Presentation (approx. 20 minutes)	6 C

Examination requirements: The students should be able to apply the contents and methods listed as “core skills” to new questions.	

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Gregor Bucher

Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 8	

Additional notes and regulations:
The module cannot be taken in combination with B.Biodiv.370.

Georg-August-Universität Göttingen **Module M.Biodiv.447: Biodiversity, ecology and evolution of terrestrial invertebrates**	6 C 7 WLH

Learning outcome, core skills: In-depth insight into the diversity of terrestrial arthropods, especially spiders and insects, and their importance in ecological systems. In-depth knowledge of the invertebrate fauna of Central Europe. In-depth knowledge of the ecology and evolution of terrestrial invertebrates. Key competencies: Overview of the diversity of terrestrial arthropods, in-depth knowledge of dichotomous identification keys, analysis and assessment of identification characters, in-depth knowledge of the ecology and evolution of terrestrial invertebrates.	**Workload:** Attendance time: 98 h Self-study time: 82 h

Course: Biodiversity, ecology and evolution of terrestrial invertebrates (Lecture)	2 WLH
Course: Biodiversity, ecology and evolution of terrestrial invertebrates (Exercise)	5 WLH
Examination: Minutes / Lab report (max. 15 pages)	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Stefan Scheu
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 20	

Georg-August-Universität Göttingen **Module M.Biodiv.450: Impact of global climate change on plant communities and their functional traits**	6 C 8 WLH

Learning outcome, core skills: The students • have profound knowledge of interactions between plants • have an overview of completion research • understand the concept of “functional traits” of species and communities • are able to analyze the reaction of plants to the main factors of global climate change experimentally • have profound knowledge of the design and statistical (variance analytical) analysis of ecological experiments • are able to present the results of ecological experiments in accordance with scientific standards in written and oral form.	**Workload:** Attendance time: 112 h Self-study time: 68 h

Course: Impact of global climate change on plant communities (Lecture)	2 WLH
Course: Impact of global climate change on plant communities (Exercise)	6 WLH
Examination: Minutes / Lab report (max. 10 pages) **Examination prerequisites:** Oral presentation (max. 25 minutes)	6 C

Examination requirements: Knowledge of plant interactions and of the concept of “functional traits”. Knowledge of experimental methods and statistical procedures in botanical (population) ecology. Knowledge of strategies for the adaption of plants to climate change.	

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Dr. Dietrich Hertel
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 12	

Georg-August-Universität Göttingen **Module M.Biodiv.470: Morphology of animals: Microscopical methods in comparative morphology**	6 C 8 WLH

Learning outcome, core skills: Microscopical techniques such as confocal laser-scanning microscopy (clsm), serial block-face scanning electron microscopy (SBFSEM) and scanning electron microscopy (SEM) exhibit detailed but different insights into animal anatomy. Therefore, a comparative approach including various microscopic methods allows comprehensive investigations of a certain topic – reaching from studies of organ systems and tissue types over surface structures towards ultrastructural details of various cell types. The course will give the theoretical and practical background of different preparation techniques and microscopic methods, and will teach the latter in a scientific and project related context. With focus on comparative investigations, pros and cons of different methods will be clarified while using specific examples related to ongoing research in the department “Animal Evolution and Biodiversity”. The goal of the course is to impart basic knowledge of different morphological methods and to work on own student projects during the course.	**Workload:** Attendance time: 112 h Self-study time: 68 h

Course: Introduction into microscopical methods and preparation techniques (Lecture)	2 WLH
Course: Comparative microscopical investigations of animal tissues and organ systems (Exercise)	6 WLH
Examination: Protocol (max. 15 pages) **Examination prerequisites:** oral presentation (ca. 15-20 Min.) **Examination requirements:** Competence and skills in confocal laser scanning microscopy (clsm), as well as scanning and serial-block-face-scanning electron microscopy (SEM, SBFSEM); characterization of organ systems, tissue and cell structure; microscopical techniques (preparation, fixation, staining, embedding); computational 3D-reconstruction.	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English, German	**Person responsible for module:** Dr. rer. nat. Christian Andreas Fischer
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** 1
Maximum number of students: 6	

Georg-August-Universität Göttingen **Module M.Biodiv.479: Phylogenomics**	6 C 6 WLH

Learning outcome, core skills: The research field of phylogenomics comprises the utilization of genome and transcriptome data for the inference of phylogenetic trees. In this modul students will be introduced to the theoretical and practical knowledge of how to assemble genomes and transcriptomes and their annotation. Moreover, techniques to search for genes in such data will be presented (e.g., BLAST, hidden markov models). Additionally, the students will work with different alignment- and read mapping methods. Based on the assembled datasets different tree reconstruction methods will be conducted (Neighbor Joining, Maximum Parsimony, Maximum Likelihood, Bayesian Inference) and critically discussed. Within an accompanying seminar actual studies in the field of evolutionary genomics are presented and discussed. Students get an introduction into the Linux environment and the installation of all programs will be done independently. The command line will be mainly used for all analyses. Students will learn to perform genome-scale analyses for the reconstruction of phylogenetic trees. Within a seminar students will present recently published genomic studies in English language. In the last week, datasets will be analysed independently and results will be summarized as poster, which will be presented within a short talk.	**Workload:** Attendance time: 84 h Self-study time: 96 h

Course: Introduction to phylogenomics (Lecture)	1 WLH
Course: Introduction to phylogenomics (Seminar) This course is open for students of the double degree programme at the partner universities. The sessions of this course might be conducted in a remote format like online video conference.	1 WLH
Course: Introduction to phylogenomics (Exercise)	4 WLH
Examination: Short talk (ca. 12-15 minutes) and poster presentation	6 C

Examination requirements: Knowledge of how to reconstruct phylogenetic trees using genomic and transcriptomics data. Critical discussion of phylogenetic analyses and overview of actual controversies.	

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Dr. Sarah Bank-Aubin
Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** 1
Maximum number of students: 15	

Georg-August-Universität Göttingen **Module M.Biodiv.491: Next generation sequencing for evolutionary biology**	6 C 4 WLH

Learning outcome, core skills: The students acquire knowledge of the various systems and techniques for “next generation sequencing”. The focus of the module lies on the fast developing field of bioinformatics and data analysis. Lab methods are explained and discussed. The students learn the different possible applications for “next generation sequencing” data in evolutionary biology of animals and plants, for example biodiversity, evolution of traits, adaption, phylogeography, population genetics, hybridization, genotyping and QTL (quantitative trait locus) analyses. They get an overview of the theory and gain practical experiences in this new research area. They acquire the competence to choose suitable methods for evolutionary questions and to test hypotheses on non-model organisms. The students are able to list the differences and (dis)advantages of various “next generation sequencing” methods and to select suitable methods to analyze specific evolutionary questions by use of non-model organisms. They are able to compare and analyze the raw data of “next generation sequencing” and to annotate genes of a compared genome or transcriptome. The students shall present and discuss case studies from the field of “next generation sequencing” during the seminar in scientific English.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: M.Biodiv.491-1 Next generation sequencing: methods, data analysis and applications (Lecture)	0,5 WLH
Course: M.Biodiv.491-2 Next generation sequencing: examples of botanical and zoological studies (Seminar)	0,5 WLH
Course: M.Biodiv.491-3 Analysis of next generation sequencing data (Exercise)	3 WLH
Examination: Minutes / Lab report (max. 12 pages) **Examination prerequisites:** Oral presentation (max. 20 min.) **Examination requirements:** Knowledge of the various applications of "next generation sequencing" in evolutionary biology of animals and plants. Overview of the theory and practical experiences in this new research area.	6 C

Admission requirements: none	**Recommended previous knowledge:** Speciation and evolution of land plants (Lecture: M.Biodiv.425). Basic knowledge about programs that deal with DNA conting assembly and multiple sequence alignment (e.g. Geneious) are advantageous
Language: English	**Person responsible for module:** Natascha Dorothea Wagner

Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 10	

Georg-August-Universität Göttingen **Module M.Biodiv.492: Molecular methods for “Next Generation Sequencing”in Evolutionary Biology and Systematics**	6 C 4 WLH

Learning outcome, core skills: The students gain a detailed understanding of the use of next generation sequencing techniques for phylogenetic and evolutionary studies in plants and animals. They achieve the theoretical and practical knowledge for the application of Illumina based short-read sequencing and Nanopore long-read sequencing methods. Students will be introduced to the preparation of sequencing libraries for Illumina and Nanopore sequencing. Competence for specific laboratory methods (RNA and DNA extraction, quality checks, probe design, library preparation, target enrichment, various sequencing techniques) and basic skills for analysis of data will be gained. An introduction to the computational analysis of raw data from Illumina and Nanopore sequencing (base calling, quality checks, assembly) will be given.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Introduction into molecular markers (Lecture)	1 WLH

Course: Target enrichment and Nanopore sequencing (Exercise)	3 WLH
Examination: Minutes / Lab report (max. 12 pages)	6 C

Examination requirements: The students show in the practical protocol (including introduction, methods, results, discussion, and literature cited) their competence to collect and analyze a genomic DNA sequencing dataset on non-model organisms (plants and animals). Results must be interpreted in the context of a specific evolutionary or phylogenetic framework and presented within an oral presentation.	

Admission requirements: none	**Recommended previous knowledge:** Lecture „Speciation and Evolution of Land Plants“ in module M.Biodiv. 425
Language: English	**Person responsible for module:** Dr. Salvatore Tomasello
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 12	

Georg-August-Universität Göttingen **Module M.Biodiv.610: Science Communication in Biodiversity research**	6 C 4 WLH

Learning outcome, core skills: Making science accessible to the general public is becoming increasingly important to address current global challenges. A fluent dialogue between scientists and policy makers, industry, and the rest of the society is absolutely necessary for science to have an influence in a positive and more sustainable future, for instance. Abilities in scientific outreach are gradually becoming one of the requirements in many job descriptions and research projects funded by governments, private companies and other institutions. However, learning how to communicate science has traditionally not been included in the curriculum of many scientific careers. This course provides the basic knowledge for scientists to effectively communicate about biodiversity to the general public. We will show how the Biodiversity Museum of the University of Göttingen can be used as platform for public outreach. The modul includes a lecture and a seminar to communicate the basics of science outreach, as well as a practical part where we will use the collections and tools of the Biodiversity Museum for individual projects. The main objectives of this course are: 1. Learn the fundamentals of science messaging and benefits of science communication to the society. 2. Communicate scientific knowledge to several different broad audiences, including general community members, youth, and policy makers. 3. Produce your own effective science communication in biodiversity, e.g interviews, videos, photos or a museum exhibition project.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Introduction to science communication (Lecture)	1 WLH
Course: Introduction to science communication (Seminar) A few sessions might be conducted in a remote format like online video conference.	1 WLH
Course: Science communication in biodiversity research (Exercise)	2 WLH
Examination: Project presentation within a talk (approx. 30 min.) **Examination prerequisites:** Realization of a science communication project within biodiversity research (e.g., design of a webpage, a movie or of an exhibition).	6 C

Examination requirements: Knowledge of basics in science communication. Learning of different techniques to present scientific knowledge.	

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Maria Teresa Aguado Molina

Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 12	

Georg-August-Universität Göttingen **Module M.Biodiv.611: Biodiversity research in the museum**	6 C 4 WLH

Learning outcome, core skills: Museums play a fundamental role in advancing scientific knowledge, particularly in the biological sciences. Their extensive collections, international collaboration and curatorial expertise are instrumental in advancing knowledge in various biological disciplines. This course provides the basic knowledge for scientists to investigate biological questions using a zoological collection. Through a combination of lectures, seminars, practical sessions and readings, students will learn about the importance of natural history collections and their impact on biodiversity research, and how to develop a scientific project using the collections and tools of the Biodiversitätsmuseum. The Zoological Collections of the Biodiversitätsmuseum comprise more than 120,000 specimens ranging from flatworms over extinct birds to the complete skeleton of a sperm whale, which have a scientific value, as well as cultural and historical. Currently some specimens are being exhibited in the Forum Wissen and others constitute the core of the Biodiversitätsmuseum exhibition, all of them and many more conveniently stored in the magazines are available for researchers to conduct their investigations. The main contents of this course are: • Value of natural history collections and their impact on research • Current scientific research studies in a museum: from taxonomy to museomics • How to develop collection-based research • Digitalization and scientific illustration • Preservation and management of collections	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Biodiversity research in the museum (Lecture)	1 WLH
Course: Biodiversity research in the museum (Seminar)	1 WLH
Course: Biodiversity research in the museum (Exercise)	2 WLH
Examination: Project presentation (ca. 20 minutes) **Examination requirements:** Realization of a scientific project using the collection of the Biodiversitätsmuseum and presentation of the project.	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Maria Teresa Aguado Molina
Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 12	

Georg-August-Universität Göttingen **Module M.CoBi.541: Bioinformatics and its areas of application**	4 C 3 WLH

Learning outcome, core skills: The students will acquire knowledge on a diverse range of topics - both applied as well as purely bioinformatical. For this, there will be research-oriented lectures. On the applied side, these topics prominently feature - but are not limited to - the different types of "omics"-approaches available to answer biological questions (genomics, transcriptomics, phylogenomics, metabolomics, proteomics, CHIP-Seq, comparative genomics, phenomics etc). They will learn about feasibility and different approaches to data analysis. Furthermore, students will learn about the digitization of the biological sciences, featuring aspescts such as machine readable phenotypic annotation of morphology, phenotypic database, biological image analysis and more. Finally, the students will acquire knowledge on algorithmic and statistical aspects of bioinformatics, featuring the latest developments and challenges in the development of new bioinformatic tools for life sciences.	**Workload:** Attendance time: 42 h Self-study time: 78 h

Course: Bioinformatics and its areas of application (Lecture) *Contents*: This course provides an appetizer of the various applications and uses of bioinformatics - especially those represented by research on Göttingen Campus.	3 WLH
Examination: Term Paper (max. 10 pages), not graded **Examination requirements:** Students show that they gained an overview of the diversity of areas of application for algorithmic and applied bioinformatics - including tools for computational biology to solve biological questions - as well as in depth knowledge on a topic of choice for the essay.	4 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Jan de Vries
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** 1
Maximum number of students: 15	

Georg-August-Universität Göttingen **Module M.INC.1003: Animal Conservation**	6 C 4 WLH

Learning outcome, core skills: In the lecture "Animal ecology" students will learn about advanced principles and theories of ecology and will be introduced to current topics of ecological research. Focus in this lecture are e.g. models of populations, functional reactions, experimental analyses and modelling of interactions and food webs, macro-ecological correlations and theories. The module part "Origins of Conservation Biology" addresses the development of Conservation Biology as scientific field. It shows how important findings from Animal Ecology and Biogeography have shaped our understanding of human impact on animal communities and populations.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Animal Ecology (Lecture)	2 WLH
Examination: Written examination (90 minutes)	3 C

Course: Origins of Conservation Biology (Lecture)	2 WLH
Examination: Written examination (90 minutes)	3 C

Examination requirements: Knowledge of basic principles and theories of ecology, population models, functional reactions, analyses and modelling of organismic interactions and food webs as well as macro-ecological correlations. Understanding of Animal Ecology and Biogeography as basis for the development of Conservation Biology, knowledge on results of major studies carried out at community and population level.	

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. rer. nat. Matthias Waltert
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 10	