Georg-August-Universität
Göttingen

Directory of Modules

zu der Prüfungs- und Studienordnung für den konsekutiven Master-Studiengang "Developmental, Neural and Behavioural Biology" (Amtliche Mitteilungen I Nr. 42/2013 S. 1664, zuletzt geaendert durch Amtliche Mitteilungen I Nr. 50/2020 S. 1040)

Modules

Index by areas of study

I. Master-Studiengang "Developmental, Neural and Behavioural Biology"

Examination components with a rating of 120 C must be completed.

1. Fachstudium

Elective compulsory modules with a total rating of 60 C must be successfully completed in accordance with the following provisions.

a. Fachmodule

Three of the following core modules worth 36 C must be successfully completed.

b. Vertiefungsmodule

Two of the following advanced modules worth 24 C must be successfully completed. The entrance requirement is successful completion of the respectively matching core module.

2. Professionalisierungsbereich

Compulsory and elective compulsory modules with a total rating of 30 C must be successfully completed in accordance with the following provisions.

a. Wahlpflichtmodule

Modules with a rating of 24 credits should be successfully completed in accordance with the following provisions.

aa. Profilmodul

An additional elective compulsory module (profile module) totalling 12 C must be successfully completed. This may be a core module not yet completed and listed under no. 1 letter a or any core module from the biology master degree programme “Microbiology and Biochemistry” or a module in the biology master degree programme “Biodiversity, Ecology and Evolution”. Instead of a single module, several modules with a total rating of at least 12 C can be completed, but not more than three modules. If several modules are to be completed instead of a single module or the module(s) is / are to be completed outside the Faculty of Biology and Psychology, this needs authorisation by the examination board, and must be applied for and reasoned by the student. A reason exists if the completion of several modules or those outside the Faculty of Biology and Psychology promotes the study objective.

bb. Schlüsselkompetenzmodule

Elective compulsory modules with a rating of 12 C should be successfully completed to acquire key competences. The following modules can be selected from the range contained in the degree programme; modules M.Bio.343 to M.Bio.348, modules M.Bio.363 to M.Bio.369 and modules M.Bio.390 to M.Bio.395 cannot be taken in combination with the matching core module:

In addition, all key competence modules from those offered in the master degree programme “Microbiology and Biochemistry”, all modules from those offered in the mathematics and natural sciences faculties or modules from the university's module index of key competences and the central institution for languages and key qualifications (ZESS) can be selected. Students may apply to the examination board for the admission of other modules; the application may be rejected without statement of reasons; the student applying does not have any right of legal recourse.

cc. Deutsch als Fremdsprache

Students unable to demonstrate German language skills at least equivalent to level B2 according to the Common European Reference Framework for Language must – instead of the modules according to letter bb. complete modules of at least 6 C to acquire additional German language skills based on the examination and study regulations for courses offered to international students, as offered by the department of German as a foreign language.

b. Pflichtmodul

The following compulsory module with a rating of 6 C must be successfully completed:

3. Masterarbeit

30 C are awarded for successful completion of the master thesis.

Georg-August-Universität Göttingen **Module M.Bio.303: Cell biology**	12 C 14 WLH

Learning outcome, core skills: **Learning outcome:** Profound insights into the molecular organisation of cells, cell proliferation, differentiation and cell death as well as the mechanisms of cell communication. Understanding of techniques for the identification, analysis and manipulation of gene functions (e.g. genetic, transgenic und reverse genetic). Knowledge of relevant databases for the in silico sequence analyses. **Core skills:** Planning and execution of molecular biological experiments on cultured cells. Practice of techniques for the establishment and culturing of cell lines. Critical analysis of results, scientific presentation and discussion of data. Use of data bases for molecular biological and cell biological research. Literature research und critical analysis of this literature.	**Workload:** Attendance time: 196 h Self-study time: 164 h

Course: Molecular cell biology (Lecture)	2 WLH
Course: Topics in molecular cell biology (Seminar)	1 WLH
Examination: Written examination (90 minutes) **Examination prerequisites:** oral presentation (seminar), protocols to the practical experiments as well as presentation and discussion of results	

Course: Methods course with tutorial: Cell biology three days a week full time over five weeks	11 WLH

Examination requirements: Profound knowledge of the molecular organisation of cells, cell proliferatio, differentiation, cell death as well as the mechanisms of cell communication.	

Admission requirements: can't be combined withl M.Bio.343 or M.Bio.363	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. rer. nat. Sigrid Hoyer-Fender
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.304: Neurobiology 1**	12 C 14 WLH

Learning outcome, core skills: Theoretical and practical knowledge of basic methods in molecular, cellular and systemic neuroscience. The curriculum includes experiments in neurogenetics, neuroanatomy, neurophysiology and neuroethology. The spectrum of methods ranges from the analysis of gene expression patterns to neuronal tracing techniques, electrophysiology, biomechanical and behavioural analysis and screening methods. The module provides the basis for advanced courses in neurobiology such as “Neurobiology 2”. Introducing a broad spectrum of state-of-the-art experimental and analytical methods, the course will put the students into the position to generate, interpret and present neurobiological data. Profound knowledge of essential techniques in Neuroscience and their application.	**Workload:** Attendance time: 196 h Self-study time: 164 h

Course: From gene to behavior (Lecture)	2 WLH
Examination: Written examination (120 minutes) **Examination prerequisites:** regular attendance, oral presentation of experimental results with reference to current literature	

Course: Methods course: Basic neurobiology	12 WLH

Examination requirements: Knowledge of lecture topics; competence in oral and written (lab report) presentation of experimental data.	

Admission requirements: can't be combined with key competence module M.Bio.344	**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.305: Neurobiology 2**	12 C 14 WLH

Learning outcome, core skills: **Learning outcome:** Ability to perform neuroscientific research independently. Profound knowledge in a range of current concepts in Neuroscience including detailed knowledge of specific classical and novel topics. Execution of individual research projects including independent development, planning, analysis and interpretation of experiments with reference to current literature. Discussion and presentation of scientific results. **Core skills:** Profound knowledge of current concepts and state-of-the-art methods in Neuroscience. Ability to perform scientific work independently.	**Workload:** Attendance time: 196 h Self-study time: 164 h

Course: Current questions and concepts in neurosciences (Lecture)	2 WLH
Examination: Written examination (120 minutes) **Examination prerequisites:** Presentation of the experimental results in form of a poster and a protocol	

Course: Methods course: Advanced course in neurobiology	12 WLH

Examination requirements: Profound knowledge of current concepts and state-of-the-art methods in Neuroscience.	

Admission requirements: M.Bio.304	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Andre Fiala
Course frequency: each summer 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.306: Introduction to Behavioral biology**	12 C 12 WLH

Learning outcome, core skills: The students learn the basic concepts in behavioral biology with emphasis on behavioral ecology, sociobiology and cognition under special consideration of the quantitative aspect of behavioral research. They gain insights into essential methods from this field of research. Students should be able to present and discuss scientific issues in oral and written form. They should also be able to gather quantitative data in the context of simple questions from the field of behavioral biology (under guidance).	**Workload:** Attendance time: 196 h Self-study time: 164 h

Course: Introduction to behavioral biology (Lecture)	3 WLH
Course: Concepts of behavioral biology (Seminar)	1 WLH
Course: Methods course: Methods in behavioral biology	8 WLH

Examination: Written examination (90 minutes) **Examination prerequisites:** Regular participation, oral presentation within the seminar	

Examination requirements: Profound knowledge of basic concepts in behavioral biology with special emphasis on behavioral ecology, sociobiology and cognition.	

Admission requirements: can't be combined with key competence module M.Bio.346 or M.Bio.366	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Dr. Matthias Markolf 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: 12	

Georg-August-Universität Göttingen **Module M.Bio.307: Behavioral biology**	12 C 14 WLH

Learning outcome, core skills: Students know the principles of the evolutionary approach in behavioral analyses. They gained rofound practical knowledge of methods important for behavioral biology. Students are able to present and discuss scientific issues in oral and written form. They can plan and realize simple projects and experiments from the field of behavioral biology. The Students know how to gather and analyse quantitative data with various technical tools.	**Workload:** Attendance time: 196 h Self-study time: 164 h

Course: Behavioral biology (Lecture)	3 WLH
Course: Behavioral biology (Seminar)	1 WLH
Course: practical course in Behavioral biology with the possibility to do parts of the course in Madagsacar or Peru	10 WLH

Examination: Written examination (90 minutes) **Examination prerequisites:** regular and active participation, oral presentation within the seminar (15 min)	12 C

Examination requirements: Profound knowledge of determinants and mechanisms of behavior. Ability to implement important methods in behavioral biology.	

Admission requirements: core module M.Bio.306 or key competence module M.Bio.346 'Introduction to Behavioral biology'; can't be combined with key competence module M.Bio.347	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Dr. Claudia Fichtel
Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** from 2
Maximum number of students: 12	

Georg-August-Universität Göttingen **Module M.Bio.308: Social behavior and communication**	12 C 14 WLH

Learning outcome, core skills: Basic knowledge of social behavior, communication and cognition of animals, especially primates. Overview of methods used in this field of research. Application of comparative methods of analysis. Integration of current scientfic research in a historical context. Design and realization of behavioral studies, project management, computer-based data collection, statistical analyses, presentation of scientific issues in oral and written form.	**Workload:** Attendance time: 196 h Self-study time: 164 h

Course: Social behavior and communication (Lecture)	2 WLH
Course: Social behavior and communication (Seminar)	2 WLH
Course: methods course: Social behavior and communication including a two-week excursion	10 WLH

Examination: Minutes / Lab report (max. 20 pages)	8 C

Examination: Oral Presentation (approx. 15 minutes) **Examination prerequisites:** regular attendance	4 C

Examination requirements: Knowledge of the basics of social behavior, communication and cognition of animals. Knowledge of the most important hypotheses on the evolution of communication and cognition.	

Admission requirements: core mdoule M.Bio.306 or key competence module M.Bio.346 'Introduction to Behavioral biology'	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Julia Fischer PD Dr Oliver Schülke
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.Bio.310: Systems biology**	12 C 14 WLH

Learning outcome, core skills: Subject of this module are the formal description, modeling, analysis and simulation of complex interactions between the components (molecules, cells, organs) of living systems on different levels of abstraction. Biomolecular networks, like networks of metabolic signaling and transduction will be introduced and various graph based abstractions of interaction networks will be demonstrated (entity interaction graph, boolean networks, Petri networks). The students will get to know basics of the graph theory (analysis of paths, cluster coefficients, centrality, etc.) and they will learn how to apply the respective theory to biomolecular networks. The students will be introduced to different high-throughput techniques and their application to biomolecular networks. The simulation of molecular networks will be presented by selected examples.	**Workload:** Attendance time: 147 h Self-study time: 213 h

Course: Bioinformatics of systems biology (Lecture)	2 WLH
Course: Bioinformatics of systems biology (Exercise)	2 WLH
Course: Bioinformatics of systems biology (Seminar)	1 WLH
Course: Methods course 'Modelling and analysis of biological systems' 3 weeks full time	9 WLH

Examination: Oral examination (approx. 30 minutes)	6 C

Examination: Minutes / Lab report (max. 10 pages) **Examination prerequisites:** oral presentation (ca. 30 min), regular attendance	6 C

Examination requirements: Ability to model, analyze and simulate biomolecular networks	

Admission requirements: can't be combined with M.Bio.340	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Tim Beißbarth
Course frequency: each summer semester; verschieden; siehe Lehrveranstaltungen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 10	

Georg-August-Universität Göttingen **Module M.Bio.314: Cellular neurobiology**	12 C 20 WLH

Learning outcome, core skills: Advanced knowledge in planning and execution of scientific experiments in the field of general and cellular neurobiology. Accurate and detailed documentation of the experimental design and performance of the experiments as well as the obtained results. Evaluation of the advantages and disadvantages of the applied methods. Research and consideration of the basics (text book knowledge) and already published original papers in the specific field of research. Discussion of the obtained results.	**Workload:** Attendance time: 280 h Self-study time: 80 h

Course: practical course 7 weeks	20 WLH
Course: department seminar	

Examination: oral examination (ca. 30 min.) **Examination prerequisites:** regular attendance in departmental seminar, testified protocol (max 15 pages)	

Examination requirements: Profound knowledge of a specific research topic on cellular neurobiology. Familiarity with the methods used in this field. Proven ability to present own experimental data.	

Admission requirements: M.Bio.304: Neurobiology 1 or M.Bio.305: Neurobiologie 2	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Martin Göpfert
Course frequency: each semester	**Duration:** 1 oder 2
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 10	

Georg-August-Universität Göttingen **Module M.Bio.315: Molecular neurobiology - advanced module**	12 C 20 WLH

Learning outcome, core skills: Advanced knowledge in planning and execution of scientific experiments in the field of molecular neurobiology and neurogenetics. Accurate and detailed documentation of the experimental design and performance of the experiments as well as the obtained results. Evaluation of the advantages and disadvantages of the applied methods. Research and consideration of the basics (text book knowledge) and already published original papers in the specific field of research. Discussion of the obtained results.	**Workload:** Attendance time: 280 h Self-study time: 80 h

Course: practical course 7 weeks	20 WLH
Course: department seminar	

Examination: oral examination (ca. 30 min.) **Examination prerequisites:** testified protocol (max. 15 pages), regular attendance in departmental seminar	12 C

Examination requirements: Profound knowledge of a specific research topic in molecular neurobiology. Familiarity with the methods used in this field. Proven ability to present own experimental data.	

Admission requirements: M.Bio.304: Neurobiology 1 or M.Bio.305Neurobiology 2	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Andre Fiala
Course frequency: each semester	**Duration:** 1 oder 2
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 7	

Georg-August-Universität Göttingen **Module M.Bio.316: Systemic neurobiology - advanced module**	12 C 20 WLH

Learning outcome, core skills: Advanced knowledge in planning and execution of scientific experiments in the field of systemic neurobiology. Accurate and detailed documentation of the experimental design and performance of the experiments as well as the obtained results. Evaluation of the advantages and disadvantages of the applied methods. Research and consideration of the basics (text book knowledge) and already published original papers in the specific field of research. Discussion of the obtained results.	**Workload:** Attendance time: 280 h Self-study time: 80 h

Course: lab rotation 7 weeks	20 WLH
Course: department seminar	

Examination: oral block examination **Examination prerequisites:** testified protocol (max 15 pages), regular attendance in departmental seminar	12 C

Examination requirements: Profound knowledge of a specific research topic on neurobiology of primates. Familiarity with the methods used in this field. Proven ability to present own experimental data.	

Admission requirements: M.Bio.304, M.Bio.305, M.Bio.306, M.Bio.307or M.Bio.308	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Stefan Treue
Course frequency: each semester	**Duration:** 1 oder 2
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 8	

Georg-August-Universität Göttingen **Module M.Bio.317: Population and behavioral biology - advanced module**	12 C 20 WLH

Learning outcome, core skills: Advanced knowledge in planning and execution of scientific experiments in the area of population-, behavior- and sociobiology. Accurate and detailed documentation of the experimental design and performance of the experiments as well as the obtained results. Evaluation of the advantages and disadvantages of the applied methods. Research and consideration of the basics (text book knowledge) and already published original papers in the specific field of research. Discussion of the obtained results.	**Workload:** Attendance time: 280 h Self-study time: 80 h

Course: lab rotation 7 weeks, full days	20 WLH

Examination: oral block examination **Examination prerequisites:** testified protocol (max 15 pages)	12 C

Examination requirements: Profound knowledge in a selected research area in population and behavioral biology. Familiarity with the methods used in this field. Proven ability to present own experimental data.	

Admission requirements: M.Bio.306, M.Bio.307	**Recommended previous knowledge:** M.Bio.308
Language: English	**Person responsible for module:** Prof. Dr. Peter M. Kappeler
Course frequency: each semester	**Duration:** 1 oder 2
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 8	

Georg-August-Universität Göttingen **Module M.Bio.318: Social behavior, communication and cognition - advanced module**	12 C 20 WLH

Learning outcome, core skills: Insights into practical research in behavioral biology. Advaced knowledge of planning and realization of a scientific experiment in the field of social behavior, communication and cognition of mammals. Dealing with current research programs. Research and consideration of the basics (text book knowledge) and published original papers in the specific field of research. Documentation of execution and results of the experiments. Critical evaluation of advantages and disadvantages of the applied techniques and of the obtained results. Statistical analysis. Team work.	**Workload:** Attendance time: 280 h Self-study time: 80 h

Course: lab rotation 7 weeks, full days	20 WLH

Examination: oral block examination **Examination prerequisites:** testified protocol (max 15 pages)	12 C

Examination requirements: Profound knowledge in a selected reseach area in behavioral biology. Familiarity with the methods used in this field. Proven ability to present own experimental data.	

Admission requirements: M.Bio.306, M.Bio.308	**Recommended previous knowledge:** M.Bio.307
Language: English	**Person responsible for module:** Prof. Dr. Julia Fischer
Course frequency: each semester	**Duration:** 1 oder 2
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 5	

Georg-August-Universität Göttingen **Module M.Bio.319: Human genetics - advanced module**	12 C 20 WLH

Learning outcome, core skills: Advanced knowledge in planning and execution of scientific experiments in the field of human genetics. Accurate and detailed documentation of the experimental design and performance of the experiments as well as the obtained results. Evaluation of the advantages and disadvantages of the applied methods. Research and consideration of the basics (text book knowledge) and already published original papers in the specific field of research. Discussion of the obtained results.	**Workload:** Attendance time: 280 h Self-study time: 80 h

Course: lab rotation 9 weeks	20 WLH

Examination: oral block examination **Examination prerequisites:** scientific presentation and discussion of results (paper-style, max 10 pages)	12 C

Examination requirements: Profound knowledge of a specific research topic on human genetics. Familiarity with the methods used in this field.	

Admission requirements: M.Bio.303: Cell biology and key competence module M.Bio.348: Human Genetics or M.Bio.310: Systems biology and key competence module M.Bio.348: Human Genetics	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** PD Dr. rer. nat. Anja Uhmann
Course frequency: each semester	**Duration:** 1 oder 2
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 3	

Georg-August-Universität Göttingen **Module M.Bio.320: Bioinformatics - advanced module**	12 C 20 WLH

Learning outcome, core skills: Ability to perform a bioinformatical project independently. Objective of this projects can be the development and analysis of bioinformatical software tools, the automation of data processing or the analysis of biological data with bioinformatical techniques.	**Workload:** Attendance time: 280 h Self-study time: 80 h

Course: lab rotation 9 weeks	20 WLH
Course: department seminar	

Examination: oral block examination **Examination prerequisites:** testified protocol (max 15 pages), regular attendance in departmental seminar	12 C

Examination requirements: independent execution of a project in bioinformatics, scientific presentation of the results	

Admission requirements: M.Bio.310 Systems biology	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Tim Beißbarth Prof. Dr. Burkhard Morgenstern
Course frequency: each semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 2	

Georg-August-Universität Göttingen **Module M.Bio.321: Current Developmental Biology**	12 C 14 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 and application of methods to identify and analyze gene function as well as manipulate embryos. Molecular and histological analysis of developmentally-relevant induction and cell interaction processes. Knowledge of databases for *in silico* sequence analysis and model system specific databases. Insights into the evolution of developmental processes. Core skills: Planning and execution of molecular biological, genetic and embryological experiments to analyze developmental processes. Critical analysis of results, scientific presentation, and discussion of experimental data. Use of publicly accessible resources for research in developmental biology.	**Workload:** Attendance time: 196 h Self-study time: 164 h

Course: Developmental biochemistry, genetics, and biology (Lecture)	2 WLH
Course: Übungen und Vertiefung der Vorlesungsinhalte (Tutorial)	1 WLH
Course: Current Topics in Developmental Biology (Seminar)	1 WLH
Course: Aktuelle Techniken der Entwicklungsbiologie (Practical course)	10 WLH

Examination: Written examination (90 minutes) **Examination prerequisites:** Oral presentation of a publication (ca. 20 min); scientific presentation and discussion of own experimental data	12 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.392 or M.Bio.393	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Ernst A. Wimmer
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** 1 - 3
Maximum number of students:	

20	

Georg-August-Universität Göttingen **Module M.Bio.322: Frontiers in Neural Development**	12 C 14 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. Execution of selected genetic, molecular and cell biological experiments (inter alia Drosophila: mutants and transgenic approaches, fluorescent immunohistochemistry; mouse: in vivo labeling of brain slices, in vitro cell differentiation, neural stem cells, myelination). Critical analysis and discussion of the results. Application of image processing software for data analysis and scientific representation of data.	**Workload:** Attendance time: 190 h Self-study time: 170 h

Course: Development and Evolution of the Nervous system (Lecture)	2 WLH
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
Course: Development of the nervous system (methods course)	10 WLH

Examination: Written examination (90 minutes) **Examination prerequisites:** Presentation and discussion of self-developed experimental approaches	12 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. Applying this knowledge to new scientific questions (for example, designing experiments and discussing possible outcomes).	

Admission requirements: can't be combined with M.Bio.394 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. Gregor Bucher

Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** 2
Maximum number of students: 12	

Georg-August-Universität Göttingen **Module M.Bio.323: Introduction to Bayesian Statsistics and Information Theory**	12 C 12 WLH

Learning outcome, core skills: *The students learn the basic concepts and main applications of Bayesian Statistics, in particular Bayesian probabilities, parameter estimation and Bayesian credible intervals, importance and choice of prior distributions based on prior knowledge, Bayesian hypothesis testing, model tests and MCMC methods. All concepts will be presented in lectures and worked with in hands-on computer assignments. The module closes with a foray into information theory.*	**Workload:** Attendance time: 195 h Self-study time: 165 h

Course: Introduction to Bayesian Inference and Information Theory (Lecture)	3 WLH
Course: Classical problems in Bayesian Interference (Seminar)	1 WLH
Course: Programmierkurs	8 WLH

Examination: Written examination (90 minutes) **Examination prerequisites:** regular attendance, oral presentation in seminar	12 C

Examination: Written examination, not graded	

Examination requirements: Knowledge of the foundations of Bayesian probabilities and statistics and the ability to solve simple classic problems in Bayesian Inference.	

Admission requirements: none	**Recommended previous knowledge:** basics in probability calculation
Language: English	**Person responsible for module:** Prof. Dr. Michael Wibral
Course frequency: each winter semester	**Duration:**
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 10	

Georg-August-Universität Göttingen **Module M.Bio.331: Scientific project management - advanced module III**	6 C 5 WLH

Learning outcome, core skills: Acquisition of abilities in scientific presentation, project managment and scientific proposals. The students learn how to present a research concept in order to demonstrate the theoretical background to a scientific question, the experimental-methodical design and its practical implementation in answering the defined question based on the current state of research.	**Workload:** Attendance time: 70 h Self-study time: 110 h

Course: Colloquia at the GZMB or other departments accepted are seminars of invited speakers at colloquia, seminars series or symposia within the Göttingen Research Campus	1 WLH
Course: Preparation of a scientific proposal for the research project of the master thesis	4 WLH

Examination: scientific research concept	

Examination: oral block examination **Examination prerequisites:** active participation in 14 colloquia	

Examination requirements: Ability to plan scientific reserach projects.	

Admission requirements: two advanced modules	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Ernst A. Wimmer
Course frequency: each semester	**Duration:** 1 bis 2
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 32	

Georg-August-Universität Göttingen **Module M.Bio.340: Systems biology (key competence module)**	3 C 2 WLH

Learning outcome, core skills: Subject of this module are the formal description, modeling, analysis and simulation of complex interactions between the components (molecules, cells, organs) of living systems on different levels of abstraction. Biomolecular networks, like networks of metabolic signaling and transduction will be introduced and various graph based abstractions of interaction networks will be demonstrated (entity interaction graph, boolean networks, Petri networks). The students will get to know basics of the graph theory (analysis of paths, cluster coefficients, centrality, etc.) and they will learn how to apply the respective theory to biomolecular networks. The students will be introduced to different high-throughput techniques and their application to biomolecular networks. The simulation of molecular networks will be presented by selected examples.	**Workload:** Attendance time: 42 h Self-study time: 48 h

Course: Bioinformatics in systems biology (Lecture)	2 WLH

Examination: Oral examination (approx. 30 minutes)	3 C

Examination requirements: Ability to model, analyze and simulate biomolecular networks.	

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Tim Beißbarth
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.343: Cell biology (key competence module)**	6 C 3 WLH

Learning outcome, core skills: Profound insights into the molecular organisation of cells, cell proliferation, differentiation and cell death as well as the mechanisms of cell communication. Understanding of techniques for the identification, analysis and manipulation of gene functions (e.g. genetic, transgenic und reverse genetic). Literature research und critical analysis of this literature.	**Workload:** Attendance time: 42 h Self-study time: 138 h

Course: Molecular cell biology (Lecture)	2 WLH
Course: Topics in molecular cell biology (Seminar)	1 WLH

Examination: Written examination (90 minutes) **Examination prerequisites:** oral presentation (ca. 15 min)	6 C

Examination requirements: Profound knowledge of the molecular organization of cells, cell proliferation, differentiation, cell death as well as the mechanisms of cell communication.	

Admission requirements: can't be combined with M.Bio.303 oder key competence module M.Bio.363	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. rer. nat. Sigrid Hoyer-Fender
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.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 (120 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.346: Introduction to behavioral biology (key competence module)**	6 C 4 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 oral and written form.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Introduction to behavioral biology (Lecture)	3 WLH
Course: concepts of behavioral biology (Seminar)	1 WLH

Examination: Written examination (90 minutes) **Examination prerequisites:** oral presentation (~ 30 min)	6 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. 366	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Dr. Cornelia Kraus
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 8	

Georg-August-Universität Göttingen **Module M.Bio.347: Behavioral biology (key competence module)**	6 C 4 WLH

Learning outcome, core skills: Students know the principles of the evolutionary approach in behavioral analyses. Students are able to present and discuss scientific issues in oral and written form.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Behavioral biology (Lecture)	3 WLH
Course: Behavioral biology (Seminar)	1 WLH

Examination: Written examination (90 minutes) **Examination prerequisites:** regular and active participation, oral presentation within seminar	6 C

Examination requirements: Profound knowledge of determinants and mechanisms of behavior. Ability to use important methods of behavioral biology.	

Admission requirements: M.Bio.306 or M.Bio.346: Introduction to Behavioral Biology; can't be combined with core module M.Bio.307	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Dr. Claudia Fichtel
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.Bio.348: Human genetics (key competence module)**	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: Tumor genetics; Modern Human Genetics (Seminar) participation in both seminar series	2 WLH

Examination: written examination (60 min) and oral presentation (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.350: From vision to action**	3 C 2 WLH

Learning outcome, core skills: The lecture series From Vision to Action will provide an introduction to visual processing and action planning in the central nervous system of primates. We will provide an overview over the different processing stages along the two major visual processing streams, leading to object perception on the one hand, and providing the basis for movement planning on the other. We will put special emphasis on the discussion of general design and coding principles. Additionally, we will discuss how improved knowledge in neuroscience can lead to clinical applications, like visual and motor neuroprosthetics or improved neuropsychological programs.	**Workload:** Attendance time: 28 h Self-study time: 62 h

Course: From Vision to Action (Lecture)	2 WLH

Examination: Written examination (60 minutes)	3 C

Examination requirements: Deatiled understanding of scientific research approaches and knowledge of the visual system and of sensomotorical integration.	

Admission requirements: none	**Recommended previous knowledge:** basic knowledge in neurobiology as taught in the lecture "Kognitive Neurowissenschaften" (Biologie) or Biopsychologie (Psychologie)
Language: English	**Person responsible for module:** Prof. Dr. Stefan Treue
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 50	

Georg-August-Universität Göttingen **Module M.Bio.356: Motor systems**	6 C 4 WLH

Learning outcome, core skills: Profound knowledge of the motor system of primates (human as well as non-human primates), especially concerning the anatomy and physiology of cortical and subcortical structures, the spinal cord, the neuro-muscular activation and their pathological disorders. Emphasis lies on the mechanisms of locomotion planning, motor control and the development of brain-machine interfaces. The seminar gives insights into scientific research approaches and the current state of knowledge about the motor system of primates on an advanced level.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Motor systems (Lecture)	2 WLH
Course: Motor systems (Seminar)	2 WLH

Examination: Oral examination (approx. 15 minutes) **Examination prerequisites:** oral presentation (ca. 30 min)	6 C

Examination requirements: Ability to understand and describe the basic functional principles of the motor system as well as its diseases and possible interactions on a high scientific level.	

Admission requirements: can't be combined with M.Bio.357	**Recommended previous knowledge:** Knowledge in neurobiology by attendace of the lecture "Kognitive Neurowissenschaften" (biology) or Biopsychologie (psychology) or a comparable lecture
Language: English	**Person responsible for module:** Prof. Dr. Hansjörg Scherberger
Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 30	

Georg-August-Universität Göttingen **Module M.Bio.357: Motor systems**	3 C 2 WLH

Learning outcome, core skills: Profound knowledge of the motor system of primates (human as well as non-human primates), especially concerning the anatomy and physiology of cortical and subcortical structures, the spinal cord, the neuro-muscular activation and their pathological disorders. Emphasis lies on the mechanisms of locomotion planning, motor control and the development of brain-machine interfaces.	**Workload:** Attendance time: 28 h Self-study time: 62 h

Course: Motor systems (Lecture)	2 WLH

Examination: Oral examination (approx. 15 minutes)	3 C

Examination requirements: Ability to understand and describe the basic functional principles of the motor system as well as its diseases and possible interactions on a high scientific level.	

Admission requirements: can't be combined with M.Bio.356	**Recommended previous knowledge:** Knowledge in neurobiology by attendace of the lecture "Kognitive Neurowissenschaften" (biology) or Biopsychologie (psychology) or a comparable lecture
Language: English	**Person responsible for module:** Prof. Dr. Hansjörg Scherberger
Course frequency: each summer 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.Bio.358: Introduction to applied statistics**	6 C 4 WLH

Learning outcome, core skills: Students should be able to select suitable statistic techniques depending on the biological problem and available data. They know how to apply simple statistic methods and to deal with the programming language R.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Basic concepts in statistics (Lecture)	2 WLH
Course: Applied statistics (Exercise)	2 WLH

Examination: Oral examinationKurztestate vor der Vorlesung (approx. 15 minutes)	6 C

Examination requirements: Understanding of basic principles of statistics. Knowledge of elementary techniques from descriptive and concluding statistics.	

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Dr. Cornelia Kraus Dr. Matthias Markolf
Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** 2 - 4
Maximum number of students: 10	

Additional notes and regulations: strongly advised for students who want to do the master project in behavioral biology

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

Learning outcome, core skills: 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.	**Workload:** 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.363: Cell biology (key competence module)**	3 C 2 WLH

Learning outcome, core skills: Profound insights into the molecular organisation of cells, cell proliferation, differentiation and cell death as well as the mechanisms of cell communication. Understanding of techniques for the identification, analysis and manipulation of gene functions (e.g. genetic, transgenic und reverse genetic).	**Workload:** Attendance time: 28 h Self-study time: 62 h

Course: Molecular cell biology (Lecture)	2 WLH

Examination: Written examination (90 minutes)	3 C

Examination requirements: Profound knowledge of the molecular organization of cells, cell proliferation, differentiation, cell death as well as the mechanisms of cell communication.	

Admission requirements: Kann nicht in Kombination mit Fachmodul M.Bio.303 oder Schlüsselkompetenzmodul M.Bio.343 belegt werden.	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. rer. nat. Sigrid Hoyer-Fender
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.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:** Dr. Cornelia Kraus
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.370: Cellular and molecular immunology**	12 C 15 WLH

Learning outcome, core skills: Understanding of the interaction of the innate and adaptive immune system in defending pathogenic microorganisms. Insights into the origin of immune pathological processes as well as into therapeutical strategies for their treatment. Knowledge of basic immunological techniques. Understanding of techniques for practical immunological research and their interpretation. Students learn to carry out special techniques of immunological basic research on their own. Critical analysis, scientific presentation and discussion of experimental data. Handling of publicly accessible resources for immunological research.	**Workload:** Attendance time: 210 h Self-study time: 150 h

Course: Cellular and Molecular Immunology (Lecture)	2 WLH
Course: seminar and tutorial: Special Aspects of Immunology	1 WLH
Course: Immunological Laboratory Practice 101 (Internship)	12 WLH

Examination: Written examination (90 minutes) **Examination prerequisites:** protocol (ca. 10 pages) und oral presentation (ca. 15 min)	

Examination requirements: Profound knowledge of principle functions of the mammalian nervous system	

Admission requirements: can't be combined with M.Bio.390 or M.Bio.391	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. rer. nat. Jürgen Wienands Dr. Niklas Engels
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.371: Molecular basis of neurological and psychiatric diseases**	2 C 2 WLH

Learning outcome, core skills: In this module, important concepts of molecular and cellular neurosciences will be presented, using the examples of neurological and psychiatric diseases. The aspects to be discussed include genetic, molecular and cellular basis of the diseases, affected structures, relevance of animal models, and current therapy concepts. Students will be coached by a supervisor regarding selection and understanding of literature and preparation of the presentation. Understanding and calling into question published scientific knowledge; selection and processing for oral presentation for other students; answering questions; critical discussion.	**Workload:** Attendance time: 14 h Self-study time: 46 h

Course: Molecular basis of neurological and psychiatric diseases (Seminar) Vorbereitung zum Seminarvortrag in Absprache mit dem Betreuer	2 WLH

Examination: Lecture (approx. 60 minutes) **Examination prerequisites:** regular attendance	2 C

Examination requirements: The students show that they are able to present and critically reflect scientific publications. They are familiar with molecular preconditions of neurological diseases.	

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

Additional notes and regulations:
Participants contact the organizer of the module (hauke@em.mpg.de) in a timely manner for matching seminar topic and supervisor.

Georg-August-Universität Göttingen **Module M.Bio.372: Matlab in neuroscience**	3 C 2 WLH

Learning outcome, core skills: Goal of the course is a general introduction into Matlab basics, with a focus on psychophysics and neuroscientific applications. The course teaches the knowledge and skills needed to understand existing Matlab code and to develop your own Matlab programs. The course consists of two parts, a more theoretically oriented lecture and a practical tutorial in which the weekly excercises will be discussed.	**Workload:** Attendance time: 28 h Self-study time: 62 h

Course: Matlab basics (Lecture)	1 WLH
Course: Matlab advanced (Tutorial)	1 WLH

Examination: Written examination (60 minutes) **Examination prerequisites:** Regular participation and performance of exercisess	3 C

Examination requirements: The students demonstrate that they can read and develop their own Matlab programs.	

Admission requirements: attendance of the lecture "Biologische Psychologie II/Kognitive Neurowissenschaften" or equivalent course.	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Alexander Gail
Course frequency: each summer semester; erste Semesterhälfte	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 20	

Additional notes and regulations:
Die Veranstaltung ist geeignet für hoch motivierte Bachelor- und Master-Studierende der Psychologie, Biologie und Physik, die überdurchschnittliches Forschungsinteresse haben.

Georg-August-Universität Göttingen **Module M.Bio.373: Visual psychophysics - from theory to experiment**	3 C 2 WLH

Learning outcome, core skills: This introductory course is a mixture of lecture, seminar and practical exercises and emphasizes the importance of psychophysics as a central method in human perceptual and sensorimotor research. As well as gaining an understanding of the underlying theoretical principles, by the end of the course students should be able to critically assess published studies and to design and conduct their own simple psychophysical experiments.	**Workload:** Attendance time: 28 h Self-study time: 62 h

Course: Psychophysics advanced (computer-pool-practical)	1 WLH
Course: Psychophysics basics (Lecture)	1 WLH

Examination: Written examination (60 minutes) **Examination prerequisites:** regular attendance **Examination requirements:** Die Studierenden erbringen den Nachweis, dass sie die grundlegenden Methoden der Psychophysik kennen. Sie besitzen das theoretische Fachwissen um kleinere psychophysische Studien durchzuführen.	3 C

Examination requirements: Ability to demonstrate knowledge of the fundamental methods of psychophysics. Capability of conducting simple psychophysical studies.	

Admission requirements: attendance in the lecture: Biologische Psychologie II/ Kognitive Neurowissenschaften orequivalent course. The participation in the course M.Bio.373 "MATLAB in Biospychology and Neuroscience" during the first half of the term is strongly advised.	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Stefan Treue
Course frequency: each summer semester; second half	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 20	

Additional notes and regulations: Die Veranstaltung ist geeignet für hoch motivierte Bachelor- und Master-Studierende der Psychologie, Biologie und Physik, die überdurchschnittliches Forschungsinteresse haben.

Georg-August-Universität Göttingen **Module M.Bio.374: Introduction to computer modeling and human cooperative behavior**	2 C 2 WLH

Learning outcome, core skills: Students gain an overview of the main concepts and application of computer modeling with a focus on evolutionary biology, behavioral ecology, sociobiology and cognition. Furthermore, students learn how to create computer models themselves and working with them. During the course the participants program their own models and hereby resolve predetermined questions. The model topics have a focus on the cooperative behavior in humans.	**Workload:** Attendance time: 24 h Self-study time: 36 h

Course: Developing and creating evolutionary computer models (Exercise)	1,5 WLH
Course: Introduction to computer modeling and human cooperative behavior (Seminar)	0,5 WLH

Examination: Minutes / Lab report (max. 4 pages), not graded **Examination prerequisites:** short oral presentation (10 min)	2 C

Examination requirements: Ability to use computer models as a tool to answer biological questions critical anlysis and discussion of simulation results	

Admission requirements: none	**Recommended previous knowledge:** none
Language: English, German	**Person responsible for module:** Prof. Dr. Dirk Semmann
Course frequency: each winter semester	**Duration:**
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 14	

Georg-August-Universität Göttingen **Module M.Bio.375: Neurorehabilitation Technologies: Introduction and Applications**	2 C 1,5 WLH

Learning outcome, core skills: Students are able to describe the state of the art in Neurorehabilitation technologies and understand the basics of the related physiological processes. They are in a position to discuss and evaluate current trends as well as to recognize limitations of available assistive and (neuro)rehabilitation technology. The programming and lab exercises will allow students to address variety of practical Neurorehabilitation challenges.	**Workload:** Attendance time: 20 h Self-study time: 40 h

Course: Introduction to Neurorehabilitation Technologies (Lecture) *Contents*: • Basic motor physiology • Biophysiological signal acquisition and processing • Invasive and non-invasive man-machine interfaces • Upper limb related technologies • Lower limb related technologies • Feedback for sensory-motor integration and rehabilitation • Selected topics on advanced technologies and their applications	1 WLH
Course: Neurorehabilitation Technologies (Exercise) *Contents*: • Biophysiological signal acquisition and processing • Prosthesis control • Motion analysis	0,5 WLH

Examination: (ca. 5 pages), not graded **Examination prerequisites:** Participation and successful completion of all laboratory exercises.	2 C

Examination requirements: Students show that they are able to present and critically reflect scientific publications. They are familiar with the basic principles of neurorehabilitation technologies.	

Admission requirements: none	**Recommended previous knowledge:** basic programming skills (B.Inf.1801/1802) basic knowledge in neurophysiology (B.Bio.123; M.Bio.304)
Language: English	**Person responsible for module:** Prof. Dr. Arndt Schilling; Dr. Marko Markovic
Course frequency: each winter semester1	**Duration:**
Number of repeat examinations permitted:	**Recommended semester:**

twice	
Maximum number of students: 16	

Additional notes and regulations:
Literature suggestions will be handed out at the beginning of each term. However, the students are expected to independently perform literature research on the selected topic.

Georg-August-Universität Göttingen **Module M.Bio.380: Cellular and molecular immunology - advanced module**	12 C 20 WLH

Learning outcome, core skills: Understanding of techniques for practical immunological research and their interpretation. Knowledge of basic and special techniques for current immunological research. Students learn to carry out special techniques of immunological basic research on their own. Critical analysis, scientific presentation and discussion of experimental data. Handling of publicly accessible resources for immunological research.	**Workload:** Attendance time: 280 h Self-study time: 80 h

Course: lab rotation 7 weeks	20 WLH
Course: department seminar	

Examination: oral block examination **Examination prerequisites:** regular attendance and oral presentation in departmental seminar (ca. 30 min), scientific presentation and discussion of results (paper-style, max 10 pages)	

Examination requirements: Profound knowledge of a specific research topic in immunology. Familiarity with the methods used in this field. Proven ability to present own experimental data.	

Admission requirements: M.Bio.303: Cell biology or M.Bio.370: Cellular and molecular immunology	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Dr. rer. nat. Niklas Engels
Course frequency: each 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.381: Current developmental biology - advanced module**	12 C 20 WLH

Learning outcome, core skills: Advanced knowledge in planning and execution of scientific experiments in the field of current developmental biology. Accurate and detailed documentation of the experimental design and performance of the experiments as well as the obtained results. Evaluation of the advantages and disadvantages of the applied methods. Research and consideration of the basics (textbook knowledge) and already published original papers in the specific field of research. Discussion of the obtained results.	**Workload:** Attendance time: 280 h Self-study time: 80 h

Course: practical course 9 weeks	20 WLH
Course: Departmental seminar	

Examination: mündliche Blockprüfung **Examination prerequisites:** regular attendance in departmental seminar, scientific presentation and discussion of results (paper-style, max 10 pages)	12 C

Examination requirements: Profound knowledge of a specific research topic on current developmental biology. Familiarity with the methods used in this field. Proven ability to present own experimental data.	

Admission requirements: M.Bio.321 or M.Bio.322	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Ernst A. Wimmer
Course frequency: each semester	**Duration:** 1 oder 2
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 10	

Georg-August-Universität Göttingen **Module M.Bio.382: Frontiers in developmental biology - advanced module**	12 C 20 WLH

Learning outcome, core skills:	**Workload:**
Advanced knowledge in planning and execution of scientific experiments in a frontiers field of developmental biology, e.g. in neural developmental biology. Accurate and detailed documentation of the experimental design and performance of the experiments as well as the obtained results. Evaluation of the advantages and disadvantages of the applied methods. Research and consideration of the basics (textbook knowledge) and already published original papers in the specific field of research. Discussion of the obtained results.	Attendance time: 280 h Self-study time: 80 h

Course: practical course *Contents*: 7-9 weeks 9 weeks	WLH
Course: Departmental seminar	

Examination: oral examination **Examination prerequisites:** regular attendance of departmental seminar and scientific presentation and discussion of results in paper-style (max 10 pages)	12 C

Examination requirements: Vertiefte Kenntnisse in einem ausgewählten Forschungsgebiet im Grenzbereich der Entwicklungsbiologie, z.B. der Neuroentwicklunsgbiologie einschließlich der darin angewandten Methoden; Nachweis der Fähigkeit zur Präsentation der eigenen Experimentalergebnisse Nachweis der Fähigkeit zur Präsentation der eigenen Experimentalergebnissen	

Admission requirements: M.Bio.321 or M.Bio.322	**Recommended previous knowledge:** M.Bio.322
Language: English	**Person responsible for module:** Prof. Gregor Bucher
Course frequency: each semester	**Duration:** 1 or 2 semester
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 10	

Georg-August-Universität Göttingen **Module M.Bio.383: Developmental cell biology - advanced module**	12 C 20 WLH

Learning outcome, core skills: Advanced knowledge in planning and execution of scientific experiments in the field of developmental cell biology. Accurate and detailed documentation of the experimental design and performance of the experiments as well as the obtained results. Evaluation of the advantages and disadvantages of the applied methods. Research and consideration of the basics (textbook knowledge) and already published original papers in the specific field of research. Discussion of the obtained results.	**Workload:** Attendance time: 280 h Self-study time: 80 h

Course: practical course 9 weeks	WLH
Course: Departmental seminar	

Examination: oral examination **Examination prerequisites:** regular attendance of departmental seminar and scientific presentation and discussion of results in paper-style (max 10 pages)	12 C

Examination requirements: Profound knowledge of a specific research topic in developmental cell biology. Familiarity with the methods used in this field. Proven ability to present own experimental data.	

Admission requirements: M.Bio.303 M.Bio.303	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. rer. nat. Sigrid Hoyer-Fender
Course frequency: each semester	**Duration:** 1 oder 2
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 6	

Georg-August-Universität Göttingen **Module M.Bio.390: Cellular and molecular immunology (key competence module)**	6 C 3 WLH

Learning outcome, core skills: Understanding of the interaction of the innate and adaptive immune system in defending pathogenic microorganisms. Insights into the origin of immune pathological processes as well as into therapeutical strategies for their treatment. Insights into basic immunological techniques.	**Workload:** Attendance time: 42 h Self-study time: 138 h

Course: Cellular & molecular immunology (Lecture)	2 WLH
Course: seminar and tutorial: Special aspects of immunology	1 WLH

Examination: Written examination (90 minutes) **Examination prerequisites:** oral presentation (ca. 15 min)	6 C

Examination requirements: Advanced knowledge of principle functions of the mammalian immune system.	

Admission requirements: can't be combined with M.Bio.370 or M.Bio.391	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. rer. nat. Jürgen Wienands Dr. Engels, Niklas
Course frequency: each summer 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.391: Cellular and molecular immunology (key competence module)**	3 C 2 WLH

Learning outcome, core skills: Understanding of the interaction of the innate and adaptive immune system in defending pathogenic microorganisms. Insights into the origin of immune pathological processes as well as into therapeutical strategies for their treatment. Insights into basic immunological techniques.	**Workload:** Attendance time: 28 h Self-study time: 62 h

Course: Cellular & molecular immunology (Lecture)	2 WLH

Examination: Written examination (90 minutes)	3 C

Examination requirements: Advanced knowledge of principle functions of the mammalian immune system.	

Admission requirements: can't be combined with M.Bio.370 or M.Bio.390	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. rer. nat. Jürgen Wienands Engels, Niklas
Course frequency: each summer 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.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
Course: Exercises to and consolidation of lecture contents (tutorial)	1 WLH
Course: Current Topics in Developmental Biology (Seminar)	1 WLH

Examination: Written examination (90 minutes) **Examination prerequisites:** Oral presentation of a publication (ca. 20 min)	6 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.393	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Ernst A. 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 A. 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
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: Written examination (90 minutes) **Examination prerequisites:** Presentation and discussion of self-developed experimental approaches	6 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. 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. 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. Gregor Bucher
Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 5	