

Directory of Modules

Master-/Promotionsstudiengang "Molekulare Biologie" - referring to: Prüfungs- und Studienordnung für den konsekutiven internationalen Master-/Promotionsstudiengang "Molekulare Biologie" (Amtliche Mitteilungen I 29/2013 p. 851, last revised through Amtliche Mitteilungen I Nr. 39/2018 p. 745)

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I. Master's and Doctoral degree programme "Molecular Biology"

1. Period I (intensive year)

The following modules comprising 90 C have to be passed.

a. Theoretical modules

The 4 following modules comprising 27 C have to be passed.

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b. Practical modules

The 4 following modules comprising 56 C have to be passed.

M.MolBio.21: Methods Courses: Proteins, Nucleic Acids, Cell Biology and Genetics (5 C).....	6615
M.MolBio.22: Methods Courses: Bioinformatics and Statistics (4 C).....	6616
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c. Area of professionalisation

The 2 following modules comprising 7 C have to be passed.

M.MolBio.31: Professional Skills in Science (2 C).....	6619
M.MolBio.32: Results of the Research Projects (5 C).....	6620

2. Period II (Master's thesis)

A total of 30 C are awarded for passing the Master's thesis.

Georg-August-Universität Göttingen		7 C
Module M.MolBio.11: DNA and Gene Expression		
Learning outcome, core skills: The students gain an understanding of the mechanisms behind the major processes in information management in the cell, such as DNA replication and repair, transcription, RNA splicing, or RNA quality control. They acquire knowledge of the methods that are appropriate to address scientific questions in this field and learn how to choose the best experimental setup.		Workload: Attendance time: 80 h Self-study time: 130 h
Course: Lecture (40 h)		
Course: Tutorial (40 h)		
Examination: Part of comprehensive examination Examination requirements: Cell architecture, DNA structure, DNA repair and recombination, chromatin structure, epigenetics, transcription, RNA splicing and processing, RNA-based regulation, protein structure and function, enzyme regulation, application problems, methods to solve scientific problems related to information management.		
Admission requirements: none	Recommended previous knowledge: -	
Language: English	Person responsible for module: PD Dr. Wilfried Kramer	
Course frequency: once a year	Duration: 10 weeks	
Number of repeat examinations permitted: once	Recommended semester:	
Maximum number of students: 20		
Additional notes and regulations: ---		
Teaching capacity provided by: Uni-Bio: 12h lecture, 12h tutorial; Med-VK: 4h lecture, 4h tutorial; MPIs/DPZ: 24h lecture, 24h tutorial		

Georg-August-Universität Göttingen		5 C
Module M.MolBio.12: Metabolic and Genetic Networks		
Learning outcome, core skills: The students study the metabolic organization of the cell. After an introduction to essential processes (respiration, central metabolism, photosynthesis) they learn about the integration of metabolic processes at the different levels of metabolic or regulatory networks. Moreover, they learn how genomics and bioinformatics help to attain a new level of understanding of life.		Workload: Attendance time: 48 h Self-study time: 102 h
Course: Lecture (24 h)		
Course: Tutorial (24 h)		
Examination: Part of comprehensive examination Examination requirements: Basic metabolism, biological membranes, photosynthesis, metabolic networks, signal transduction, genomics, microbiomes.		
Admission requirements: none	Recommended previous knowledge: -	
Language: English	Person responsible for module: Prof. Dr. Ivo Feußner	
Course frequency: once a year	Duration: 6 weeks	
Number of repeat examinations permitted: once	Recommended semester:	
Maximum number of students: 20		
Additional notes and regulations: ---		
Teaching capacity provided by: Uni-Bio: 8h lecture, 8h tutorial; Med-VK: 6h lecture, 6h tutorial; Med-KT: 6h lecture, 6h tutorial; Uni-Agr: 4h lecture, 4h tutorial		

Georg-August-Universität Göttingen		10 C
Module M.MolBio.13: Cell Biology, Immunology, Neuroscience and Developmental Biology		
Learning outcome, core skills: The students study the internal organization of the eukaryotic cell, in particular processes at the membrane and the cytoskeleton. They learn how to identify methods suited to address problems in these fields. They gain profound knowledge of relevant methods to study membrane processes and will be able to judge their relevance. Moreover, the students study the human immune system and learn to understand the underlying principles of some of the most important diseases such as cancer and infectious diseases. In addition, they are introduced to the general principles of neuroscience and developmental biology.		Workload: Attendance time: 104 h Self-study time: 196 h
Course: Lecture (52 h)		
Course: Tutorial (52h)		
Examination: Part of comprehensive examination Examination requirements: Protein sorting and processing, membrane traffic, biosynthesis of organelles, autophagocytosis, nucleocytoplasmic transport, cytoskeleton, cell adhesion, cell cycle, apoptosis, cancer, immunology, infectious diseases, principles of pathogenicity, nervous and sensory systems, developmental biology		
Admission requirements: none	Recommended previous knowledge: -	
Language: English	Person responsible for module: Prof. Dr. Reinhard Jahn	
Course frequency: once a year	Duration: 13 weeks	
Number of repeat examinations permitted: once	Recommended semester:	
Maximum number of students: 20		
Additional notes and regulations: ---		
Teaching capacity provided by: Uni-Bio: 4h lecture, 4h tutorial; Med-VK: 6h lecture, 6h tutorial; Med-KT: 18h lecture, 18h tutorial; Med-KL: 4h lecture, 4h tutorial; Uni-Phy: 2h lecture, 2h tutorial; MPIs/DPZ: 18h lecture, 18h tutorial		

Georg-August-Universität Göttingen		5 C
Module M.MolBio.14: Model Systems and Biotechnology		
Learning outcome, core skills: The students gain an understanding of the major prokaryotic and eukaryotic systems that are commonly used in basic research. They learn how to evaluate the pros and cons of the different systems and to decide which is appropriate for a given problem. A special focus in this module is on developmental aspects of model organisms. Here, the students understand how model systems contribute to the investigation of human development and how this is important for human health.		Workload: Attendance time: 56 h Self-study time: 94 h
Course: Lecture (28 h)		
Course: Tutorial (28 h)		
Examination: Part of comprehensive examination Examination requirements: Stem cells, fungi, <i>Arabidopsis</i> , <i>Drosophila</i> , zebrafish, <i>Xenopus</i> , mouse, viral systems and their use in primate research, molecular evolution, biotechnology (bacteria, fungi, insects, plants)		
Admission requirements: none	Recommended previous knowledge: -	
Language: English	Person responsible for module: Prof. Dr. Stefan Pöhlmann	
Course frequency: once a year	Duration: 7 weeks	
Number of repeat examinations permitted: once	Recommended semester:	
Maximum number of students: 20		
Additional notes and regulations: ---		
Teaching capacity provided by: Uni-Bio: 16h lecture, 16h tutorial; Med-VK: 4h lecture, 4h tutorial; Med-KL: 2h lecture, 2h tutorial; MPIs/DPZ: 6h lecture, 6h tutorial		

Georg-August-Universität Göttingen		5 C
Module M.MolBio.21: Methods Courses: Proteins, Nucleic Acids, Cell Biology and Genetics		
Learning outcome, core skills: The students get introduced to the major methods for studying (1) the properties of proteins such as protein preparation, gene expression analysis with microarrays and sequencing, analysis of protein-protein and nucleic acid-protein interactions, (2) nucleic acids including purification and electrophoresis of nucleic acids, polymerase chain reaction I, cDNA synthesis and cloning, RNA analysis, and (3) practical aspects of cell biology, including light microscopy, analysis of cellular compartments, cell culture, and expression analysis. They learn to understand the background of these methods and when/how to apply them.		Workload: Attendance time: 120 h Self-study time: 30 h
Course: Introductory methods course (120 h)		
Examination: Oral group examination, not graded Examination requirements: Scientific hypotheses, experimental design, laboratory techniques, analysis, interpretation and scientific presentation of research results.		
Admission requirements: none	Recommended previous knowledge: -	
Language: English	Person responsible for module: Prof. Dr. Dirk Görlich	
Course frequency: once a year	Duration: 5 weeks	
Number of repeat examinations permitted: once	Recommended semester:	
Maximum number of students: 5		
Additional notes and regulations: ----		
Teaching capacity provided by: Uni-Bio: 18h; Med-VK: 48h; Med-KT: 12h; Uni-Agr: 6h; MPIs/DPZ: 36h		

Georg-August-Universität Göttingen		4 C
Module M.MolBio.22: Methods Courses: Bioinformatics and Statistics		
Learning outcome, core skills: The students get introduced to the basic principles of statistical data analysis, based on an introduction into the programming language R. These skills will then be applied in next generation sequence analysis. Furthermore, the students are introduced to various bioinformatics tools and their application, ranging from protein bioinformatics to comparative sequence analysis, phylogeny, gene ontologies and the modeling of biological networks.		Workload: Attendance time: 80 h Self-study time: 40 h
Course: Introductory methods courses (80 h)		
Examination: Oral group examination, not graded Examination requirements: Scientific hypotheses, experimental design, laboratory techniques, analysis, interpretation and scientific presentation of research results.		
Admission requirements: none	Recommended previous knowledge: -	
Language: English	Person responsible for module: Prof. Dr. Dirk Görlich	
Course frequency: once a year	Duration: 5 weeks	
Number of repeat examinations permitted: once	Recommended semester:	
Maximum number of students: 5		
Additional notes and regulations: ---		
Teaching capacity provided by: Uni-Bio: 10h; Med-VK: 6h; Med-KT: 39h; MPIs/DPZ: 25h		

Georg-August-Universität Göttingen		2 C
Module M.MolBio.24: Methods Courses: Special Techniques in Molecular Biology		
Learning outcome, core skills: The students get introduced to a selection of advanced special methods and gain an understanding of the theoretical background behind these methods. The advanced special courses cover structural analysis of protein and protein structure validation, (3D-Cryo) electron microscopy, NMR spectroscopy, mass spectrometry, and proteomics.		Workload: Attendance time: 48 h Self-study time: 12 h
Course: Advanced methods courses (48 h)		
Examination: Oral group examination, not graded Examination requirements: Scientific hypotheses, experimental design, laboratory techniques, analysis, interpretation and scientific presentation of research results.		
Admission requirements: none	Recommended previous knowledge: -	
Language: English	Person responsible for module: Prof. Dr. Dirk Görlich	
Course frequency: once a year	Duration: 2 weeks	
Number of repeat examinations permitted: once	Recommended semester:	
Maximum number of students: 5		
Additional notes and regulations: ----		
Teaching capacity provided by: MPIs/DPZ: 48h		

Georg-August-Universität Göttingen Module M.MolBio.25: Lab Rotations		45 C
Learning outcome, core skills: In these individually supervised research projects, the students acquire the skills to organize a scientific project, from defining the scientific question, identifying the appropriate methods, performing the experiments, and evaluating the experiments, to presenting and discussing the results in written and oral reports. The students are encouraged to select their research projects from different research areas and methodological approaches.		Workload: Attendance time: 720 h Self-study time: 630 h
Course: Three Lab Rotations (8 weeks, 40 h teaching, 200 h laboratory work each)		
Examination: 3 lab reports, not graded Examination requirements: Scientific hypotheses, experimental design, laboratory techniques, analysis, interpretation and scientific presentation of research results.		
Admission requirements: none	Recommended previous knowledge: -	
Language: English	Person responsible for module: Prof. Dr. Peter Rehling	
Course frequency: once a year	Duration: 24 weeks	
Number of repeat examinations permitted: once	Recommended semester:	
Maximum number of students: 1		

Georg-August-Universität Göttingen		2 C
Module M.MolBio.31: Professional Skills in Science		
Learning outcome, core skills: The students are trained in scientific writing and oral presentation skills which enable them to adequately structure and compose scientific texts, particularly for written and oral reports on experimental findings in the field of their studies. They get introduced to the principles of good scientific practice and comprehension of adequate measures to secure ethical standards in science. In addition, the students gain an understanding of laboratory safety principles and knowledge of adequate measures and procedures to secure laboratory safety standards in a research environment. The students get also introduced to ethical and practical aspects of experimental work with animals in the laboratory.		Workload: Attendance time: 32 h Self-study time: 28 h
Course: Seminar / Workshop: Scientific Writing and Graphics (12 h) (Seminar)		
Course: Seminar / Workshop: Oral Presentation of Scientific Results (6 h) (Seminar)		
Course: Seminar / Workshop: Laboratory Safety (4 h) (Seminar)		
Course: Seminar / Workshop: Good Scientific Practice (4 h) (Seminar)		
Course: Seminar / Workshop: Ethical and practical aspects of handling experimental animals (6 h) (Seminar)		
Examination: Oral presentation, scientific text, oral group examination, not graded Examination requirements: Demonstration of writing competence, oral presentation skills, understanding of ethical codes of conduct and knowledge of experimental work with animals, lab safety rules and regulations in a scientific context in the English language at an advanced level.		
Admission requirements: none	Recommended previous knowledge: -	
Language: English	Person responsible for module: Prof. Dr. Marina Rodnina	
Course frequency: once a year	Duration: 5 weeks	
Number of repeat examinations permitted: once	Recommended semester:	
Maximum number of students: 20		
Additional notes and regulations: ---		
Teaching capacity provided by: Uni-Bio: 6h; Med-ENI: 18h; MPIs/DPZ: 8h		

Georg-August-Universität Göttingen		5 C
Module M.MolBio.32: Results of the Research Projects		
Learning outcome, core skills: The specific skills practiced in the seminar include efficient and concise presentation of own scientific results in English, supported by power point presentations, development of a differentiated scientific vocabulary, and the critical discussion of the scientific data in the broader context of their relevance for current research in the molecular biosciences.		Workload: Attendance time: 32 h Self-study time: 118 h
Course: Seminar (32 h) (Seminar)		
Examination: Two oral presentations per student, group discussion, not graded Examination requirements: Demonstration of adequate oral presentation skills including the critical discussion and evaluation of the data presented.		
Admission requirements: none	Recommended previous knowledge: -	
Language: English	Person responsible for module: Dr. Henning Urlaub	
Course frequency: once a year	Duration: 16 weeks	
Number of repeat examinations permitted: once	Recommended semester:	
Maximum number of students: 1		
Additional notes and regulations: ---		
Teaching capacity provided by: Uni-Bio: 6h; Uni-Phy: 6h; MPIs/DPZ: 20h		