

Modulverzeichnis

**Master's degree programme "Molecular Medicine"
- referring to: Prüfungs- und Studienordnung
für den internationalen konsekutiven Master-
Studiengang "Molecular Medicine" (Amtliche
Mitteilungen I No. 24/2026 p. 457)**

Übersicht nach Modulgruppen

I. Master-Studiengang "Molecular Medicine"

Es müssen Leistungen im Umfang von 120 C erfolgreich absolviert werden.

1. Pflichtmodule

Es müssen folgende sechs Module im Umfang von insgesamt 76 C erfolgreich absolviert werden:

M.MM.108: Pathogens, Immunity and Therapeutics (12 C, 8 SWS) - Pflichtmodul.....	4131
M.MM.109: Lab Rotation Infection and Medication (12 C, 15 SWS) - Pflichtmodul.....	4132
M.MM.110: Molecular and Cellular Basis of Disease (12 C, 8 SWS) - Pflichtmodul.....	4133
M.MM.111: Lab Rotation Pathology and Cancer (12 C, 15 SWS) - Pflichtmodul.....	4135
M.MM.112: Cardiovascular and Kidney Diseases (7 C, 4 SWS) - Pflichtmodul.....	4136
M.MM.113: Molecular Pathology of the Nervous System (5 C, 3 SWS) - Pflichtmodul.....	4137
M.MM.114: Lab Rotation Heart and Brain (12 C, 15 SWS) - Pflichtmodul.....	4138
M.MM.115: Current Topics in Molecular Medicine (4 C, 3 SWS) - Pflichtmodul.....	4139

2. Wahlmodule (Professionalisierung - Schlüsselkompetenzen)

Es müssen Wahlmodule zum weiteren Erwerb von Schlüsselkompetenzen im Umfang von insgesamt wenigstens 14 C erfolgreich absolviert werden. Es können folgende Module belegt werden:

a. Module der Medizinischen Fakultät

M.MM.009: Molecular Imaging in Biomedical Research (3 C, 2 SWS).....	4110
M.MM.010: State-of-the-art methods in biomedical research (2 C, 1,5 SWS).....	4111
M.MM.011: Drug Discovery and Project Management in the Pharmaceutical Industry (2 C, 2 SWS).....	4113
M.MM.012: Tumor Genetics (2 C, 1 SWS).....	4114
M.MM.017: Auditory Neuroscience (3 C, 2,5 SWS).....	4115
M.MM.018: Modelling and Targeting Pancreatic Cancer (4 C, 3 SWS).....	4117
M.MM.019: Modern Aspects of Human Genetics (2 C, 1 SWS).....	4118
M.MM.022: Committee work in student or academic self-administration (2 C, SWS).....	4119
M.MM.023: The Biotech Industry (2 C, 2 SWS).....	4120
M.MM.024: Exploring Transcriptional Dynamics and Control Mechanisms in Cancer (2 C, 1 SWS).....	4121

M.MM.026: Recombinant proteins for antibody detection and kits for antigen typing (1 C, 0,5 SWS).....	4123
M.MM.027: Biology and Pathology of Cellular Organelles (2 C, 1 SWS).....	4124
M.MM.028: Integrative Auditory Neuroscience (3 C, 2 SWS).....	4126
M.MM.029: Voluntary Lab Rotation (6 C, 8 SWS).....	4128
M.MM.030: Experimental, epidemiological and clinical approaches in dermatology (2 C, 2 SWS).....	4129

3. Masterarbeit

Durch die erfolgreiche Anfertigung der Masterarbeit werden 30 C erworben.

Georg-August-Universität Göttingen Module M.MM.009: Molecular Imaging in Biomedical Research		3 C 2 WLH
Learning outcome, core skills: Upon completion of the module, the student will be familiar with the basics, principles and possible applications of different imaging techniques, such as computed tomography (CT), optical imaging using fluorescent dyes or bioluminescence, positron emission tomography (PET), single photon emission computed tomography (SPECT) and magnetic resonance imaging (MRI) in preclinical research as well as in clinical application. Since extracting valid information from acquired images is crucial, fundamental concepts of image processing and data analysis will introduced as well. Key learning objectives are to be able to assess the advantages and limitations of each imaging method: Which imaging device can be used for which preclinical and clinical problem? What can be visualized with each individual method? By the end of the module, students are familiar with the procedures for developing new molecular imaging samples regarding specific problems. With this knowledge, students are able to demonstrate long-term perspectives that innovative imaging techniques bring to preclinical and clinical applications.		Workload: Attendance time: 28 h Self-study time: 62 h
Course: Molecular Imaging (Seminar)		2 WLH
Examination: Written examination (30 minutes) Examination prerequisites: Regular attendance at the seminar. Examination requirements: Principles and applications of imaging techniques in molecular medicine research.		3 C
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: apl. Prof. Dr. med. Frauke Alves PD. Dr. Christian Dullin	
Course frequency: once a year	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester: 1 - 2	
Maximum number of students: 10		

Georg-August-Universität Göttingen Module M.MM.010: State-of-the-art Methods in Biomedical Research		2 C 1,5 WLH
Learning outcome, core skills: After successful completion of the module the students can/know ... • the basics and the state of the art of mass spectrometry-based proteomic analysis • essential applications of proteomic analysis in the field of biomedical and clinical research and can understand and critically evaluate simple publications in this field • the basic factors of statistical analysis of clinical and experimental data • the most important applications of machine learning methods in the field of biomedical and clinical research • the relevant factors for the planning of experiments • describe the importance and added value of secondary use of data in medical care and research • explain the methodological prerequisites and challenges of data integration and cross-institutional data sharing; name and assess relevant aspects of data privacy and ethics • define the term „biospecimen science“ and provide two arguments for research in this area • describe how the Central Biobank can support research • the basics and the current status of modern MR techniques • the main applications of MR techniques in the field of biomedical and clinical research • read and understand simple publications using MR techniques • the basics and the current state of the art of NGS techniques and applications • the major applications of transcriptome and genome analyses in the field of biomedical and clinical research • NGS pipelines including QC analysis and data preprocessing		Workload: Attendance time: 21 h Self-study time: 39 h
Course: State-of-the-art Methods in Biomedical Research (Lecture,Seminar)		1,5 WLH
Examination: Minutes / Lab report (max. 5 pages), not graded Examination prerequisites: Regular attendance at the seminar.		2 C
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Dr. Christof Lenz, Dr. Andreas Leha, PD Dr. Sara Nußbeck, Sabine Rey/Prof. U. Sax, PD Dr. Peter Dechent, Dr. Gabriela Salinas, Prof. Wulf	
Course frequency: once a year	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester: 1 - 2	

Maximum number of students:	
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Georg-August-Universität Göttingen Module M.MM.011: Drug Discovery and Project Management in the Pharmaceutical Industry		2 C 2 WLH
Learning outcome, core skills: Upon completion of the module students • know the principle of matrix organization as a management concept • have basic knowledge of project work in the private sector • know the processes of drug development: identification of targets, high throughput screening and alternative approaches for hit identification, drug optimization, cell based assay development, ADME, PK, PD, toxicology, in vivo models, clinical trial design, and risk management • have gained insight into industrial drug production		Workload: Attendance time: 28 h Self-study time: 32 h
Course: Drug Discovery and Project Management in the Pharmaceutical Industry (Seminar)		1,5 WLH
Course: Production of Medication (Excursion)		0,5 WLH
Examination: protocol (max. 5 pages), not graded Examination prerequisites: Complete attendance on all days, active participation in the workshop aspect of the seminar and the excursion.		2 C
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: PD Dr. Gunnar Dietz	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester: 1 - 2	
Maximum number of students: 18		

Georg-August-Universität Göttingen Module M.MM.012: Tumor Genetics		2 C 1 WLH
Learning outcome, core skills: Using primary literature the students will obtain (i.a.): • an overview about the role of chromosomal aberrations, oncogenes and tumor suppressor genes during tumor initiation and tumor progression • insights into somatic gene therapy and prospects for the development of adequate therapeutic strategies • an overview about relevant and new techniques in molecular cytogenetics and molecular genetics • a new publication from the field of tumor genetics and the students will work out the relevant methods and results described therein • coaching how to present these methods and results to an audience using PowerPoint followed by a discussion		Workload: Attendance time: 14 h Self-study time: 46 h
Course: "Tumor Genetics" (Seminar)		1 WLH
Examination: Presentation (approx. 30 minutes) and discussion (approx. 15 minutes) Examination prerequisites: Regular attendance at the seminar. Examination requirements: Work out and adequate presentation of the methods, research results and procedures described in the primary literature. Discussion and questions for the understanding of the presented methods and results.		2 C
Admission requirements: Successful participation of module B.MM.106 (Molekulare Zellbiologie und Molekulare Genetik) or equivalent course	Recommended previous knowledge: Basic knowledge in molecular genetics, cell biology and tumor genetics	
Language: English	Person responsible for module: Prof. Dr. rer. nat. Peter Burfeind PD Dr. rer. nat. Silke Kaulfuß	
Course frequency: each semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester: 1 - 2	
Maximum number of students: 14		

Georg-August-Universität Göttingen Module M.MM.017: Auditory Neuroscience	3 C 2,5 WLH
Learning outcome, core skills: The group leaders of the Göttingen Inner Ear Lab will offer seminar lecture to introduce the different scientific approaches they undertake to investigate sensory processing in the ear and hearing rehabilitation. Extensive practical training will comprise lab tours and own experiments: dissection of mouse organs of Corti, immunohistochemistry, patch clamp experiments, superresolution and electron microscopy, hearing tests. After completion of the module, the students will be able to • understand auditory function from the sound wave to the auditory cortex with a focus on synaptic transmission in sensory inner hair cells • Understand how standard tests of hearing function are done both in the clinical assessment of human patients and in the laboratory assessment of rodents • have basic knowledge on the pathophysiology of human hearing loss and rehabilitation strategies • understand how novel animal models could bridge the gap between basic research and clinical practice • understand the general AAV methodology and gene delivery techniques • understand the concept of an optogenetic cochlear implant • perform immunohistochemical labeling of inner ear tissue under supervision • perform patch clamp electrophysiology experiments on inner hair cells under supervision	Workload: Attendance time: 31 h Self-study time: 59 h
Course: Auditory Neuroscience (Practical course,Seminar)	2,5 WLH
Examination: Written test (45 minutes), not graded Examination prerequisites: Regular attendance at the seminar and the practical course.	3 C
Admission requirements: none	Recommended previous knowledge: • General knowledge of the anatomy and normal function of the Inner Ear, as laid out in standard textbooks of Neuroscience (e.g. Kandel Principles of Neuroscience) or Physiology (E.g. Schmidt/Thews Physiology) or taught in the Göttingen Bachelor program of Molecular Medicine • General knowledge of synaptic structure and function • General knowledge of molecular biology and gene therapy
Language: English	Person responsible for module: Prof. Dr. Nicola Strenzke

	Prof. Dr. Tobias Moser
Course frequency: once a year	Duration: Approx. 2 weeks
Number of repeat examinations permitted: twice	Recommended semester: 1
Maximum number of students: 16	

Georg-August-Universität Göttingen Module M.MM.018: Modelling and Targeting Pancreatic Cancer		4 C 3 WLH
Learning outcome, core skills: After completing the module, students have gained an overview on current pancreatic cancer research with a particular focus on concepts for modelling and targeting the disease. Students • have basic knowledge of the impact of the molecular characteristics of pancreatic cancer on the tumour biology and the clinical course of the disease • understand the impact of intra- and intertumoral heterogeneity on therapy-decision-making processes • know the chances and pitfalls of in vivo modelling of pancreatic cancer • can assess pancreatic cancer immune heterogeneity by multiplex immunofluorescence • understand the challenges in primary tissue extraction from the surgical perspective • have trained in orthotopic transplantation on pancreatic cancer cells into mice • have knowledge of functional in vitro assays for studying pancreatic cancer progression • have gained insights into the implications of the microbiome in pancreatic cancer and have trained ways of analyzing microbiome datasets • have obtained insights into the metabolic characteristics of pancreatic cancer • have understood the chances, challenges, analytic basics and experimental conditions of standardized drug screening approaches in pancreatic cancer models		Workload: Attendance time: 45 h Self-study time: 75 h
Course: Modelling and Targeting Pancreatic Cancer (Seminar)		2 WLH
Course: Modelling and Targeting Pancreatic Cancer (Practical course)		1 WLH
Examination: Written protocol. (max. 5 pages) Examination prerequisites: Regular attendance and active participation in the seminar and practical course.		4 C
Admission requirements: none	Recommended previous knowledge: Participation in module M.MM.102.	
Language: English	Person responsible for module: Prof. Dr. Elisabeth Heßmann	
Course frequency: once a year	Duration: Approx. 4 weeks	
Number of repeat examinations permitted: twice	Recommended semester: 1 - 3	
Maximum number of students: 6		

Georg-August-Universität Göttingen Module M.MM.019: Modern Aspects of Human Genetics		2 C 1 WLH
Learning outcome, core skills: Using primary literature the students will obtain (i.a.): • an overview about established and novel, state-of-the-art methods used in the field of human genetics • insights into the main research focus including new techniques used for identification of mutations and characterization of their effects using different cellular and animal models • insights into the development of novel therapeutic strategies including CRISPR/Cas- and iPSCs-based (genome editing) approaches • a new publication from the field of human genetics that the students will use to work out the relevant methods and results described therein • coaching how to present these methods and results to an audience using PowerPoint followed by a discussion		Workload: Attendance time: 12 h Self-study time: 48 h
Course: "Modern Aspects of Human Genetics" (Seminar)		1 WLH
Examination: Presentation (approx. 30 minutes) and discussion (approx. 15 minutes) Examination prerequisites: Regular attendance at the seminar. Examination requirements: Work out and adequate presentation of the methods, research results and procedures described in the primary literature. Discussion and questions for the understanding of the presented methods and results.		2 C
Admission requirements: Successful participation of module B.MM.106 (Molekulare Zellbiologie und Molekulare Genetik) or equivalent course	Recommended previous knowledge: Basic knowledge in molecular genetics, cell biology and tumor genetics	
Language: English	Person responsible for module: Dr. rer. nat. Gökhan Yigit	
Course frequency: each semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester: from 1	
Maximum number of students: 12		

Georg-August-Universität Göttingen Module M.MM.022: Committee work in student or academic self-administration		2 C
Learning outcome, core skills: Students acquire central knowledge of the organizational structures and decision-making processes in the academic self-administration of a faculty. They acquire the ability to participate in university committees, to represent student concerns and to critically reflect on the processes in these committees. Students develop skills in the areas of rhetoric, dialogue and discourse, as well as conversation, argumentation and conflict resolution. They gain in-depth insights into the structure, processes and function of a faculty or other organizational units of a university in the areas of study and teaching, research and administration.		Workload: Attendance time: 20 h Self-study time: 40 h
Examination: Written report at the end of each semester, not graded Examination requirements: Ability to represent and present the concerns of the student status group in the relevant bodies.		2 C
Admission requirements: Proof of activity and membership in a committee of the Faculty of Medicine or another committee of the Georg-August University; activity as student representative of the Master's program of Molecular Medicine.	Recommended previous knowledge: none	
Language: German	Person responsible for module: Prof. Dr. rer. nat. Holger Reichardt	
Course frequency: each semester	Duration: 2 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester:	

Georg-August-Universität Göttingen Module M.MM.023: The Biotech Industry		2 C 2 WLH
Learning outcome, core skills: This elective module will introduce students to drug development and the biotech industry. After completion of the module, students will have gained knowledge about: • Stages in drug development • ICH guidelines • Structure of the CTD Dossier • Principles in toxicology, bioanalytics and the development of supporting methods • Principles of pharmacology and initial clinical development (phase 1 and 2) • Principles in advanced clinical development and biological product manufacturing • Production principles of cell therapy and drug release processes • From science to market - ways to commercialize • The biomed industry in a local and global perspective • Regulation as a key to success or failure • Product development and registration process in the light of global regulation • From the laboratory to the patient, a "simple" story of a drug • The use of artificial intelligence for drug development • Immunotherapy treatments for cancer and autoimmune diseases		Workload: Attendance time: 24 h Self-study time: 36 h
Course: The Biotech Industry (Excursion,Seminar)		2 WLH
Examination: Written examination (60 minutes), not graded		2 C
Examination requirements: Regular attendance (1 seminar may be missed without a reason, 1 additional seminar may be missed due to illness)		
Admission requirements: Bachelor's degree in Molecular Medicine or a related study program	Recommended previous knowledge: Basic lectures in life sciences	
Language: English	Person responsible for module: Dr. Liat Nissimov-Brück	
Course frequency: once a year	Duration: 6 weeks	
Number of repeat examinations permitted: twice	Recommended semester: 1 - 4	
Maximum number of students: 25		

Georg-August-Universität Göttingen Module M.MM.024: Exploring Transcriptional Dynamics and Control Mechanisms in Cancer		2 C 1 WLH
Learning outcome, core skills: Students will gain comprehensive insights into the intricacies of the transcription cycle, the pivotal roles of transcription factors, oncogenes, and tumor suppressors in driving the multifaceted processes underlying cancer initiation and progression. Students will delve into the realm of epigenetic regulation, exploring its profound influence on gene expression dynamics, and critically evaluate its implications for devising cutting-edge (immuno)-therapeutic interventions aimed at combating cancer. An overview of state-of-the-art gene editing techniques, including the revolutionary CRISPR technology, will equip students with the necessary proficiency to manipulate genomic sequences with unprecedented precision. Additionally, students will be introduced to user-friendly graphical user interface (GUI) tools for analyzing transcriptomic data (e.g., RNAseq), enabling them to extract meaningful insights without the need for extensive bioinformatics expertise. Engaging with a recent, impactful publication from the domains of cancer biology, gene editing, or related disciplines, students will meticulously dissect the methodologies and findings therein. This exercise will not only broaden their knowledge base but also hone their critical thinking and analytical skills. Guidance and coaching will be provided to students on effectively communicating their findings and insights to audiences using dynamic multimedia presentations, leveraging tools such as PowerPoint. Subsequent discussions will foster a deeper understanding of the nuances inherent in scientific discourse and facilitate the exchange of ideas amongst peers.		Workload: Attendance time: 15 h Self-study time: 45 h
Course: Exploring Transcriptional Dynamics and Control Mechanisms in Cancer <i>Course frequency:</i> each winter semester		1 WLH
Examination: Oral Presentation (approx. 45 minutes), not graded		2 C
Admission requirements: Bachelor's degree in Molecular Medicine or a related study program	Recommended previous knowledge: Basic lectures in life sciences	

Language: English	Person responsible for module: PD Dr. Matthias Wirth
Course frequency: once a year	Duration: 6 Halbtage
Number of repeat examinations permitted: twice	Recommended semester: 1 - 4
Maximum number of students: 6	

Georg-August-Universität Göttingen Module M.MM.026: Recombinant proteins for antibody detection and kits for antigen typing		1 C 0,5 WLH
Learning outcome, core skills: Students should become familiar with methods and techniques in the following areas: - Protein design - Recombinant protein production Basic knowledge of blood group antigens and human leukocyte antigens is also taught.		Workload: Attendance time: 6 h Self-study time: 24 h
Course: Recombinant proteins for antibody detection and kits for antigen typing		0,5 WLH
Examination: Minutes / Lab report, not graded		1 C
Admission requirements: Bachelor's degree in Molecular Medicine or a related study program	Recommended previous knowledge: basic lectures in life sciences	
Language: English	Person responsible for module: Dr. Clemens Schneeweiß	
Course frequency: once a year	Duration: 1 Tag	
Number of repeat examinations permitted: twice	Recommended semester: 1 - 4	
Maximum number of students: 10		

Georg-August-Universität Göttingen Module M.MM.027: Biology and Pathology of Cellular Organelles		2 C 1 WLH
Learning outcome, core skills: Students will gain comprehensive insights into the intricacies of the transcription cycle, the pivotal roles of transcription factors, oncogenes, and tumor suppressors in driving the multifaceted processes underlying cancer initiation and progression. Students will delve into the realm of epigenetic regulation, exploring its profound influence on gene expression dynamics, and critically evaluate its implications for devising cutting-edge (immuno)-therapeutic interventions aimed at combating cancer. An overview of state-of-the-art gene editing techniques, including the revolutionary CRISPR technology, will equip students with the necessary proficiency to manipulate genomic sequences with unprecedented precision. Additionally, students will be introduced to user-friendly graphical user interface (GUI) tools for analyzing transcriptomic data (e.g., RNAseq), enabling them to extract meaningful insights without the need for extensive bioinformatics expertise. Engaging with a recent, impactful publication from the domains of cancer biology, gene editing, or related disciplines, students will meticulously dissect the methodologies and findings therein. This exercise will not only broaden their knowledge base but also hone their critical thinking and analytical skills. Guidance and coaching will be provided to students on effectively communicating their findings and insights to audiences using dynamic multimedia presentations, leveraging tools such as PowerPoint. Subsequent discussions will foster a deeper understanding of the nuances inherent in scientific discourse and facilitate the exchange of ideas amongst peers.		Workload: Attendance time: 14 h Self-study time: 46 h
Course: Biology and Pathology of Cellular Organelles (Seminar)		1 WLH
Examination: Oral Presentation (approx. 30 minutes), not graded		2 C
Admission requirements: Successful completion of module B.MM.106 (Molecular Cell Biology and Genetics) or equivalent coursework.	Recommended previous knowledge: none	
Language:	Person responsible for module:	

English	Prof. Dr. med. Lars Schlotawa, PD Dr. rer. nat. Susanne Diegmann
Course frequency: once a year	Duration:
Number of repeat examinations permitted: twice	Recommended semester: 1 - 4
Maximum number of students: 10	

Georg-August-Universität Göttingen Module M.MM.028: Integrative Auditory Neuroscience		3 C 2 WLH
Learning outcome, core skills: Students will gain comprehensive insights into the intricacies of the transcription cycle, the pivotal roles of transcription factors, oncogenes, and tumor suppressors in driving the multifaceted processes underlying cancer initiation and progression. Students will delve into the realm of epigenetic regulation, exploring its profound influence on gene expression dynamics, and critically evaluate its implications for devising cutting-edge (immuno)-therapeutic interventions aimed at combating cancer. An overview of state-of-the-art gene editing techniques, including the revolutionary CRISPR technology, will equip students with the necessary proficiency to manipulate genomic sequences with unprecedented precision. Additionally, students will be introduced to user-friendly graphical user interface (GUI) tools for analyzing transcriptomic data (e.g., RNAseq), enabling them to extract meaningful insights without the need for extensive bioinformatics expertise. Engaging with a recent, impactful publication from the domains of cancer biology, gene editing, or related disciplines, students will meticulously dissect the methodologies and findings therein. This exercise will not only broaden their knowledge base but also hone their critical thinking and analytical skills. Guidance and coaching will be provided to students on effectively communicating their findings and insights to audiences using dynamic multimedia presentations, leveraging tools such as PowerPoint. Subsequent discussions will foster a deeper understanding of the nuances inherent in scientific discourse and facilitate the exchange of ideas amongst peers.		Workload: Attendance time: 28 h Self-study time: 62 h
Course: Integrative Auditory Neuroscience (Seminar)		2 WLH
Examination: Written draft (max. 3 pages), not graded		2 C
Admission requirements: none	Recommended previous knowledge: General knowledge of the anatomy and normal function of the auditory system, as laid out in standard textbooks of Neuroscience (e.g. Kandel Principles of Neuroscience) or	

	Physiology (E.g. Schmidt/Thews Physiology) or taught in the Göttingen Bachelor program of Molecular Medicine • General knowledge of neurophysiology. • Attendance of elective module B.MM.014 Auditorische Neurowissenschaften or M.MM.017 Auditory Neuroscience is helpful but not required.
Language: English	Person responsible for module: Prof. Dr. rer. nat. Marcus Jeschke
Course frequency: once a year	Duration:
Number of repeat examinations permitted: twice	Recommended semester: 1 - 4
Maximum number of students: 16	

Georg-August-Universität Göttingen Module M.MM.029: Voluntary Lab Rotation		6 C 8 WLH
Learning outcome, core skills: In the course of the module the students will acquire deepened molecular knowledge of the interplay between pathogens and the host defense, immunological diseases and pharmacological approaches to interfere with various disorders. The graduates know current immunological questions and methods, and are able to explain the mechanism and therapy of related diseases. They know the function and regulation of microbial virulence factors and understand their role in the pathogenesis of infectious diseases. In addition, they have extensive insight into the taxonomy and structure of viruses. The graduates know the principles of pharmacological research and current therapeutic strategies. They can apply concepts of pharmacology to practical examples and name effects of selected toxic substances. The graduates have the ability to work under supervision on a small defined scientific project using experimental methods, and to analyze and interpret the obtained data. They are able to present their results in a seminar, and to discuss and document them in written form similar to a scientific publication.		Workload: Attendance time: 112 h Self-study time: 68 h
Course: "Voluntary Lab Rotation" (Practical course)		8 WLH
Examination: Written draft (max. 10 pages)		6 C
Admission requirements: Bachelor's degree in a related study program or successfully passed first exam in human medicine	Recommended previous knowledge: Basic lectures in microbiology, virology, immunology and pharmacology.	
Language: English	Person responsible for module: Prof. Dr. rer. nat. Holger Reichardt	
Course frequency: once a year	Duration: 6 weeks	
Number of repeat examinations permitted: twice	Recommended semester: 3 - 4	
Maximum number of students: 25		

Georg-August-Universität Göttingen Module M.MM.030: Experimental, epidemiological and clinical approaches in dermatology		2 C 2 WLH
Learning outcome, core skills: After completing the module, students: • are familiar with the structure, function and immunology of the skin • have an overview of immunological, cellular and molecular mechanisms of different skin disorders such as atopic dermatitis, contact dermatitis, skin fibrosis and skin cancer • have gained insights into experimental models of dermatology (<i>in vivo</i> mouse models, <i>in vitro</i> cell culture) and different analytical tools • know the most important contact sensitizers, their distribution in environment and occupation, and are familiar with patch testing and corresponding epidemiological research (including the design of an epidemiological questionnaire) • can describe how the IVDK (Information Network of Departments of Dermatology) contributes to disease surveillance and prevention • obtained practical expertise in planning, conducting and interpreting epidemiological and laboratory experiments, including literature interpretation and presentation		Workload: Attendance time: 30 h Self-study time: 30 h
Course: "Skin biology: from homeostasis to diseases" (Lecture)		1 WLH
Course: "Revising research data for presentation" (Seminar)		0,5 WLH
Examination: Oral Presentation (30 minutes) Examination prerequisites: Regular attendance in seminars and courses (80%) Examination requirements: Basic knowledge of dermatological research approaches, adequate work out and presentation of methods and research results.		2 C
Examination requirements: Apply their gained knowledge of basic skin diseases and dermatological research approaches to understand and interpret related issues from the literature. In this context, students are expected to compile and present a specified topic in small working groups.		
Admission requirements: Bachelor's degree in Molecular Medicine or a related field of study	Recommended previous knowledge: Basic knowledge in immunology, molecular biology and statistics	
Language: English	Person responsible for module: Prof. Dr. med. Timo Buhl, Dr. Andrea Braun	
Course frequency: once a year	Duration: 3 weeks	
Number of repeat examinations permitted: twice	Recommended semester: 1 - 3	

Maximum number of students:	
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Georg-August-Universität Göttingen Module M.MM.108: Pathogens, Immunity and Therapeutics		12 C 8 WLH
Learning outcome, core skills: In the course of the module the students will acquire deepened molecular knowledge of the interplay between pathogens and the host defense, immunological diseases and pharmacological approaches to interfere with various disorders. The graduates know current immunological questions and methods, and are able to explain the mechanism and therapy of related diseases. They know the function and regulation of microbial virulence factors and understand their role in the pathogenesis of infectious diseases. In addition, they have extensive insight into the taxonomy and structure of viruses. The graduates know the principles of pharmacological research and current therapeutic strategies. They can apply concepts of pharmacology to practical examples and name effects of selected toxic substances. The graduates have the ability to work under supervision on a small defined scientific project using experimental methods, and to analyze and interpret the obtained data. They are able to present their results in a seminar, and to discuss and document them in written form similar to a scientific publication.		Workload: Attendance time: 112 h Self-study time: 248 h
Course: Pathogens, Immunity and Therapeutics (Lecture,Seminar)		8 WLH
Examination: Written examination (120 minutes) Examination prerequisites: Regular attendance at the seminar. Examination requirements: Deepened knowledge of clinically relevant pathogens and their mechanisms, basic concepts of immune responses and their failure, and current principles of pharmacological therapy of selected diseases.		12 C
Admission requirements: Bachelor's degree in a related study program or successfully passed first exam in human medicine	Recommended previous knowledge: Basic lectures in microbiology, virology, immunology and pharmacology.	
Language: English	Person responsible for module: Prof. Dr. rer. nat. Holger Reichardt	
Course frequency: once a year	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester: 1 - 2	
Maximum number of students: 30		

Georg-August-Universität Göttingen Module M.MM.109: Lab Rotation Infection and Medication		12 C 15 WLH
Learning outcome, core skills: In the course of the module the students will acquire deepened molecular knowledge of the interplay between pathogens and the host defense, immunological diseases and pharmacological approaches to interfere with various disorders. The graduates know current immunological questions and methods, and are able to explain the mechanism and therapy of related diseases. They know the function and regulation of microbial virulence factors and understand their role in the pathogenesis of infectious diseases. In addition, they have extensive insight into the taxonomy and structure of viruses. The graduates know the principles of pharmacological research and current therapeutic strategies. They can apply concepts of pharmacology to practical examples and name effects of selected toxic substances. The graduates have the ability to work under supervision on a small defined scientific project using experimental methods, and to analyze and interpret the obtained data. They are able to present their results in a seminar, and to discuss and document them in written form similar to a scientific publication.		Workload: Attendance time: 210 h Self-study time: 150 h
Course: "Lab Rotation" (Practical course)		15 WLH
Examination: Written draft (max. 20 pages) Examination prerequisites: Regular attendance at the lab rotation. Completion of the course "Good Scientific Practice". Attendance at the occupational health and safety briefing and medical prevention. Examination requirements: Practical application of typical experimental methods to elucidate molecular, cellular and pathophysiological processes, and conclusive presentation of the obtained research results.		12 C
Admission requirements: Bachelor's degree in a related study program or successfully passed first exam in human medicine	Recommended previous knowledge: Basic lectures in microbiology, virology, immunology and pharmacology.	
Language: English	Person responsible for module: Prof. Dr. rer. nat. Holger Reichardt	
Course frequency: once a year	Duration: 8 weeks	
Number of repeat examinations permitted: twice	Recommended semester: 1 - 4	
Maximum number of students: 25		

Georg-August-Universität Göttingen Module M.MM.110: Molecular and Cellular Basis of Disease		12 C 8 WLH
Learning outcome, core skills: After successfully finishing this module the students should be familiar with molecular processes within the cell and corresponding aspects associated with pathological changes and pathological tissues. They are able to describe qualitatively genetic and metabolic diseases as well as inflammatory and cancerous processes. The students are familiar with tools, concepts and methods of cell biology, pathology, human genetics and molecular/experimental oncology and thus be able to describe causes and consequences of changes within genetic and cellular processes by using typical examples. Furthermore, fundamental mechanisms in pathology, genetics and cell biology are deduced. In addition, under qualified supervision students acquire the ability to perform experimental work within the lab covering a clear cut issue. The results of this practical course will be presented within the corresponding scientific group and written down in corresponding scientific style.		Workload: Attendance time: 112 h Self-study time: 248 h
Course: Molecular and Cellular Basis of Disease (Lecture,Seminar)		WLH
Examination: Written examination (180 minutes) Examination prerequisites: Regular attendance at the seminar. Examination requirements: Knowledge about fundamental mechanisms in gene regulation, extended knowledge about principles in cell communications and intracellular signaling processes, mechanisms of feedback/-forward regulatory circuits in cell signaling, Hallmarks of cancer, criteria of cell transformation in in vitro und in vivo assays, models of tumor development and therapy, tools to investigate cancer cells, current concepts in cancer therapy, tumor associated viruses and their mode of action, tumorsuppressor genes and oncogenes: modern concepts and mode of action, mechanisms, regulation of cell cycle phases, cell cycle check-points, posttranslational modifications as ubiquitination and phosphorylation, regulation of mitosis and chromosome segregation, genetic instability in cancer and chromosomal aberrations (examples, formation and detection/diagnosis), general pathology of inflammation and tumor pathology, the stem cell concept, concepts about the evolution of immune related genes, genetics of inflammatory reactions/ diseases and analysis of prehistorical DNA in the context of concepts of Anthropology, selected topic of molecular and translational oncology and hematological neoplasias, knowledge about current methods to analyse DNA, proteome analysis for molecular medicine.		12 C
Admission requirements: Bachelor's degree in a related study program or successfully passed first exam in human medicine.	Recommended previous knowledge: Basic lectures in oncology, biochemistry, pathology, cell biology, molekular biology, dermatology und human genetics.	
Language: English	Person responsible for module: Prof. Dr. Dieter Kube	

Course frequency: once a year	Duration: 8 weeks
Number of repeat examinations permitted: twice	Recommended semester: 1 - 2
Maximum number of students: 30	

Georg-August-Universität Göttingen Module M.MM.111: Lab Rotation Pathology and Cancer		12 C 15 WLH
Learning outcome, core skills: In the course of the module the students will acquire deepened molecular knowledge of the interplay between pathogens and the host defense, immunological diseases and pharmacological approaches to interfere with various disorders. The graduates know current immunological questions and methods, and are able to explain the mechanism and therapy of related diseases. They know the function and regulation of microbial virulence factors and understand their role in the pathogenesis of infectious diseases. In addition, they have extensive insight into the taxonomy and structure of viruses. The graduates know the principles of pharmacological research and current therapeutic strategies. They can apply concepts of pharmacology to practical examples and name effects of selected toxic substances. The graduates have the ability to work under supervision on a small defined scientific project using experimental methods, and to analyze and interpret the obtained data. They are able to present their results in a seminar, and to discuss and document them in written form similar to a scientific publication.		Workload: Attendance time: 210 h Self-study time: 150 h
Course: Lab Rotation Pathology and Cancer (Practical course)		WLH
Examination: Written draft (max. 20 pages) Examination prerequisites: Regular attendance at the lab rotation. Completion of the course "Good Scientific Practice". Attendance at the occupational health and safety briefing and medical prevention. Examination requirements: Practical application of typical experimental methods to elucidate molecular, cellular and pathophysiological processes, and conclusive presentation of the obtained research results.		12 C
Admission requirements: Bachelor's degree in a related study program or successfully passed first exam in human medicine	Recommended previous knowledge: Basic lectures in microbiology, virology, immunology and pharmacology.	
Language: English	Person responsible for module: Prof. Dr. rer. nat. Holger Reichardt	
Course frequency: once a year	Duration: 8 weeks	
Number of repeat examinations permitted: twice	Recommended semester: 1 - 4	
Maximum number of students: 25		

Georg-August-Universität Göttingen Module M.MM.112: Cardiovascular and Kidney Diseases		7 C 4 WLH
Learning outcome, core skills: After successfully completing this module the students should be familiar with molecular aspects of different renal diseases like polycystic kidney disease, diabetic nephropathy as well as with mechanisms leading to renal fibrosis. In molecular cardiology the student become familiar with mechanisms of different forms of heart failure, mechanisms of arrhythmia and myocarditis and the role of stem cells in tissue regeneration. In pharmacology, this knowledge is supplemented by pharmacotherapeutic strategies in the treatment of hypertension, heart failure, arrhythmia, the metabolic syndrome and thromboembolic events. An outlook on potential future therapies of cardiovascular diseases is given including gene therapy, stem-cell based therapies and tissue engineering.		Workload: Attendance time: 52 h Self-study time: 158 h
Course: Cardiovascular and Kidney Diseases		4 WLH
Examination: Written examination (120 minutes) Examination prerequisites: None Examination requirements: Profound knowledge of molecular mechanisms in the field of nephrology, cardiology and pharmacology as well as of therapeutic strategies to treat the respective disorders.		7 C
Admission requirements: Bachelor's degree in Molecular Medicine or a related study program	Recommended previous knowledge: Basic lectures in nephrology, cardiology and pharmacology	
Language: English	Person responsible for module: Prof. Dr. rer. nat. Susanne Lutz	
Course frequency: once a year	Duration: 4 weeks	
Number of repeat examinations permitted: twice	Recommended semester: 2 - 4	
Maximum number of students: 25		

Georg-August-Universität Göttingen Module M.MM.113: Molecular Pathology of the Nervous System		5 C 3 WLH
Learning outcome, core skills: After successfully finishing this module, students should be familiar with the neuropathological / molecularbiological hallmarks of the most important neurological diseases. Mechanisms playing a role in neurodegenerative disorders resulting from protein misfolding like Alzheimer's, Huntington's and Parkinson's disease, as well as Prion diseases will be covered. A further goal of this module is a profound understanding of the molecular mechanisms of neuromuscular diseases (including polyneuropathies, myopathies, Amyotrophic Lateral Sclerosis and Spinal Muscular Atrophy), cerebral vascular diseases (especially ischemic Strokes) and neurological autoimmune diseases including Multiple Sclerosis and its Mimics, as well as paraneoplastic and other autoimmune Encephalitides. CNS tumors and Epilepsia will also be covered. These topics are complemented by the presentation of state-of-the-art therapeutic strategies to treat the most common neurological diseases.		Workload: Attendance time: 40 h Self-study time: 110 h
Course: Molecular Pathology of the Nervous System		3 WLH
Examination: Written examination (90 minutes) Examination requirements: Profound knowledge of molecular mechanisms of neurological diseases and therapeutic approaches.		5 C
Admission requirements: Bachelor's degree in Molecular Medicine or a related study program	Recommended previous knowledge: Basic lectures in neurology	
Language: English	Person responsible for module: Prof. Dr. med. Christine Stadelmann-Nessler, PD Dr. Fabian Maass	
Course frequency: once a year	Duration: 3 weeks	
Number of repeat examinations permitted: twice	Recommended semester: 2 - 4	
Maximum number of students: 25		

Georg-August-Universität Göttingen Module M.MM.114: Lab Rotation Heart and Brain		12 C 15 WLH
Learning outcome, core skills: The practical work will be performed under direct one-to-one supervision in a group with expertise in a discipline linked to the field of molecular neurology or cardiology. By participating in a research project the students will learn to • answer scientific questions using state-of-the-art techniques • critically analyze own research data • manage time and resources in a scientific project • present and discuss own data in an appropriate written form.		Workload: Attendance time: 210 h Self-study time: 150 h
Course: Lab Rotation Heart and Brain		15 WLH
Examination: Written draft (max. 20 pages) Examination prerequisites: Regular attendance at the lab rotation. Completion of the course "Good Scientific Practice". Attendance of the "Occupational health and safety briefing". Examination requirements: Appropriate personal performance, clarity and completeness of the lab book and lab report; the lab report should be structured like a scientific publication containing the following sections: Introduction, Materials & Methods, Results, Discussion, References		12 C
Admission requirements: Bachelor's degree in Molecular Medicine or a related study program	Recommended previous knowledge: Experience in experimental methods gained during at least 300 hours of practical lab work	
Language: English	Person responsible for module: Prof. Dr. rer. nat. Holger Reichardt	
Course frequency: once a year; Individual appointment	Duration: 8 weeks	
Number of repeat examinations permitted: twice	Recommended semester: 1 - 4	
Maximum number of students: 25		

Georg-August-Universität Göttingen Module M.MM.115: Current Topics in Molecular Medicine		4 C 3 WLH
Learning outcome, core skills: After completion of the module, the participant is capable of communicating his own scientific projects to a broader audience of scientists. Furthermore, she/he is capable of introducing such an audience to a general topic of molecular medicine. She/He can summarize primary scientific literature and review articles in an overview talk. The participants will be capable of following seminar talks about a topic that they are not immediately familiar with. They are asking meaningful questions and have become able to discuss methodological approaches and scientific conclusions in a critical and constructive manner.		Workload: Attendance time: 42 h Self-study time: 78 h
Course: Current Topics in Molecular Medicine (Seminar)		3 WLH
Examination: Oral Presentation (approx. 30 minutes) Examination prerequisites: Regular attendance at the seminar. Examination requirements: The seminar talk must be understandable and clearly structured. It should reflect broad knowledge regarding the scientific background. The questions behind the project should be derived from this background. Methods and results should be outlined understandably, and the conclusions should be presented in a way that the audience can follow. The participants are also required to actively contribute to the discussion, to ask questions, and to evaluate the above-mentioned aspects of the presentation.		4 C
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Holger Bastians, Prof. Dr. Ramona Schulz-Heddergott	
Course frequency: once a year	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester: from 2	
Maximum number of students: 20		