
Modulhandbuch

Molecular Biomedicine - Master-Studiengang

im Sommersemester 2024

erstellt am 01.05.2024

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Background Modules

bio605 - Molecular Genetics and Cell Biology

Modulbezeichnung	Molecular Genetics and Cell Biology			
Modulkürzel	bio605			
Kreditpunkte	12.0 KP			
Workload	360 h			
Verwendbarkeit des Moduls	• Master Biologie (Master) > Background Modules • Master Biology (Master) > Background Modules • Master Neuroscience (Master) > Background Modules • Master's Programme Molecular Biomedicine (Master) > Background Modules			
Zuständige Personen	• Neidhardt, John (Modulverantwortung) • Neidhardt, John (Prüfungsberechtigt) • Koch, Karl-Wilhelm (Prüfungsberechtigt) • Jüschke, Christoph (Prüfungsberechtigt)			
Teilnahmevoraussetzungen	BSc (Biologie, Biochemie)			
Kompetenzziele	++ vertiefte biologische Fachkenntnisse ++ vertiefte Kenntnisse biologischer Arbeitstechniken + Fähigkeit zur Datenanalyse ++ fächerübergreifendes Denken + kritisches und analytisches Denken + eigenständige Recherche und Kenntnisse wissenschaftlicher Primärliteratur + Datenpräsentation und Diskussion in Wort und Schrift (E) + Teamfähigkeit + Ethik und professionelles Verhalten + Projekt- und Zeitmanagement Für Studierende mit Interesse an einem molekularbiologischen, molekulargenetischen, zellbiologischen und neurobiologischen Schwerpunkt.			
Modulinhalte	Theorie: Vertiefung der Kenntnisse in der molekularen Genetik und Zellbiologie. Ein Bezug zu menschlichen Erkrankungen wird hergeleitet. Praxis: Überprüfung der theoretischen Kenntnisse im Experiment. Erwerb methodischer Kenntnisse der molekularen Genetik, Zellbiologie und Therapieentwicklung. Einblicke in die Durchführung von Forschungsvorhaben. Themen der Vorlesung und des Seminars: Molekulare Grundlagen neurodegenerativer Erkrankungen, Struktur und Funktion von DNA/RNA/Proteinen, Hochdurchsatz-Technologien, Struktur und Funktion von Membranen, Cytoskelett, Zellzyklus, programmierter Zelltod, Zellen im sozialen Verband. Übungen: Vermittlung aktueller Methoden der Molekularbiologie und Humangenetik, Hochdurchsatztechnologien, Einführung in Zellkulturtechniken.			
Literaturempfehlungen	Lehrbücher der Zellbiologie und Humangenetik			
Links	http://www.uni-oldenburg.de/humangenetik/			
Unterrichtssprache	Englisch			
Dauer in Semestern	1 Semester			
Angebotsrhythmus Modul				
Aufnahmekapazität Modul	15			
Hinweise	verknüpft mit dem Modul bio900			
Modulart	Wahlpflicht / Elective			
Modullevel	MM (Mastermodul / Master module)			
Vorkenntnisse	Zellbiologische Grundkenntnisse, Genetik, Biochemie			
Prüfung	Prüfungszeiten	Prüfungsform		
Gesamtmodul		Präsentation(en) 30 % und Klausur (70 %) unbenotet: abgezeichnete Protokolle Voraussetzung für das Bestehen des Moduls ist die aktive regelmäßige Teilnahme.		
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		2	WiSe	28
Seminar		1	WiSe	14
Übung		5	WiSe	70

Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Präsenzzeit Modul insgesamt				112 h

bio695 - Biochemical concepts in signal transduction

Modulbezeichnung	Biochemical concepts in signal transduction			
Modulkürzel	bio695			
Kreditpunkte	12.0 KP			
Workload	360 h			
Verwendbarkeit des Moduls	• Master Biologie (Master) > Background Modules • Master Biology (Master) > Background Modules • Master Neuroscience (Master) > Background Modules • Master's Programme Molecular Biomedicine (Master) > Background Modules			
Zuständige Personen	• Koch, Karl-Wilhelm (Modulverantwortung) • Koch, Karl-Wilhelm (Prüfungsberechtigt) • Scholten, Alexander (Prüfungsberechtigt) • Scholten, Alexander (Modulberatung)			
Teilnahmevoraussetzungen	keine			
Kompetenzziele	++ vertiefte biologische Fachkenntnisse ++ vertiefte Kenntnisse biologischer Arbeitstechniken ++ Methoden: Proteinexpression und Reinigung, Funktionsassays, Enzymkinetik, spektroskopische Techniken ++ Fähigkeit zur Datenanalyse + fächerübergreifendes Denken ++ kritisches und analytisches Denken + eigenständige Recherche und Kenntnisse wissenschaftlicher Primärliteratur + Fähigkeit zur eigenständigen biologischen Forschung ++ Datenpräsentation und Diskussion in Wort und Schrift (D/E) ++ Teamfähigkeit + Projekt- und Zeitmanagement			
Modulinhalte	V: Molekulare Grundlagen der zellulären Signalverarbeitung S: Signaltransduktion Ü: Experimente zur zellulären Signaltransduktion und Enzymologie Mechanismen der biochemischen Signaltransduktion werden theoretisch und experimentell vermittelt			
Literaturempfehlungen	Lehrbücher der Zellbiologie und Biochemie. Aktuelle Literatur über Themen der Signaltransduktion (wird in der Vorbesprechung bekannt gegeben)			
Links				
Unterrichtssprache	Englisch			
Dauer in Semestern	1 Semester			
Angebotsrhythmus Modul				
Aufnahmekapazität Modul	20			
Modulart	Wahlpflicht / Elective			
Modullevel	MM (Mastermodul / Master module)			
Prüfung	Prüfungszeiten	Prüfungsform		
Gesamtmodul		Klausur (90 Minuten; 50 %) und Protokoll(e) (50%) Voraussetzung für das Bestehen des Moduls ist die aktive Teilnahme: Präsentation(en) im Seminar		
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		1	WiSe	14
Seminar		1	WiSe	14
Übung		6	WiSe	84
Präsenzzeit Modul insgesamt				112 h

gsw010 - Molecular Physiology

Modulbezeichnung	Molecular Physiology
Modulkürzel	gsw010
Kreditpunkte	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Master's Programme Molecular Biomedicine (Master) > Background Modules
Zuständige Personen	• Milenkovic, Ivan (Modulverantwortung) • Milenkovic, Ivan (Prüfungsberechtigt) • Radulovic, Tamara (Prüfungsberechtigt) • Keine, Christian (Prüfungsberechtigt) • Radulovic, Tamara (Modulberatung) • Milenkovic, Ivan (Modulberatung)
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine; Knowledge of cell biology is beneficial for comprehension of lecture content
Kompetenzziele	Goals of the Module: Upon successful completion of this module, students - know molecular mechanisms of cellular physiology - know physiology of the following human body organ systems: muscular system, nervous system, cardiovascular system, respiratory system, urinary system - understand pathophysiology of certain diseases - know basic principles of functional tests for certain organ systems. Competencies: ++ deepened biological expertise ++ deepened clinical/pathological expertise ++ deepened knowledge of medical diagnostic methods + data analysis and clinical interpretation + interdisciplinary thinking
Modulinhalte	The module focuses on physiology of the cell, physiology of human organ systems in health and disease, homeostatic regulation mechanisms Lecture topics: 1. Cellular mechanisms of excitability 2. Synaptic transmission 3. Muscle contraction 4. Spinal cord reflexes 5. Motor skills 6. Basic principles of circulatory function 7. Pulmonary ventilation 8. Regulation of respiration 9. General sensory physiology 10. Physiology of special senses 11. Kidneys 12. Water homeostasis and osmoregulation Exercise: 1. Excitability of nerve cells and AP propagation 2. Reflexes 3. Electrocardiography 4. Pulmonary function tests and regulation of respiration 5. Functional tests for sensory systems 6. Water and osmolarity homeostasis
Literatureempfehlungen	Guyton and Hall - Textbook of medical physiology (covers most topics) Kandler, Schwarz, Jessell - Principles of neural science Gary G. Matthews – Cellular Physiology of Nerve and Muscle
Links	https://uol.de/physiologie
Unterrichtssprache	Englisch
Dauer in Semestern	1 Semester
Angebotsrhythmus Modul	winter and summer term
Aufnahmekapazität Modul	10 (participation at lectures is not restricted)
Hinweise	The number of participants for the practical part of this module is limited to 10. Students which are enrolled in Master's programme Molecular Biomedicine will be preferred.
Modulart	Wahlpflicht / Elective

Modullevel		MM (Mastermodul / Master module)		
Lehr-/Lernform		Lecture and Exercise		
Vorkenntnisse		Basic knowledge in physiology and cell biology		
Prüfung	Prüfungszeiten		Prüfungsform	
Gesamtmodul			Oral examination (20 min.)	
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		2	SoSe und WiSe	28
Praktikum		2	SoSe und WiSe	28
Präsenzzeit Modul insgesamt				56 h

gsw020 - Cellular and Subcellular Structures

Modulbezeichnung	Cellular and Subcellular Structures	
Modulkürzel	gsw020	
Kreditpunkte	6.0 KP	
Workload	180 h	
Verwendbarkeit des Moduls	• Master's Programme Molecular Biomedicine (Master) > Background Modules	
Zuständige Personen	• Bräuer, Anja (Modulverantwortung) • Bräuer, Anja (Prüfungsberechtigt) • Maier, Esther Christine (Prüfungsberechtigt) • Maier, Esther Christine (Modulberatung)	
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine	
Kompetenzziele	Goals of the Module: Upon successful completion of this module, students know and understand cellular and subcellular structures and their function in the human body. Competencies: ++ deepened biological expertise ++ deepened clinical / pathological expertise ++ deepened knowledge of biological working methods ++ deepened knowledge of clinical / pathological diagnostics + interdisciplinary thinking + critical and analytical thinking + ability to perform independent biological research + ethics and professional behaviour	
Modulinhalte	The module aims to give students an insight into microscopic functional anatomy. In this module, we will cover aspects of cell compartmentalisation and tissue organisation as the basis for normal function and homeostasis. In addition, we will cover examples of organ organisation and organ function. To introduce students to clinical concepts, and to deepen their understanding of the functional roles of cells and tissues, we will also cover aspects of the pathological basis of disease for selected organs and organelles. In the accompanying seminar, students will have the chance to work on light and electron microscopic pictures, to practice annotation and identification of cells and tissues. In addition, the students will read and present original literature. This will introduce select aspects of disease, but also introduce research methodology and scientific thinking. This course is not a full histology course, but it serves as an introduction to the topic, recapitulates aspects of cell biology and introduces a few select aspects of pathology. Thus, this module is aimed at students with little experience in cell biology.	
Literaturempfehlungen	Molecular Biology of the Cell (Alberts et al., 6th ed.) Junqueira's Basic Histology: Text and Atlas (Mescher, 14th ed.) Robbins Basic Pathology (Kumar et al., 9th ed.)	
Links	https://uol.de/anatomie/forschung/	
Unterrichtssprache	Englisch	
Dauer in Semestern	1 Semester	
Angebotsrhythmus Modul	summer semester	
Aufnahmekapazität Modul	25	
Hinweise	For your notice: this course will NOT cover microscopic imaging techniques, if you are interested please see module gsw200_Microscopic Imaging in Biomedical Sciences.	
Modulart	Wahlpflicht / Elective	
Modullevel	MM (Mastermodul / Master module)	
Lehr-/Lernform	Lecture and Seminar	
Vorkenntnisse	Basic knowledge in biology, chemistry, mathematics	
Prüfung	Prüfungszeiten	Prüfungsform
Gesamtmodul	written examination (45 min.)	

Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		2	SoSe	28
Übung		2	SoSe	28
Präsenzzeit Modul insgesamt				56 h

gsw030 - Biophysical Chemistry

Modulbezeichnung	Biophysical Chemistry			
Modulkürzel	gsw030			
Kreditpunkte	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	Master's Programme Molecular Biomedicine (Master) > Background Modules			
Zuständige Personen	- Winklhofer, Michael (Modulverantwortung) - Winklhofer, Michael (Prüfungsberechtigt)			
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine			
Kompetenzziele	Goals of the Module: Upon successful completion of this module, students understand physical principles underlying biochemistry and cell biology. Competencies: ++ deepened biological expertise + data analysis skills + usage of databases and computational tools + interdisciplinary thinking ++ critical and analytical thinking ++ data presentation and discussion			
Modulinhalte	The module focuses on molecular biophysics, biophysical chemistry, biochemistry, cell biology. Dynamics of single molecules, molecular thermodynamics, statistical thermodynamics; diffusion; chemical equilibria involving macromolecules, signal amplification; spectroscopical techniques (molecular vibration and rotation spectroscopy, electronic absorption and fluorescence spectroscopy, FRET, NMR, Atomic force microscopy).			
Literaturempfehlungen	Principles of Biophysical Chemistry (van Holde et al., Pearson/Prentice Hall) Physical chemistry (Atkins, Wiley VCH) Biophysics - Searching for principles (Bialek, Princeton UP)			
Links	https://uol.de/en/biology/groups-our-research/sensory-biology-of-animals			
Unterrichtssprache	Englisch			
Dauer in Semestern	1 Semester			
Angebotsrhythmus Modul	summer semester			
Aufnahmekapazität Modul	20			
Modulart	Wahlpflicht / Elective			
Modullevel	MM (Mastermodul / Master module)			
Lehr-/Lernform	Lecture and Seminar			
Vorkenntnisse	basic knowledge in biochemistry and physics			
Prüfung	Prüfungszeiten		Prüfungsform	
Gesamtmodul			short tests in seminar (75%) + presentation (25%)	
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		2	SoSe	28
Seminar		2	SoSe	28
Präsenzzeit Modul insgesamt				56 h

gsw040 - Molecular and Cellular Biology of Hearing and Deafness

Modulbezeichnung	Molecular and Cellular Biology of Hearing and Deafness
Modulkürzel	gsw040
Kreditpunkte	12.0 KP
Workload	360 h
Verwendbarkeit des Moduls	Master's Programme Molecular Biomedicine (Master) > Background Modules
Zuständige Personen	- Claußen, Maike (Prüfungsberechtigt) - Ebbers, Lena (Prüfungsberechtigt) - Ebbers, Lena (Modulverantwortung) - Claußen, Maike (Modulverantwortung)
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine
Kompetenzziele	Competencies: ++ deepened biological expertise ++ deepened knowledge of biological working methods ++ data analysis skills + interdisciplinary thinking ++ critical and analytical thinking ++ independent searching and knowledge of scientific literature + data presentation and discussion (written and spoken) + team work
Modulinhalte	The module focuses on auditory neuroscience, molecular and cellular neurobiology. Lecture: Development, anatomy and function of the auditory system (cochlea to cortex), classification, molecular causes and inheritance of auditory disorders, investigation of these disorders in animal models, insights into possibilities of treatment/therapy Seminar: The seminar will focus on possibilities of treatment options in the field of auditory rehabilitation. In a flipped classroom, students will shortly present and discuss different approaches. Exercise: Laboratory experiments to study mouse models of deafness/auditory processing disorders
Literatureempfehlungen	Springer Handbook of Auditory Research Series Vol. 63: - Manley, G.A., Gummer, A.W., Popper, A.N., Fay, R.R. (Eds.), "Understanding the Cochlea", 2017, Springer - Oliver, D.L., Cant, N., Fay, R.R., Popper, A.N. (Eds.), "The Mammalian Auditory Pathways - Synaptic Organization and Microcircuits", 2018, Springer - Cramer, K.S., Coffin, A., Fay, R.R., Popper, A.N. (Eds.), "Auditory Development and Plasticity", 2017, Springer Jeremy M. Wolfe, Keith R. Kluender, Dennis M. Levi, Linda M. Bartoshuk, Rachel S. Herz, Roberta L. Klatzky, and Daniel M. Merfeld, "Sensation & Perception", 2017, Sinauer Vona, B., Haaf, T. (Eds.), "Genetics of Deafness", 2016, Karger Publishers
Links	https://uol.de/en/neurogenetics/research/
Unterrichtssprache	Englisch
Dauer in Semestern	1 Semester
Angebotsrhythmus Modul	Second half of the summer semester
Aufnahmekapazität Modul	8
Hinweise	The number of participants for this module is limited to 8. If there are more students registered than places available, lots will be drawn. Students which are enrolled in Master's programme Molecular Biomedicine will be preferred.
Modulart	Wahlpflicht / Elective
Modullevel	MM (Mastermodul / Master module)
Lehr-/Lernform	Lecture, Seminar and Exercise
Vorkenntnisse	basic knowledge in genetics, molecular biology and cell biology

Prüfung		Prüfungszeiten	Prüfungsform	
Gesamtmodul			presentation (50%), protocol (50%)	
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		1	SoSe	14
Seminar		2	SoSe	28
Praktikum		5	SoSe	70
Präsenzzeit Modul insgesamt				112 h

gsw050 - Current Topics of Genetics

Modulbezeichnung	Current Topics of Genetics			
Modulkürzel	gsw050			
Kreditpunkte	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	• Master's Programme Molecular Biomedicine (Master) > Background Modules			
Zuständige Personen	• Ebbers, Lena (Prüfungsberechtigt) • Ebbers, Lena (Modulverantwortung)			
Teilnahmevoraussetzungen	Enrolment in Master´s programme Molecular Biomedicine			
Kompetenzziele	Competencies: ++ deepened biological expertise ++ deepened knowledge of biological working methods + data analysis skills + interdisciplinary thinking ++ critical and analytical thinking ++ independent searching and knowledge of scientific literature ++ data presentation and discussion (written and spoken) + team work			
Modulinhalte	Lecture: imparting of newest methods and "Hot Topics" in genetics (epigenetics, non-coding RNAs (also with reference to associated diseases)), genome editing, prospects and limitations of studying animal models/organoid cultures of human genetic disease, gene therapy, etc. Seminar: reading/analyzing current literature in the field			
Literaturempfehlungen	Klug, Cummings, Spencer, Palladio, Killian, "Concepts of Genetics", Pearson, 2019 Strachan and Read, "Human molecular genetics", CRC Press, 2019 Current publications in genetics journals (e.g. Frontiers in Genetics, Trends in Genetics, PLOS Genetics, Nature Genetics, etc.)			
Links	https://uol.de/en/neurogenetics/research/			
Unterrichtssprache	Englisch			
Dauer in Semestern	1 Semester			
Angebotsrhythmus Modul	Second half of the winter semester			
Aufnahmekapazität Modul	20			
Modulart	Wahlpflicht / Elective			
Modullevel	MM (Mastermodul / Master module)			
Lehr-/Lernform	Lecture and Seminar			
Vorkenntnisse	basic knowledge in genetics			
Prüfung	Prüfungszeiten		Prüfungsform	
Gesamtmodul			graded: written examination (50%), portfolio (50%, concept paper and short presentation), ungraded: technical implementation of the concept paper (production of digital content for science communication (video/podcast))	
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		2	SoSe	28
Seminar		2	SoSe	28
Präsenzzeit Modul insgesamt				56 h

neu141 - Visual Neuroscience - Physiology and Anatomy

Modulbezeichnung	Visual Neuroscience - Physiology and Anatomy
Modulkürzel	neu141
Kreditpunkte	12.0 KP
Workload	360 h (3 SWS Lecture (VO) Total workload 90 h: 30h contact / 60h background literature reading and preparation for sh 1 SWS Seminar (SE) Total workload 30h: 10h contact / 20h literature reading and preparation of result presentation 8 SWS Supervised exercise (UE) Total workload 240h: 200h contact / 40h results analysis, writing of short reports for portfolio)
Verwendbarkeit des Moduls	• Master Biologie (Master) > Background Modules • Master Biology (Master) > Background Modules • Master Neuroscience (Master) > Background Modules • Master's Programme Molecular Biomedicine (Master) > Background Modules
Zuständige Personen	• Greschner, Martin (Modulverantwortung) • Greschner, Martin (Prüfungsberechtigt) • Ahlers, Malte (Prüfungsberechtigt) • Dedek, Karin (Prüfungsberechtigt) • Dömer, Patrick (Prüfungsberechtigt)
Teilnahmevoraussetzungen	Basic knowledge of neurobiology
Kompetenzziele	++ Neurosci. knowlg. ++ Expt. Methods + Independent research ++ Scient. Literature + Social skills + Maths/Stats/Progr. ++ Data present./disc. + Scientific English + Ethics Upon successful completion of this course, students • have basic knowledge of electrophysiological techniques used in neuroscience research • have acquired first practical skills in some electrophysiological techniques • have acquired basic skills in data analysis • have knowledge on retinal physiology and anatomy of the visual system • have basic knowledge of brain structures and their function • have profound knowledge of the architecture and circuits of the vertebrate retina • have acquired basic skills in histological techniques (tissue fixation, embedding, sectioning, staining procedures, immunohistochemistry) • have acquired fundamental skills in microscopy (differential interference contrast microscopy, phase-contrast microscopy, confocal microscopy)
Modulinhalte	The background module Neurophysiology consists of two weeks of theoretical introduction and two weeks of hands-on lab exercises in patch or extracellular recordings and two weeks of hands-on lab exercises in anatomy. The seminars cover the following topics: • Visual system • Introduction to electrophysiological methods • Introduction into methods used in neuroanatomy and neurochemistry • Introduction into microscopy and image analysis • Presentation and discussion of results relating to the literature
Literaturempfehlungen	Course scripts and mandatory scientific literature discussed in the seminar will be available in Stud.IP.

Background and seminar literature will be available in Stud.IP.

Links				
Unterrichtssprache		Englisch		
Dauer in Semestern		1 Semester		
Angebotsrhythmus Modul		annually, summer term, first half (full time)		
Aufnahmekapazität Modul		12 - with Visual Neuroscience: Anatomy (Shared course components with (cannot be credited twice): neu151 BM Visual Neuroscience: Anatomy)		
Modulart		Wahlpflicht / Elective		
Modullevel		MM (Mastermodul / Master module)		
Vorkenntnisse		Basic knowledge in neurobiology		
Prüfung	Prüfungszeiten		Prüfungsform	
Gesamtmodul	during the course (summer semester, first half) In addition, mandatory but ungraded: seminar presentation		Portfolio consisting of short tests and short reports	
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		2	SoSe oder WiSe	28
Seminar		2	SoSe oder WiSe	28
Übung		2	SoSe oder WiSe	28
Präsenzzeit Modul insgesamt				84 h

neu220 - Neurocognition and Psychopharmacology

Modulbezeichnung	Neurocognition and Psychopharmacology			
Modulkürzel	neu220			
Kreditpunkte	6.0 KP			
Workload	180 h (3 SWS Lecture (VO) "Introd. to Cognitive Neuroscience" and "Psychopharmacol." Total workload 135h: 45h contact/ 45 background reading/ 45h exam preparation 1 SWS Supervised exercise (UE) Total workload 45h: 14h contact/ 31h paper reading)			
Verwendbarkeit des Moduls	• Master Biologie (Master) > Background Modules • Master Biology (Master) > Background Modules • Master Neuroscience (Master) > Background Modules • Master's Programme Molecular Biomedicine (Master) > Background Modules			
Zuständige Personen	• Thiel, Christiane Margarete (Modulverantwortung) • Thiel, Christiane Margarete (Modulberatung) • Thiel, Christiane Margarete (Prüfungsberechtigt) • Gießing, Carsten (Prüfungsberechtigt)			
Teilnahmevoraussetzungen				
Kompetenzziele	[nop] ++ Neurosci. knowlg. + Expt. methods + Scient. literature + Social skills ++ Interdiscipl. knowlg. + Data present./disc. + Scientific English [nop] Upon successful completion of this course, students know the fundamentals of neurotransmission know the basic neural mechanisms underlying attention, learning, emotion, language and executive functions understand the relationship between disturbances in neurotransmitter systems, cognitive functions and psychiatric disease know the principles of drug treatment for psychiatric disorders have in-depth knowledge in selected areas of these topics are able to understand, explain and critically assess neuroscientific approaches in animals and humans are able to understand and critically assess published work in the area of cognitive neuroscience			
Modulinhalte	The lecture "Introduction to Cognitive Neuroscience" gives a short introduction into neuroanatomy and cognitive neuroscience methods and then covers different cognitive functions. Lecture topics: History of cognitive neuroscience Methods of cognitive neuroscience Attention Learning Emotion Language Executive functions. The supervised exercise either deepens that knowledge by exercises or discussions of recent papers/ talks on the respective topic covered during that week. The lecture "Psychopharmacology" illustrates the connection between neurotransmitters and behaviour and its links to psychiatric disease. The lecture contains several interactive parts to consolidate and critically evaluate the acquired knowledge. Lecture topics: Introduction to Terms and Definitions in Drug Research Dopaminergic and Noradrenergic System Cholinergic and Serotonergic System GABAergic and Glutamatergic System Addiction Depression Schizophrenia Anxiety Alzheimer's Disease			
Literaturempfehlungen	Ward J (2010) The Student's Guide to Cognitive Neuroscience. Psychology Press Meyer JS and Quenzer LF (2012) Psychopharmacology. Sinauer			
Links				
Unterrichtssprache	Englisch			
Dauer in Semestern	1 Semester			
Angebotsrhythmus Modul	annually			
Aufnahmekapazität Modul	30 (Recommended in combination with neu210 "Neurosensory Science and Behaviour", neu300 "Functional MRI data analysis" Shared course components with (cannot be credited twice): bio610 and psy181 (5.02.614 "Introduction to Cognitive Neuroscience", 5.02.615 "Psychopharmacology"))			
Hinweise	Course in the second half of the semester Regular active participation is required to pass the module.			
Modulart	je nach Studiengang Pflicht oder Wahlpflicht			
Vorkenntnisse	Fundamentals of Neurobiology, Behavioural Biology			
Prüfung	Prüfungszeiten	Prüfungsform		
Gesamtmodul	as agreed, usually in the break after the winter term	100% written exam (content of the lectures)		
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz

Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		3	--	42
Übung		1	--	14
Präsenzzeit Modul insgesamt				56 h

gsw230 - Molecular Pharmacology

Modulbezeichnung		Molecular Pharmacology		
Modulkürzel		gsw230		
Kreditpunkte		6.0 KP		
Workload		180 h		
Verwendbarkeit des Moduls		Master's Programme Molecular Biomedicine (Master) > Background Modules		
Zuständige Personen		- Rauch, Bernhard (Modulverantwortung) - Rauch, Bernhard (Prüfungsberechtigt) - Meyer, Ulrike (Modulberatung)		
Teilnahmevoraussetzungen		Enrolment in Master's programme Molecular Biomedicine		
Kompetenzziele		Goals of the module: upon completion of this module, students - know about the subject of pharmacology in general, its areas of expertise such as pharmacokinetics and pharmacodynamics and their functions. - understand on which pathophysiological mechanisms diseases are based and on which molecular targets pharmaceuticals act in order to alleviate diseases. - know the basic actions and side effects of important drug groups. - understand basic parameters of clinical studies and the importance of clinical studies for therapeutic approaches. Skills to be acquired/ competencies: ++ deepened biological expertise ++ deepened clinical expertise + deepened knowledge of biological working methods + deepened knowledge of clinical diagnostics + data analysis skills + interdisciplinary thinking + critical and analytical thinking + independent searching and knowledge of scientific literature + data presentation and discussion (written and spoken) + teamwork + ethics and professional behavior		
Modulinhalte		- Fundamentals of general pharmacology, its specialist areas such as pharmacokinetics and pharmacodynamics - Explanation of the pathophysiological mechanisms of diseases and the corresponding molecular drugs targets - Mechanisms of action and side effects of the major drug groups • Knowledge of basic parameters of clinical studies and understanding of the importance of clinical studies for therapeutic approaches		
Literaturempfehlungen		Basic & Clinical Pharmacology (Basic and Clinical Pharmacology), McGraw-Hill Education (2020) For German speaking students: Kurzlehrbuch Pharmakologie und Toxikologie, Herdegen, Thieme (2019)		
Links				
Unterrichtssprache		Englisch		
Dauer in Semestern		2 Semester		
Angebotsrhythmus Modul		winter term		
Aufnahmekapazität Modul		6 (Places are based on attended courses and given grades. Knowledge of physiology and biochemistry is required.)		
Modulart		Wahlpflicht / Elective		
Modullevel		MM (Mastermodul / Master module)		
Lehr-/Lernform		Lectures and Seminars (winter term), Exercises (summer term)		
Vorkenntnisse		Basic knowledge in physiology and molecular biochemistry		
Prüfung		Prüfungszeiten		Prüfungsform
Gesamtmodul		written or oral exam: at the end of winter semester, protocol: at the end of the practical course		written or oral examination (graded), protocol (ungraded)
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung und Seminar		2	WiSe	28
Übung		2	SoSe	28

Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Präsenzzeit Modul insgesamt				56 h

gsw240 - Basic Immunology in Health and Disease

Modulbezeichnung	Basic Immunology in Health and Disease
Modulkürzel	gsw240
Kreditpunkte	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Master's Programme Molecular Biomedicine (Master) > Background Modules
Zuständige Personen	• Loser, Karin (Modulverantwortung) • Loser, Karin (Prüfungsberechtigt) • Mykicki, Nadine (Prüfungsberechtigt)
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine Basic knowledge in primary cell culture, quantitative real-time PCR, flow cytometry or histology would be highly desirable.
Kompetenzziele	Goals of this module: After completing this module, students are able to perform experimental approaches necessary to investigate selective immunological questions. These will comprise the normal function of the healthy immune system as well as processes leading to immune system dysregulation or immune system dysfunction in several systemic or organ specific diseases. Based on the basic knowledge of immunology acquired in the module students will be able to understand and analyze specific scientific problems, plan experimental approaches accordingly, and perform the experiments. Skills to be acquired/ competencies: ++ Deepened biological expertise ++ Deepened clinical expertise ++ Deepened knowledge of biological working methods + Deepened knowledge of clinical diagnostics ++ Data analysis skills + Interdisciplinary thinking ++ Critical and analytical thinking + Independent searching and knowledge of scientific literature + Ability to perform independent biological research ++ Data presentation and discussion (written and spoken) + Teamwork + Project and time management Methods: Key methods learned and implemented in this module include - Primary cell culture and cell separation - RNA extraction, reverse transcription and quantitative real-time PCR - Tissue sectioning, immunohistology and immunofluorescence staining including microscopy - Multicolor flow cytometry - Quantification of soluble factors and inflammatory mediators using multiplex-assay techniques
Modulinhalte	Lecture: - Regulation of innate and adaptive immune responses in healthy individuals - Dysregulation of the immune system in inflammatory diseases, cancer or autoimmunity - Impact of the environment on immune regulation Seminar: - Presentation and discussion of laboratory methods used in the practical part Exercise: This module involves working on small research projects in groups of 2-3 students. The projects include basic immunology in humans and mice with the goal of better understanding the development of allergy, sterile inflammation or autoimmunity as well as immune regulation during cancer or infection. Using the knowledge of immune regulation gained in the lecture and seminar, students will analyze and evaluate specific scientific problems. Required methods of immunology, cell and molecular biology (e.g., flow cytometry, cell separation, isolation and culture of primary immune cells, gene expression studies, histology) are taught and used.
Literatureempfehlungen	Text books of Immunology including Janeway's <i>Immunobiology</i> or Abbas et al. <i>Molecular and Cellular Immunology</i>
Links	
Unterrichtssprache	Englisch

Dauer in Semestern	1 Semester	
Angebotsrhythmus Modul	winter term	
Aufnahmekapazität Modul	6 (Due to restrictions in space and limitations in equipment availability the number of participants for this module has to be limited. Students have to be enrolled in the Master's program Molecular Biomedicine.)	
Hinweise	High priority is given to students of the Master's program Molecular Biomedicine. In exceptional cases, vacancies may be allocated to Biology students. However, allocation to students not enrolled in the Master's program Molecular Biomedicine can only be made by the lecturer(s) responsible for this module (personal application required).	
Modulart	Wahlpflicht / Elective	
Modullevel	MM (Mastermodul / Master module)	
Lehr-/Lernform	Lecture/Seminar and Exercises	
Vorkenntnisse	Solid knowledge in cellular and molecular biology is mandatory. Basic knowledge in genetics or histology would be desirable.	
Prüfung	Prüfungszeiten	Prüfungsform
Gesamtmodul	After the end of the module.	50% presentation, 50% protocol
Lehrveranstaltungsform	Seminar und Übung	
SWS	4	
Angebotsrhythmus	WiSe	
Workload Präsenzzeit	56 h	

gsw250 - Molecular Microbiology

Modulbezeichnung		Molecular Microbiology		
Modulkürzel		gsw250		
Kreditpunkte		6.0 KP		
Workload		180 h		
Verwendbarkeit des Moduls		Master's Programme Molecular Biomedicine (Master) > Background Modules		
Zuständige Personen		- Noster, Janina (Modulverantwortung) - Noster, Janina (Prüfungsberechtigt)		
Teilnahmevoraussetzungen		Enrolment in Master's programme Molecular Biomedicine		
Kompetenzziele		Goals of this module: Upon completion of this module the students will have a basic knowledge about bacteriology, antibiotic resistances and gene mutagenesis methods. Skills to be acquired/ competencies: ++ deepened biological expertise ++ deepened knowledge of biological working methods + deepened knowledge of clinical diagnostics + data analysis skills ++ interdisciplinary thinking ++ critical and analytical thinking ++ independent searching and knowledge of scientific literature ++ data presentation and discussion (written and spoken) + teamwork + ethics and professional behavior ++ project and time management		
Modulinhalte		Lecture: In the first lectures, basic knowledge of general and specific bacteriology is taught. Subsequently, antibiotic resistance as well as resistance mechanisms are explained in more detail. Finally, the topic of horizontal gene transfer and mobile genetic elements will be discussed. Seminar: The seminar will address with the topic of antibiotic resistances. Students gain initial experience in formulating a scientific question and designing experiments to answer it. Different cloning strategies are discussed in detail. Practical course: The methods developed in the seminar will be put into practice. Antibiotic resistance plasmids will be modified using various techniques and the effects of these manipulations on bacterial physiology and resistance patterns will be investigated.		
Literatureempfehlungen		Textbooks of microbiology. Current literature on antibiotic resistances and horizontal gene transfer will be announced in the lecture.		
Links				
Unterrichtssprache		Englisch		
Dauer in Semestern		1 Semester		
Angebotsrhythmus Modul		winter term		
Aufnahmekapazität Modul		6 ((participation at lectures is not restricted))		
Hinweise		The lecture is held weekly during the semester (first half). Seminar and practical course form a joint block course.		
Modulart		Wahlpflicht / Elective		
Modullevel		MM (Mastermodul / Master module)		
Lehr-/Lernform		Lecture, seminar and exercise		
Vorkenntnisse		basic knowledge of bacteriology and molecular biology		
Prüfung	Prüfungszeiten		Prüfungsform	
Gesamtmodul	written examination: end of the module, presentation: during the seminar/practical course joint block, protocol: end of the practical course		graded: written examination, ungraded: presentation, protocols	
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		1	WiSe	14

Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Seminar und Übung		3	WiSe	42
Präsenzzeit Modul insgesamt				56 h

gsw260 - Molecular Virology

Modulbezeichnung	Molecular Virology			
Modulkürzel	gsw260			
Kreditpunkte	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	Master's Programme Molecular Biomedicine (Master) > Background Modules			
Zuständige Personen	- Kinast, Volker (Modulverantwortung) - Kinast, Volker (Prüfungsberechtigt)			
Teilnahmevoraussetzungen				
Kompetenzziele	Goals of this module: upon completion of this module, students - know about general aspects of virology including the viral replication cycle, classification of viruses, virus-host-interactions, innate immune response and mechanisms of antiviral therapies - know safety aspects of working in a S2 laboratory and working with infectious agents - are able to understand, explain and evaluate fundamental concepts and research results in the field of virology Skills to be acquired/ competencies: ++ comprehensive understanding of the fundamentals of virology ++ knowledge of virological working methods + data analysis skills ++ critical and analytical thinking + independent searching and knowledge of scientific literature ++ data presentation and discussion (written and spoken) + teamwork + ethics and professional behavior			
Modulinhalte	Lecture: Fundamentals of virology Seminar: Discussion of selected aspects and methods of virology based on original/current literature Exercises: cell culture, viral replication assays, luminescence assays, microscopy, data analysis and interpretation			
Literatureempfehlungen	Literature will be provided during the lecture/seminar			
Links				
Unterrichtssprache	Englisch			
Dauer in Semestern	1 Semester			
Angebotsrhythmus Modul	summer term			
Aufnahmekapazität Modul	16			
Modulart	Wahlpflicht / Elective			
Modullevel	MM (Mastermodul / Master module)			
Lehr-/Lernform	Lecture, seminar, exercise			
Vorkenntnisse	basic knowledge of cell biology and molecular biology			
Prüfung	Prüfungszeiten	Prüfungsform		
Gesamtmodul	at the end of the course	graded: written examination, ungraded: presentation (seminar), protocol (exercise)		
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		1	SoSe	14
Seminar und Übung		3	SoSe	42
Präsenzzeit Modul insgesamt				56 h

bio845 - Introduction to Development and Evolution

Modulbezeichnung	Introduction to Development and Evolution
Modulkürzel	bio845
Kreditpunkte	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Master Biologie (Master) > Background Modules • Master Biology (Master) > Background Modules • Master Neuroscience (Master) > Background Modules • Master's Programme Molecular Biomedicine (Master) > Background Modules
Zuständige Personen	• Sienknecht, Ulrike (Modulverantwortung) • Sienknecht, Ulrike (Modulberatung) • Sienknecht, Ulrike (Prüfungsberechtigt) • Claußen, Maike (Prüfungsberechtigt)
Teilnahmevoraussetzungen	

Kompetenzziele

Upon successful completion of this course, students

- know the fundamental problems organisms share in development
- know the common basic steps of ontogenesis after comparing the life cycles of different species (both vertebrates and invertebrates)
- know the fundamentals of the genetic control of cell-fate specification, morphogenesis, and organogenesis
- know the principles of gene regulatory networks in development and are able to explain examples
- are able to explain and discuss mechanisms of development across taxonomic groups and questions about the evolution of developmental mechanisms
- have in-depth knowledge of the development of animal nervous systems, including cellular and net-work properties

skills:

- ++ deepened biological expertise
- + deepened knowledge of biological working methods
- ++ interdisciplinary thinking
- ++ critical and analytical thinking
- + independent searching and knowledge of scientific literature
- + ability to perform independent biological research
- + teamwork

Modulinhalte

Lectures on the fundamentals and concepts of developmental biology, including evolutionary aspects. Parallel seminars matching the topics of the lectures and emphasizing discussion. Lecture topics:

- Introduction to Developmental Biology
- Cell-Cell Communication
- Differential Gene Expression (I and II)
- Early Development of Vertebrates, Gastrulation

- Neurulation
- Brain Development
- Axonal Growth, Target Selection, Synaptogenesis and Refinement
- Neural Crest
- Mesoderm Development
- Morphogenesis
- Developmental Mechanisms of Evolutionary Change
- Model Organisms in Developmental Biology
- Transgenic Mice
- Medical Implications of Developmental Biology

Literaturempfehlungen

Literature: **textbook:** Gilbert S.F.: Developmental Biology, Macmillan Publishers Ltd, 11th edition 2016 (current edition); and current literature on course topics

Links

Unterrichtssprache	Englisch			
Dauer in Semestern	1 Semester			
Angebotsrhythmus Modul	Wintersemester			
Aufnahmekapazität Modul	20 (selection criteria: sequence of registration)			
Hinweise	associated with bio846 (neu120) (Lab Exercises in Development and Evolution)			
Modulart	Wahlpflicht / Elective			
Modullevel	MM (Mastermodul / Master module)			
Lehr-/Lernform	Vorlesung, Seminar			
Vorkenntnisse	organismic biology, developmental biology, evolutionary biology, neurobiology, genetics, molecular biology			
Prüfung	Prüfungszeiten	Prüfungsform		
Gesamtmodul	same winter term	oral exam of 30 minutes (or written exam)		
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		3	WiSe	45
Seminar		3	WiSe	45
Präsenzzeit Modul insgesamt				90 h

gsw231 - Molecular Pharmacology and Toxicology

Modulbezeichnung	Molecular Pharmacology and Toxicology	
Modulkürzel	gsw231	
Kreditpunkte	6.0 KP	
Workload	180 h	
Verwendbarkeit des Moduls	Master's Programme Molecular Biomedicine (Master) > Background Modules	
Zuständige Personen	- Rauch, Bernhard (Modulverantwortung) - Rauch, Bernhard (Prüfungsberechtigt) - Meyer, Ulrike (Modulberatung)	
Teilnahmevoraussetzungen	Enrolment in the Master's programme „Molecular Biomedicine“ Enrolment in the Bachelors's programme „Chemie“	
Kompetenzziele	Upon completion of this module, students - know about the subject of pharmacology in general, its areas of expertise such as pharmacokinetics and pharmacodynamics and their functions. - understand on which pathophysiological mechanisms diseases are based and on which molecular targets pharmaceuticals act in order to alleviate diseases. - know the basic actions and side effects of important drug groups. - understand basic parameters of clinical studies and the importance of clinical studies for therapeutic approaches. Skills to be acquired/ competencies: ++ deepened biological expertise ++ deepened clinical expertise + interdisciplinary thinking + critical and analytical thinking + independent searching and knowledge of scientific literature + data presentation and discussion (written and spoken) + ethics and professional behavior + basic knowledge of physiology and biochemistry is required	
Modulinhalte	- Fundamentals of general pharmacology, its specialist areas such as pharmacokinetics and pharmacodynamics - Explanation of the pathophysiological mechanisms of diseases and the corresponding molecular drugs targets - Mechanisms of action and side effects of the major drug groups Mechanisms of action and toxins - Mechanisms of action of common toxins and antidotes - Knowledge of basic parameters of clinical studies and understanding of the importance of clinical studies for therapeutic approaches	
Literaturempfehlungen	Basic & Clinical Pharmacology (Basic and Clinical Pharmacology), McGraw-Hill Education (2020) For German speaking students: Kurzlehrbuch Pharmakologie und Toxikologie, Herdegen, Thieme (2019)	
Links		
Unterrichtssprache	Englisch	
Dauer in Semestern	1 Semester	
Angebotsrhythmus Modul		
Aufnahmekapazität Modul	40	
Modulart	Wahlpflicht / Elective	
Modullevel	MM (Mastermodul / Master module)	
Prüfung	Prüfungszeiten	Prüfungsform
Gesamtmodul	Klausur oder mündl. Prüfung	
Lehrveranstaltungsform	Vorlesung	
SWS	4	
Angebotsrhythmus	SoSe oder WiSe	
Workload Präsenzzeit	56 h 4 SWS	

gsw235 - Practical Molecular Pharmacology

Modulbezeichnung	Practical Molecular Pharmacology			
Modulkürzel	gsw235			
Kreditpunkte	6.0 KP			
Workload	180 h (5 SWS ca. 70 h (two weeks practical seminar/laboratory exercise))			
Verwendbarkeit des Moduls	Master's Programme Molecular Biomedicine (Master) > Background Modules			
Zuständige Personen	- Rauch, Bernhard (Modulverantwortung) - Rauch, Bernhard (Prüfungsberechtigt) - Meyer, Ulrike (Modulberatung)			
Teilnahmevoraussetzungen	Enrolment in Master's programme admission requirement is attendance of the gsw230 module ("Lecture Molecular Pharmacology") Places are based on attended module "Lecture Molecular Pharmacology" and given grades. Knowledge of physiology and biochemistry is required.			
Kompetenzziele	Upon completion of this module, students - have fundamental knowledge of good laboratory practice. - have an in-depth understanding of different working methods in the laboratory. - understand basic parameters of studies and the importance for basic research and therapeutic approaches. Skills to be acquired/ competencies: ++ deepened biological expertise ++ deepened clinical expertise ++ deepened knowledge of biological working methods ++ data analysis skills ++ critical and analytical thinking + deepened knowledge of clinical diagnostics + interdisciplinary thinking + independent searching and knowledge of scientific literature + data presentation and discussion (written and spoken) + teamwork + ethics and professional behavior			
Modulinhalte	- Fundamentals of experimental pharmacology, common analytical laboratory techniques in this area - Explanation of the pathophysiological mechanisms of diseases and the corresponding molecular drugs targets - Specific knowledge on selected current research topic in the field of experimental pharmacology - Knowledge of basic parameters of clinical studies and understanding of the importance of clinical studies for therapeutic approaches			
Literaturempfehlungen	Basic & Clinical Pharmacology (Basic and Clinical Pharmacology), McGraw-Hill Education (2020) For German speaking students: Kurzlehrbuch Pharmakologie und Toxikologie, Herdegen, Thieme (2019)			
Links				
Unterrichtssprache	Englisch			
Dauer in Semestern	1 Semester			
Angebotsrhythmus Modul				
Aufnahmekapazität Modul	8			
Modulart	Wahlpflicht / Elective			
Modullevel	MM (Mastermodul / Master module)			
Vorkenntnisse	Basic knowledge in physiology and molecular			
Prüfung	Prüfungszeiten		Prüfungsform	
Gesamtmodul			Protokoll	
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Seminar			SoSe oder WiSe	0
Übung		2	SoSe oder WiSe	0

Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Präsenzzeit Modul insgesamt				0 h

gsw270 - Introduction to Human Anatomy

Modulbezeichnung	Introduction to Human Anatomy			
Modulkürzel	gsw270			
Kreditpunkte	3.0 KP			
Workload	90 h (2 SWS)			
Verwendbarkeit des Moduls	Master's Programme Molecular Biomedicine (Master) > Background Modules			
Zuständige Personen	- Maier, Esther Christine (Modulverantwortung) - Maier, Esther Christine (Prüfungsberechtigt)			
Teilnahmevoraussetzungen	Prerequisites: Enrolment in Master Molecular Biomedicine Previous knowledge: the modul is an introductory modul no specialist knowledge required			
Kompetenzziele	Competencies Anatomical knowledge of body structure Functional anatomical knowledge of the body Understanding the anatomical basis for specific clinical symptoms Find and name anatomical structures during virtual dissections and annotations Group work			
Modulinhalte	Description +++ Anatomical knowledge ++ Social skills + Interdisciplinary knowledge + Data present./disc. ++ Scientific English ++ Ethics Students should be able to correctly identify the anatomical structures of the body and describe the major anatomical pathways connecting the different parts. They also should acquire an understanding of the functional anatomy. This knowledge is applied to analyse some specific examples of clinical symptoms, to deepen the students understanding of the functional relationships of the body parts. Lectures will be complete by virtual dissection excercises and anatomical seminars.			
Literaturempfehlungen				
Links				
Unterrichtssprache	Englisch			
Dauer in Semestern	1 Semester			
Angebotsrhythmus Modul				
Aufnahmekapazität Modul	24			
Modulart	Wahlpflicht / Elective			
Modullevel	SPM (Schwerpunktmodul / Main emphasis)			
Prüfung	Prüfungszeiten	Prüfungsform		
Gesamtmodul			Portfolio oder mündl. Prüfung oder Präsentation Oral exam or portfolio or presentation will be graded	
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		1	SoSe oder WiSe	0
Seminar		1	SoSe oder WiSe	0
Präsenzzeit Modul insgesamt				0 h

Clinical Modules

gsw060 - Epigenetics and Gene Regulation

Modulbezeichnung	Epigenetics and Gene Regulation
Modulkürzel	gsw060
Kreditpunkte	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	Master's Programme Molecular Biomedicine (Master) > Clinical Modules
Zuständige Personen	- Plösch, Torsten (Modulverantwortung) - Heep, Axel (Modulverantwortung) - Plösch, Torsten (Prüfungsberechtigt) - Heep, Axel (Prüfungsberechtigt) - Hinz, Cornelia (Prüfungsberechtigt)
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine
Kompetenzziele	Goals of the Module: Upon successful completion of this module, students - know about epigenetic regulation of gene transcription - can determine different epigenetic features - have a basic understanding of the role of epigenetics in human disease Competencies: ++ deepened biological expertise + deepened clinical expertise ++ deepened knowledge of biological working methods + deepened knowledge of clinical diagnostics + data analysis skills + critical and analytical thinking + ability to perform independent biological research + data presentation and discussion (written and spoken) + teamwork
Modulinhalte	Lecture: - introduction to epigenetics - regulation of gene expression - developmental epigenetics - cancer epigenetics - current methods - ethics Seminar: - presentation of important historical and current primary literature - presentation and discussion of lab methods used in the practical part Exercise: - Designing bisulfite PCR strategies for methylated DNA - analyses of datasets - DNA isolation from cells - <i>in vitro</i> methylation of DNA - methylation-specific restriction analysis (and PCR) - methylation-specific bisulfite PCR - histone characterization
Literaturempfehlungen	
Links	https://uol.de/en/paediatrics/perinatal-neurobiology
Unterrichtssprache	Englisch
Dauer in Semestern	1 Semester
Angebotsrhythmus Modul	summer term
Aufnahmekapazität Modul	12
Hinweise	The number of participants for this module is limited to 12. If there are more students registered than places available, lots will be drawn. Students which are enrolled in Master's programme Molecular Biomedicine will be preferred.
Modulart	Wahlpflicht / Elective
Modullevel	MM (Mastermodul / Master module)
Lehr-/Lernform	Lecture, Seminar, Exercises
Vorkenntnisse	basic knowledge in cell and developmental biology, solid knowledge in

genetics

Prüfung	Prüfungszeiten	Prüfungsform
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Gesamtmodul

presentation 50%, protocol 50%

Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		1	SoSe	14
Seminar		1	SoSe	14
Übung		2	SoSe	28
Präsenzzeit Modul insgesamt				56 h

gsw070 - Gene-based Therapies in Human diseases

Modulbezeichnung	Gene-based Therapies in Human diseases			
Modulkürzel	gsw070			
Kreditpunkte	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	• Master's Programme Molecular Biomedicine (Master) > Clinical Modules			
Zuständige Personen	• Neidhardt, John (Modulverantwortung) • Neidhardt, John (Prüfungsberechtigt) • Jüschke, Christoph (Prüfungsberechtigt)			
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine			
Kompetenzziele	Competencies: ++ deepened biological expertise ++ deepened clinical expertise ++ deepened knowledge of biological working methods + deepened knowledge of clinical diagnostics + data analysis skills + interdisciplinary thinking ++ critical and analytical thinking + independent searching and knowledge of scientific literature ++ ability to perform independent biological research + data presentation and discussion (written and spoken) + team work + project and time management Adressing students with emphasis on translational/therapeutical interest in molecular biology, molecular genetics, cell biology and neurobiology.			
Modulinhalte	The module focuses on translational research in human genetics, molecular biology, molecular genetics, translational medicine, cell- and neurobiology. Subjects of the lecture: Therapeutic strategies and research applications, molecular bases of neurodegenerative diseases, structure and function of DNA/RNA/proteins/membranes. Lecture: To improve knowledge in molecular genetics, molecular biology and cell biology in correlation with human diseases, gain knowledge in Antisense-Oligonucleotide-, U1- and CRISPR-based genetic therapies, viruses in gene therapy, cell sorting and diagnosis by FACS. Exercises: Learning current methods of therapy development; molecular biology and human genetics; high throughput technologies; introduction to cell cultivation techniques. Learn to transfer the theoretical knowledge to experiments. Gaining methodological knowledge in molecular genetics, cell biology and therapeutic approaches. Initial training on how to perform research projects.			
Literatureempfehlungen	Molecular Biology of the Cell (Alberts et al., 6th edition)			
Links	https://uol.de/humangenetik/research-and-clinical-collaborations/			
Unterrichtssprache	Englisch			
Dauer in Semestern	1 Semester			
Angebotsrhythmus Modul	summer semester			
Aufnahmekapazität Modul	15			
Modulart	Wahlpflicht / Elective			
Modullevel	MM (Mastermodul / Master module)			
Lehr-/Lernform	Lecture and Exercise			
Vorkenntnisse	basic knowledge of cell biology, genetics			
Prüfung	Prüfungszeiten		Prüfungsform	
Gesamtmodul			50% presentation or written examination or oral examination, 50% protocols	
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		1	SoSe	14
Übung		3	SoSe	42

Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Präsenzzeit Modul insgesamt				56 h

gsw080 - Genetic Diagnostics: from chromosomal aberrations to gene mutations

Modulbezeichnung	Genetic Diagnostics: from chromosomal aberrations to gene mutations			
Modulkürzel	gsw080			
Kreditpunkte	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	• Master's Programme Molecular Biomedicine (Master) > Clinical Modules			
Zuständige Personen	• Owczarek-Lipska, Marta (Modulverantwortung) • Owczarek-Lipska, Marta (Prüfungsberechtigt)			
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine			
Kompetenzziele	Goals of the Module: to expand the knowledge about classical cytogenetics and molecular genetics as well as modern cyto- and molecular genetics technics applied in clinical diagnostics and research. Competencies: ++ deepened biological and clinical expertise (cytogenetics and molecular genetics) ++ deepened knowledge of biological working methods and clinical diagnostics (classical cyto- and molecular genetics laboratory methods) ++ data analysis skills + interdisciplinary thinking ++ critical and analytical thinking + independent searching and knowledge of scientific literature ++ ability to perform independent biological research + data presentation and discussion (written and spoken) + team work + project and time management			
Modulinhalte	The module focuses on genome- and gene mutations, cyto- and molecular genetics, human syndromes and diseases caused by different chromosomal aberrations. Lecture: essentials of classical cytogenetics and molecular genetics, classification of mutations, genetics syndromes/diseases, introduction to the genetic diagnostic laboratory techniques Exercises: chromosomal stainings, microscopy, karyotyping, identification of chromosomal aberrations, identification of gene mutations			
Literaturempfehlungen	Principles of Clinical Cytogenetics by Steven L. Gersen, Martha B. Keagle			
Links	https://uol.de/genetik-gehirnfehlbildungen/forschungsschwerpunkte/			
Unterrichtssprache	Englisch			
Dauer in Semestern	1 Semester			
Angebotsrhythmus Modul	Second half of the winter semester			
Aufnahmekapazität Modul	10			
Hinweise	The number of participants for the practical part of this module is limited to 10. If there are more students registered than places available, lots will be drawn. Students which are enrolled in Master's programme Molecular Biomedicine will be preferred.			
Modulart	Wahlpflicht / Elective			
Modullevel	MM (Mastermodul / Master module)			
Lehr-/Lernform	Lecture, Seminar and Exercise			
Vorkenntnisse	basic knowledge of genetics and cell biology			
Prüfung	Prüfungszeiten		Prüfungsform	
Gesamtmodul			written examination (90 min., 70%), presentation (30%) additionally ungraded: signed lab protocols	
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		1	WiSe	14
Seminar		1	WiSe	14
Übung		2	WiSe	28

Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Präsenzzeit Modul insgesamt				56 h

gsw090 - Current Topics in Clinical Research

Modulbezeichnung	Current Topics in Clinical Research
Modulkürzel	gsw090
Kreditpunkte	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	• Master's Programme Molecular Biomedicine (Master) > Clinical Modules
Zuständige Personen	• Dömer, Patrick (Modulverantwortung) • Dömer, Patrick (Prüfungsberechtigt) • Heep, Axel (Prüfungsberechtigt) • Plösch, Torsten (Prüfungsberechtigt) • Loser, Karin (Prüfungsberechtigt) • Hinz, Cornelia (Prüfungsberechtigt) • Dübbel, Lena (Prüfungsberechtigt) • Hamprecht, Axel (Prüfungsberechtigt) • Noster, Janina (Prüfungsberechtigt) • Rauch, Bernhard (Prüfungsberechtigt) • Meyer, Helge (Prüfungsberechtigt) • Helgers, Simeon (Prüfungsberechtigt)
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine
Kompetenzziele	Goals of the Module: Upon successful completion of this course, students - are familiar with the basic epigenetic mechanisms - know the principles of different sequencing techniques, both for genetic and epigenetic research - are familiar with the "first 1000 days of life concept" and how the early environment influences long term health - know how the human body is colonized - know about the basic mechanisms involved in CNV development during fetal and early postnatal life - know about the methods used to study molecular intercellular signaling - know about the non-invasive methods used to study functional brain development - know about the insults leading to cerebral ischemia - know about the mechanism of the neurovascular response - know about the cellular and electrophysiological effects of acute and chronic cerebral ischemia - know about the cell types, cellular interactions and molecular changes during peripheral nerve; degeneration and regeneration following nerve trauma - are able to explain some oncogenic mechanisms of viruses - can explain preeclampsia and its immunological regulation - are familiar with antibiotic classes, mode of actions of antibiotics, principles of antibiotic resistance, dissemination of current plasmids causing multi-resistance - know about differences between susceptibility, tolerance, resistance and persistence to antibiotics, the methods to determine minimal inhibitory concentrations, the causes of persistent infections, the characteristics of persister cells and mechanisms of persister cell formation, and current medical treatment strategies - are able to explain the concept of cancer immunosurveillance and immunoediting - can explain current strategies in immunotherapy of cancer including checkpoint inhibition, CAR T cell therapy and cancer vaccination - are able to explain the mechanisms underlying therapy resistance in malignant diseases, particularly cancers of the gastrointestinal tract and the hepato-pancreato-biliary system - can explain current strategies in cancer diagnostic, particularly liquid biopsy Competencies: ++ deepened clinical expertise ++ deepened knowledge of biological working methods and clinical diagnostics ++ interdisciplinary thinking + data analysis skills ++ critical and analytical thinking + independent searching and knowledge of scientific literature + ethics and professional behavior
Modulinhalte	The module focuses on molecular aspects as part of current clinical research in different fields. Lectures: (Part 1)

- Genetic and epigenetic sequencing technology
- Epigenetic programming by early life events
- The human microbiome and colonization of the human body
- Molecular insights into functional brain development
- Basic mechanisms involved in CNS development during fetal and early postnatal life
- Introduction to methods used to study molecular signaling
- Introduction to non-invasive methods used to study functional brain development
- (Part 2)
 - Contribution of the immune system to the progression of infection, autoimmunity, cancer or (neuro-) inflammation
 - Modulation of the immune system as a potential therapeutic option
 - Interaction of the microbiome with the immune system and impact of environmental factors on the development of immune-mediated diseases
- (Part 3)
 - Oncogenic potential of viruses (e.g. Cervix carcinoma caused by HPV viruses)
 - Molecular insights into carcinogenesis
 - Preeclampsia and its immunological regulation
- (Part 4)
 - Concept of cancer immunosurveillance and immunoediting
 - Current strategies for cancer immunotherapy
 - Mechanisms of cancer therapy resistance
 - Current strategies for cancer diagnosis and liquid biopsy
- (Part 5)
 - Insights into antibiotic resistance (mode of antibiotics, principles of antibiotic resistance)
 - Emergence of multi-resistance and dissemination of plasmids causing multi-resistance
 - Differences between susceptibility, tolerance, resistance and persistence of pathogens to antibiotics
 - Current hypotheses of inducers for persister cell formation and medical treatment
- (Part 6)
 - Neurovascular regulation in response to cerebral ischemia
 - Molecular and cellular mechanisms of peripheral nerve regeneration

Literaturempfehlungen		Current literature on topics will be provided via Stud.IP	
Links			
Unterrichtssprache		Englisch	
Dauer in Semestern		1 Semester	
Angebotsrhythmus Modul		winter semester	
Aufnahmekapazität Modul		25	
Modulart		Wahlpflicht / Elective	
Modullevel		MM (Mastermodul / Master module)	
Lehr-/Lernform		Lecture	
Prüfung	Prüfungszeiten		Prüfungsform
Gesamtmodul			written examination (90 min.)
Lehrveranstaltungsform	Vorlesung		
SWS	4		
Angebotsrhythmus	WiSe		
Workload Präsenzzeit	56 h		

gsw100 - Immunology and Inflammation

Modulbezeichnung	Immunology and Inflammation			
Modulkürzel	gsw100			
Kreditpunkte	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	Master's Programme Molecular Biomedicine (Master) > Clinical Modules			
Zuständige Personen	- Loser, Karin (Modulverantwortung) - Loser, Karin (Prüfungsberechtigt)			
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine			
Kompetenzziele	Competencies: ++ comprehensive understanding of the fundamentals of immunology and inflammation ++ deepened knowledge of clinical aspects of diseases ++ systematic understanding in the therapy diseases + interdisciplinary thinking + critical and analytical thinking ++ independent searching and knowledge of scientific literature ++ data presentation and discussion (written and spoken) ++ teamwork + time management			
Modulinhalte	The module focuses on dermatology, immunology and inflammation. Lectures: Fundamentals of immunology and inflammation Seminars: Worked examples of major inflammatory diseases (e.g. allergies, infections, autoimmune diseases) and advanced therapeutic concepts. Exercises: Students will be expected to demonstrate the ability to prepare presentations in small working groups where they critically evaluate current research regarding specific examples of inflammatory diseases and their therapy (problem-orientated learning)			
Literatureempfehlungen	Textbooks: Janeway's Immunobiology; Authors: Kenneth Murphy, Casey Weaver; 2016 (9th Edition; Garland Science), Cellular and Molecular Immunology; Authors: Abul Abbas, Andrew H. Lichtman, Shiv Pillai; 2017 (9th Edition; Elsevier) Example review article: Siebenhaar F, Redegeld FA, Bischoff SC, Gibbs BF, Maurer M. Mast Cells as Drivers of Disease and Therapeutic Targets. Trends Immunol. 2018 Feb;39(2):151-162. doi: 10.1016/j.it.2017.10.005			
Links	https://uol.de/dermatologie/forschung/			
Unterrichtssprache	Englisch			
Dauer in Semestern	1 Semester			
Angebotsrhythmus Modul	First half of the winter semester			
Aufnahmekapazität Modul	25			
Modulart	Wahlpflicht / Elective			
Modullevel	MM (Mastermodul / Master module)			
Lehr-/Lernform	Lecture, Seminar, Exercise			
Vorkenntnisse	basic knowledge in immunology			
Prüfung	Prüfungszeiten	Prüfungsform		
Gesamtmodul		graded: written examination (60 min.; 60%), coursework (short review in English in the style "News and Views" article, 40%) ungraded: formative feedback given for presentations		
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		1.5	WiSe	21
Seminar		1	WiSe	14
Übung		1.5	WiSe	21
Präsenzzeit Modul insgesamt				56 h

gsw110 - Clinical Aspects of Degenerative Diseases

Modulbezeichnung	Clinical Aspects of Degenerative Diseases			
Modulkürzel	gsw110			
Kreditpunkte	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	• Master's Programme Molecular Biomedicine (Master) > Clinical Modules			
Zuständige Personen	• Zieschang, Tania (Modulverantwortung) • Dewald, Oliver (Modulverantwortung) • Zieschang, Tania (Prüfungsberechtigt) • Koschate, Jessica (Prüfungsberechtigt) • Mellert, Friedrich (Prüfungsberechtigt) • Ort, Katharina (Prüfungsberechtigt) • Hoppe, Florian (Prüfungsberechtigt)			
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine			
Kompetenzziele	Competencies: ++ comprehensive understanding of clinical manifestation, epidemiology, risk factors, treatment strategies of degenerative diseases ++ understanding of geriatric phenomena ++ understanding and application of the comprehensive geriatric assessment (CGA) ++ interdisciplinary thinking ++ ethics and professional behaviour ++ critical and analytical thinking + independent searching and knowledge of scientific literature ++ data presentation and discussion (written and spoken) ++ teamwork			
Modulinhalte	The module focuses on geriatric medicine. Lecture: fundamentals of degenerative diseases (Alzheimer's disease, Parkinson's disease, Rheumatoid Arthritis, Osteoarthritis, heart valve disease, aortic dilatation) and geriatric phenomena as frailty, multimorbidity and polypharmacy and their impact on diagnostic and treatment options, basics of geriatric medicine, evidence of the impact of the CGA on patient outcomes, dimensions of the CGA, surgical and interventional heart procedures in geriatric patients Seminar: instant ageing, the geriatric team, cognitive assessment with actors, work in heart team Excursion: small groups (2 students) can accompany clinical rounds on the geriatric ward (either acute geriatric care or geriatric rehabilitation). Conduction of parts of the CGA with patients			
Literaturempfehlungen	Textbooks on geriatric medicine and geriatric psychiatry, e.g. Zeyfang et al. Basiswissen Medizin des Alterns und des alten Menschen. Springer. Textbooks on cardiac surgery and cardiology, e.g. Ziemer, Haverich: Herzchirurgie. Scientific papers related to current research topics will be available in Stud.IP			
Links	https://www.aortenklappenregister.de/publikationen-des-registers.html			
Unterrichtssprache	Englisch			
Dauer in Semestern	1 Semester			
Angebotsrhythmus Modul	First half of the winter semester			
Aufnahmekapazität Modul	20			
Modulart	Wahlpflicht / Elective			
Modullevel	MM (Mastermodul / Master module)			
Lehr-/Lernform	Lecture, Seminar, Excursion			
Vorkenntnisse	physiology and cardiovascular system			
Prüfung	Prüfungszeiten		Prüfungsform	
Gesamtmodul			written examination (60 min, 50%), case presentation (50%)	
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		1.5	WiSe	28

Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Seminar		1.5	WiSe	21
Übung		1	WiSe	14
Präsenzzeit Modul insgesamt				63 h

gsw120 - Tumor Biology

Modulbezeichnung	Tumor Biology
Modulkürzel	gsw120
Kreditpunkte	6.0 KP
Workload	180 h
Verwendbarkeit des Moduls	Master's Programme Molecular Biomedicine (Master) > Clinical Modules
Zuständige Personen	- Griesinger, Frank (Modulverantwortung) - Griesinger, Frank (Prüfungsberechtigt) - Roeper, Julia (Prüfungsberechtigt) - Dübbel, Lena (Prüfungsberechtigt) - Loser, Karin (Prüfungsberechtigt) - Mykicki, Nadine (Prüfungsberechtigt) - Dübbel, Lena (Modulberatung) - Roeper, Julia (Modulberatung)
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine
Kompetenzziele	Goals of the Module: Upon successful completion of this module, students - can define and identify oncogenes and tumor suppressor genes - know about the hallmarks of cancer and can explain them based on example pathways and traits - know about the complexity of the tumor tissue and the different cells that are involved - know about the principles of metastasis. Competencies: ++ deepened biological & clinical expertise ++ interdisciplinary thinking + deepened knowledge of biological working methods & clinical diagnostics ++ data analysis skills + usage of databases and computational tools ++ critical & analytical thinking + independent searching & knowledge of scientific literature ++ data presentation & discussion (written and spoken) + teamwork ++ ethics & professional behavior
Modulinhalte	Part 1 - Lecture: We will give a brief overview of several aspects of tumor biology: Types of mutation, hallmarks of cancer, tumor as a tissue, metastasis, oncogenes and tumor suppressor genes, signal transduction and many example pathways that are important for cancer progression. In addition, you will learn about tumor-infiltrating immune cells and new therapy options like tumor-immune therapy. Part 2 - Seminar: Students will be expected to demonstrate the ability to prepare presentations in small working groups where they critically evaluate current research regarding specific examples of tumor diseases and their therapy (problem-orientated learning) Optional: Lectures from the study programme Human Medicine (winter semester only; will be held in German) Lecture topics from the Human Medicine programme focusses on large tumor entities, therapy strategies, and basics of carcinogenesis and therapeutic implementation. Please note, that these lectures are not part of the curriculum and are therefore not relevant for the examinations.
Literaturempfehlungen	Current literature will be uploaded on Stud.IP. Previous literature research is not necessary. If you are looking for more information/background: Weinberg; "The Biology of Cancer"; Garland Science
Links	
Unterrichtssprache	Englisch
Dauer in Semestern	1 Semester
Angebotsrhythmus Modul	winter and summer semester (seminars during the semester break)
Aufnahmekapazität Modul	25
Hinweise	The number of participants for this module is limited to 25. If there are more students registered than places available, lots will be drawn. Students which

			are enrolled in Master´s programme Molecular Biomedicine will be preferred.	
Modulart			Wahlpflicht / Elective	
Modullevel			MM (Mastermodul / Master module)	
Vorkenntnisse			Basic knowledge of genetics, cell biology and biochemistry	
Prüfung		Prüfungszeiten		Prüfungsform
Gesamtmodul			written examination (60 min., 75%), presentation (25%)	
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		2	SoSe und WiSe	28
Seminar		2	SoSe und WiSe	28
Präsenzzeit Modul insgesamt				56 h

gsw130 - Regenerative Medicine in Ophthalmology

Modulbezeichnung	Regenerative Medicine in Ophthalmology			
Modulkürzel	gsw130			
Kreditpunkte	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	• Master's Programme Molecular Biomedicine (Master) > Clinical Modules			
Zuständige Personen	• Mertsch, Sonja (Modulverantwortung) • Mertsch, Sonja (Prüfungsberechtigt) • Schrader, Stefan (Prüfungsberechtigt)			
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine			
Kompetenzziele	Competencies: ++ comprehensive understanding of the fundamentals of regenerative research ++ deepened knowledge of clinical aspects of eye diseases ++ deepened knowledge of biological lab methods and clinical diagnostics (classical tissue engineering, cell culture and molecular laboratory methods) ++ systematic understanding in translational research + interdisciplinary thinking + critical and analytical thinking ++ data analysis and interpretation skills ++ data presentation and discussion (written and spoken) ++ teamwork + time management			
Modulinhalte	The module focuses on regenerative medicine with the main emphasis on ophthalmologic research. Lectures: Fundamentals of different tissue engineering methods in the lab, insights of current ophthalmologic research projects including tissue engineering methods as well as an overview of some ophthalmologic diseases. Exercises: Practical laboratory work: generation of tissue engineered artificial cornea, preparation of porcine cornea and retina, cultivation of primary corneal stem cells, sample preparation for protein and mRNA, Western Blotting, qrtPCR, Paraffin sectioning, HE-staining			
Literatureempfehlungen	Textbooks of ophthalmology, anatomy, current literature concerning tissue engineering methods. Primary and secondary literature of the field will be provided and introduced at the first meeting.			
Links	https://uol.de/augenheilkunde			
Unterrichtssprache	Englisch			
Dauer in Semestern	1 Semester			
Angebotsrhythmus Modul	winter and summer semester			
Aufnahmekapazität Modul	5			
Hinweise	The number of participants is limited to 5. Students which are enrolled in Master's programme Molecular Biomedicine will be preferred.			
Modulart	Wahlpflicht / Elective			
Modullevel	MM (Mastermodul / Master module)			
Lehr-/Lernform	Lecture and Exercise			
Vorkenntnisse	basic knowledge of cell culture methods, protein and mRNA isolation methods			
Prüfung	Prüfungszeiten		Prüfungsform	
Gesamtmodul			protocol (30%), presentation (70%)	
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		1	WiSe	14
Übung		3	WiSe	42
Präsenzzeit Modul insgesamt			56 h	

Research Modules

gsw150 - Research Project Molecular Biomedicine

Modulbezeichnung	Research Project Molecular Biomedicine	
Modulkürzel	gsw150	
Kreditpunkte	15.0 KP	
Workload	450 h	
Verwendbarkeit des Moduls	Master's Programme Molecular Biomedicine (Master) > Research Modules	
Zuständige Personen	- Koch, Karl-Wilhelm (Modulverantwortung) - Koch, Karl-Wilhelm (Prüfungsberechtigt)	
Weitere verantwortliche Personen	all teachers of the curriculum (module counselling, authorized examiners)	
Teilnahmevoraussetzungen	as defined in the admission and examination regulations	
Kompetenzziele	Competencies: ++ deepened biological and / or clinical expertise ++ deepened knowledge of biological working methods and / or clinical diagnostics ++ data analysis skills + interdisciplinary thinking ++ critical and analytical thinking ++ independent searching and knowledge of scientific literature ++ ability to perform independent biological research ++ data presentation and discussion (written and spoken) + team work + ethics and professional behaviour + project and time management	
Modulinhalte	Emphasis on research Theory and practice of topics related to issues in molecular biomedicine; independent treatment of an individual project; acquiring an advanced theoretical knowledge in selected fields of the molecular biology of the cell (points of emphasis: genetics, biochemistry, cell biology; topics depending on research groups) There are several options for the lab projects, for example in the broad categories of: https://uol.de/en/neurosciences/ https://uol.de/en/biochemistry/research/ https://uol.de/en/neurogenetics/research/ https://uol.de/en/retina/research/ https://uol.de/humanmedizin/ https://uol.de/anatomie/forschung/ https://uol.de/dermatologie/forschung/ https://uol.de/immunologie/aktuelle-forschungsprojekte https://uol.de/humangenetik/research-and-clinical-collaborations/ https://uol.de/genetik-gehirnfehlbildungen/forschungsschwerpunkte/ https://uol.de/augenheilkunde/forschungsschwerpunkte	
Literaturempfehlungen	Specific literature of the topics indicated above; original papers related to the current research question; will be different for every student and every year	
Links		
Unterrichtssprache	Englisch	
Dauer in Semestern	1 Semester	
Angebotsrhythmus Modul	every semester, time is flexible and subject to individual arrangement	
Aufnahmekapazität Modul	unbegrenzt	
Modulart	Wahlpflicht / Elective	
Modullevel	MM (Mastermodul / Master module)	
Lehr-/Lernform	Seminar and Project	
Vorkenntnisse	basic knowledge of cell biology, genetics, biochemistry or clinical biomedicine	
Prüfung	Prüfungszeiten	Prüfungsform
Gesamtmodul	graded: project report ungraded: participation in seminar and 30 min. presentation	

Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Seminar		2	SoSe oder WiSe	28
Projekt (Individuelles Forschungsprojekt)		8	SoSe oder WiSe	112
Präsenzzeit Modul insgesamt				140 h

gsw160 - External Research Project Molecular Biomedicine

Modulbezeichnung	External Research Project Molecular Biomedicine			
Modulkürzel	gsw160			
Kreditpunkte	15.0 KP			
Workload	450 h			
Verwendbarkeit des Moduls	Master's Programme Molecular Biomedicine (Master) > Research Modules			
Zuständige Personen	- Koch, Karl-Wilhelm (Modulverantwortung) - Koch, Karl-Wilhelm (Prüfungsberechtigt)			
Weitere verantwortliche Personen	all teachers of the curriculum (module counselling, authorized examiners)			
Teilnahmevoraussetzungen	External research projects are done on an individual basis. They are supervised by one person from Oldenburg and a local supervisor at the research institution or university of your choice (in Germany and abroad). Before you can start, please contact Prof. Karl-Wilhelm Koch (karl.w.koch@uni-oldenburg.de).			
Kompetenzziele	Competencies: ++ deepened biological and / or clinical expertise ++ deepened knowledge of biological working methods and / or clinical diagnostics ++ data analysis skills + interdisciplinary thinking ++ critical and analytical thinking ++ independent searching and knowledge of scientific literature ++ ability to perform independent biological research ++ data presentation and discussion (written and spoken) + team work + ethics and professional behaviour + project and time management			
Modulinhalte	Emphasis on research Theory and practice of topics related to issues in molecular biomedicine; independent treatment of an individual project; acquiring an advanced theoretical knowledge in selected fields of the molecular biology of the cell (points of emphasis: genetics, biochemistry, cell biology; topics depending on research groups).			
Literatureempfehlungen	Specific literature of the topics indicated above; original papers related to the current research question; will be different for every student and every year.			
Links				
Unterrichtssprache	Englisch			
Dauer in Semestern	1 Semester			
Angebotsrhythmus Modul	every semester, time is flexible and subject to individual arrangement			
Aufnahmekapazität Modul	unbegrenzt			
Modulart	Wahlpflicht / Elective			
Modullevel	MM (Mastermodul / Master module)			
Lehr-/Lernform	Seminar and Project			
Vorkenntnisse	basic knowledge of cell biology, genetics, biochemistry or clinical biomedicine			
Prüfung	Prüfungszeiten		Prüfungsform	
Gesamtmodul			graded: project report ungraded: participation in seminar and 30 min. presentation	
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Seminar		2	SoSe oder WiSe	28
Projekt (Individuelles Forschungsprojekt)		8	SoSe oder WiSe	112
Präsenzzeit Modul insgesamt				140 h

Skills Modules

gsw170 - Research Techniques Molecular Biomedicine

Modulbezeichnung	Research Techniques Molecular Biomedicine			
Modulkürzel	gsw170			
Kreditpunkte	6.0 KP			
Workload	180 h			
Verwendbarkeit des Moduls	Master's Programme Molecular Biomedicine (Master) > Skills Modules			
Zuständige Personen	- Hartmann, Anna-Maria (Modulverantwortung) - Hartmann, Anna-Maria (Prüfungsberechtigt)			
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine			
Kompetenzziele	Competencies: ++ deepened knowledge of biological working methods + deepened knowledge of clinical diagnostics ++ data analysis skills + interdisciplinary thinking ++ critical and analytical thinking ++ ability to perform independent biological research ++ data presentation and discussion (written and spoken) Basic knowledge of techniques used in molecular biomedicine			
Modulinhalte	The module focuses on competence in research methods. Seminar: Hybridization and detection of nucleic acid, polymerase chain reaction, nucleic acid sequencing, analyses of epigenetic modifications, protein-nucleic acid Interaction, immunological techniques, light microscopy techniques, mass spectrometry analyses, protein-protein interactions, fluorescence <i>in situ</i> hybridization Exercise: molecular biological techniques (PCR, agarose gel, plasmid preparation, restriction), immunological methods (cell culturing, cytochemistry), biochemistry techniques (SDS gel, western blotting, protein purification, photometry)			
Literaturempfehlungen	Bioanalytics: Analytical Methods and Concepts in Biochemistry and Molecular Biology, Lottspeich and Engels (ISBN-13: 978-3527339198)			
Links				
Unterrichtssprache	Englisch			
Dauer in Semestern	1 Semester			
Angebotsrhythmus Modul	Second half of the winter semester			
Aufnahmekapazität Modul	25			
Modulart	Wahlpflicht / Elective			
Modullevel	MM (Mastermodul / Master module)			
Lehr-/Lernform	Seminar and Exercise			
Prüfung	Prüfungszeiten		Prüfungsform	
Gesamtmodul			graded: presentation (20 min.) ungraded; signed protocols	
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		2	WiSe	28
Praktikum		2	WiSe	28
Präsenzzeit Modul insgesamt				56 h

gsw180 - Ethics in Medicine

Modulbezeichnung	Ethics in Medicine	
Modulkürzel	gsw180	
Kreditpunkte	3.0 KP	
Workload	90 h	
Verwendbarkeit des Moduls	Master's Programme Molecular Biomedicine (Master) > Skills Modules	
Zuständige Personen	- Schweda, Mark (Modulverantwortung) - Schweda, Mark (Prüfungsberechtigt) - Weßel, Merle (Prüfungsberechtigt)	
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine	
Kompetenzziele	Competencies: ++ deepened medical / ethical expertise with a focus on research ethics ++ interdisciplinary thinking ++ critical and analytical thinking + independent searching and knowledge of scientific literature + ability to perform independent biological research ++ data presentation and discussion (written and spoken) + team work ++ ethics and professional behaviour + project and time management	
Modulinhalte	Concept of ethics and central theoretical approaches to ethics Research ethical standards and their evolution Good scientific practice (scientific misconduct, criteria of authorship, documentation of research, IRB approval) Central areas of ethically sensitive research (stem cell and embryonic research, genomic research, clinical studies, social research) Ethical problems in research (research with incompetent and vulnerable populations)	
Literaturempfehlungen	Excerpts from relevant textbooks (e.g., Beauchamp, T., Childress, J. F. (2013): Principles of Biomedical Ethics; Emanuel, E. J., Grady, C. C., Crouch, R. A., Lie, R. K., Miller, F. G., Wendler, D. D. (eds.) (2008): The Oxford Textbook of Clinical Research Ethics; Hughes, J., Hunter, D., Sheehan, M., Wilkinson, S., Wrigley, A. (2010): European Textbook on Ethics in Research); current research articles	
Links	https://uol.de/medizinethik/	
Unterrichtssprache	Englisch	
Dauer in Semestern	1 Semester	
Angebotsrhythmus Modul	winter semester	
Aufnahmekapazität Modul	25	
Modulart	Wahlpflicht / Elective	
Modullevel	MM (Mastermodul / Master module)	
Lehr-/Lernform	Lecture	
Prüfung	Prüfungszeiten	Prüfungsform
Gesamtmodul		essay
Lehrveranstaltungsform	Vorlesung und Seminar	
SWS	2	
Angebotsrhythmus	WiSe	
Workload Präsenzzeit	28 h	

gsw190 - Journal Club

Modulbezeichnung	Journal Club	
Modulkürzel	gsw190	
Kreditpunkte	3.0 KP	
Workload	90 h	
Verwendbarkeit des Moduls	Master's Programme Molecular Biomedicine (Master) > Skills Modules	
Zuständige Personen	- Mertsch, Sonja (Modulverantwortung) - Mertsch, Sonja (Prüfungsberechtigt) - Maier, Esther Christine (Prüfungsberechtigt) - Schrader, Stefan (Prüfungsberechtigt)	
Weitere verantwortliche Personen	all teachers of the curriculum	
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine. Neuroscience and Biology students can participate on request.	
Kompetenzziele	Competencies: ++ reading and understanding of original scientific literature ++ deepened biological expertise ++ deepened knowledge of biological working methods ++ data analysis skills + interdisciplinary thinking ++ critical and analytical thinking ++ independent searching and knowledge of scientific literature + ability to perform independent biological research ++ data presentation and discussion (written and spoken)	
Modulinhalte	The module focuses on current topics in molecular cell biology and biomedicine. Students will learn how to read, interpret and to present current research literature from different topics. The presentations include a 10min talk with a PowerPoint presentation as well as a poster presentation. The literature can be chosen by the students themself. Seminar topics: original literature of molecular life science related to health and disease	
Literaturempfehlungen	publications related to the current research question	
Links		
Unterrichtssprache	Englisch	
Dauer in Semestern	1 Semester	
Angebotsrhythmus Modul	winter and summer semester	
Aufnahmekapazität Modul	20	
Modulart	Wahlpflicht / Elective	
Modullevel	MM (Mastermodul / Master module)	
Lehr-/Lernform	Seminar	
Vorkenntnisse	basic knowledge of cell biology, genetics, biochemistry	
Prüfung	Prüfungszeiten	Prüfungsform
Gesamtmodul		2 presentations
Lehrveranstaltungsform	Seminar	
SWS	2	
Angebotsrhythmus	SoSe und WiSe	
Workload Präsenzzeit	28 h	

gsw200 - Microscopic Imaging in Biomedical Sciences

Modulbezeichnung		Microscopic Imaging in Biomedical Sciences		
Modulkürzel		gsw200		
Kreditpunkte		3.0 KP		
Workload		90 h		
Verwendbarkeit des Moduls		• Master Neuroscience (Master) > Skills Modules • Master's Programme Molecular Biomedicine (Master) > Skills Modules		
Zuständige Personen		• Dedek, Karin (Modulverantwortung) • Groß, Petra (Prüfungsberechtigt) • Dedek, Karin (Prüfungsberechtigt) • Solovyeva, Vita (Prüfungsberechtigt)		
Teilnahmevoraussetzungen		Enrolment in Master´s programmes Molecular Biomedicine and Neuroscience.		
Kompetenzziele		Competencies: + deepened biological expertise ++ deepened knowledge of biological working methods + data analysis skills ++ interdisciplinary thinking ++ critical and analytical thinking ++ data presentation and discussion (written and spoken) + team work		
Modulinhalte		The module focuses on microscopy, imaging and methods of microscopy. Lecture: Basics in optics, microscopy methods, image processing, biomedical applications Seminar: Examples for selected microscopy methods and their application. Different microscopical methods and their applications are discussed and compared. Students will understand the basics and limitations of microscopy methods and learn to evaluate them. Selected methods are demonstrated.		
Literatureempfehlungen		Literature will be provided during the lecture/seminar		
Links				
Unterrichtssprache		Englisch		
Dauer in Semestern		1 Semester		
Angebotsrhythmus Modul		afternoon event during winter semester		
Aufnahmekapazität Modul		16 (Selection criteria: attendance at first meeting)		
Modulart		Wahlpflicht / Elective		
Modullevel		MM (Mastermodul / Master module)		
Lehr-/Lernform		Lecture and Seminar		
Vorkenntnisse		basic physics, basic cell biology		
Prüfung		Prüfungszeiten		Prüfungsform
Gesamtmodul				
graded: written examination (60 min.), ungraded: presentation				
Note: to qualify for the exam, regular participation during the semester is mandatory, no more than 2 days of absence				
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		1	WiSe	14
Seminar		1	WiSe	14
Präsenzzeit Modul insgesamt				28 h

neu751 - Laboratory Animal Science

Modulbezeichnung	Laboratory Animal Science
Modulkürzel	neu751
Kreditpunkte	3.0 KP
Workload	90 h (1 week full-time in semester break + flexible time for studying and exam preparation 1 SWS Lecture total workload 45h: 2h contact / 20h background reading / 23h exam preparation 1 SWS Supervised exercise total workload 45h: 35h contact / 10h background reading)
Verwendbarkeit des Moduls	• Master Biologie (Master) > Skills Modules • Master Biology (Master) > Skills Modules • Master Neuroscience (Master) > Skills Modules • Master's Programme Molecular Biomedicine (Master) > Skills Modules
Zuständige Personen	• Köppl, Christine (Modulverantwortung) • Köppl, Christine (Prüfungsberechtigt) • Langemann, Ulrike (Prüfungsberechtigt) • Nolte, Arne (Prüfungsberechtigt) • Heyers, Dominik (Prüfungsberechtigt) • Ebbers, Lena (Prüfungsberechtigt) • Dedek, Karin (Prüfungsberechtigt) • Schmaljohann, Heiko (Prüfungsberechtigt) • Winklhofer, Michael (Prüfungsberechtigt)
Teilnahmevoraussetzungen	none
Kompetenzziele	++ Expt. Methods + Independent Research + Scient. Literature ++ Social skills ++ Interdiscipl. knowl + Scientific English ++ Ethics Upon successful completion of this course, students • know the relevant EU legislation governing animal welfare and are able to explain its meaning in common language • understand and are able to critically discuss salient ethical concepts in animal experimentation, such as the three Rs and humane endpoint. • have basic knowledge of the biology and husbandry of laboratory animal species held at the University of Oldenburg (rodents or birds or fish) • are able to critically assess the needs and welfare of animals without compromising scientific integrity of the investigation • have practical skills in handling small rodents or birds or fish • have profound knowledge of anaesthesia, analgesia and basic principles of surgery. • have practised invasive procedures and euthanasia. NOTE: These objectives aim to satisfy the requirements for EU directive A „Persons carrying out animal experiments“ and EU directive D „Persons killing animals“.
Modulinhalte	Background knowledge is taught using the third-party online platform "LAS Interactive" which concludes with a written exam that has to be passed before the practical part. Topics covered are: • Legislation, ethics and the 3Rs • Scientific integrity • Data collection " • Basic biology of rodents, birds and fish • Husbandry, and nutrition of rodents, birds and fish • Animal Welfare • Health monitoring • Pain and distress • Euthanasia

Practical procedures will first be demonstrated, important aspects will then be practiced under supervision by every participant, on an animal model of their choice (rodents, birds or fish):

- Handling and external examination
- Administration of substances, blood sampling
- Euthanasia and dissection
- Transcardial perfusion
- Anaesthesia and surgery

Literaturempfehlungen		"LAS interactive" internet-based learning platform		
Links				
Unterrichtssprache		Englisch		
Dauer in Semestern		1 Semester		
Angebotsrhythmus Modul		semester break, every semester		
Aufnahmekapazität Modul		20 (Registration procedure / selection criteria: StudIP. Priority according to urgency of qualification for work.)		
Modulart		je nach Studiengang Pflicht oder Wahlpflicht		
Prüfung		Prüfungszeiten		Prüfungsform
Gesamtmodul		immediately before the practical part		written exam of 90 minutes
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		1	SoSe und WiSe	14
Übung		1	SoSe und WiSe	14
Präsenzzeit Modul insgesamt				
28 h				

neu760 - Scientific English

Modulbezeichnung	Scientific English	
Modulkürzel	neu760	
Kreditpunkte	6.0 KP	
Workload	180 h (0,5 SWS Lecture (VO) Total workload 23h: 8h contact / 15h research for term paper 3,5 SWS Supervised exercise (UE) Total workload 158h: 46h contact / 46h preparation of texts and presentations / 66h term paper)	
Verwendbarkeit des Moduls	• Master Biologie (Master) > Skills Modules • Master Biology (Master) > Skills Modules • Master Neuroscience (Master) > Skills Modules • Master's Programme Molecular Biomedicine (Master) > Skills Modules	
Zuständige Personen	• Köppl, Christine (Modulverantwortung) • Köppl, Christine (Prüfungsberechtigt)	
Teilnahmevoraussetzungen		
Kompetenzziele	+ Neurosci. knowlg. ++ Social skills ++ Data present./disc. ++ Scientific English Upon completion of this course, students • have increased their proficiency in different forms of scientific presentation and communication in English, with special emphasis on neuroscience • are able to express themselves with correct sentence structure and grammar, correct use of idioms and correct pronunciation • are proficient in different contexts of scientific communication (e.g., paper, poster and informal exchange by email or phone) • are able to recognize and avoid common errors of non-native speakers.	
Modulinhalte	Lectures cover - characteristics of the different forms of scientific presentations - sentence structure using the passive voice - scientific vocabulary and terminology as contrasted to common speech - appropriate language for communication with scientific editors and referees Students read neuroscience texts of an advanced level and practice explaining and presenting these in both written and oral form. They also practice different contexts of scientific communication (e.g., paper, poster and informal exchange by email or phone). Emphasis is placed on individual problems in pronunciation and language use errors.	
Literatureempfehlungen	http://users.wpi.edu/~nab/sci_eng/ScientificEnglish.pdf	
Links		
Unterrichtssprache	Englisch	
Dauer in Semestern	1 Semester	
Angebotsrhythmus Modul	annually, semester break	
Aufnahmekapazität Modul	12	
Hinweise	Usually held in the break before summer term Outsourced to STELS-OL (Scientific and Technical English Language Service); native English speaker with in-depth neuroscience knowlg.	
Modulart	je nach Studiengang Pflicht oder Wahlpflicht	
Vorkenntnisse	minimum English level B2 (C1 preferred) according to Common European Framework of Reference for Languages (CEFR) priority to non-native speakers, higher semester	
Prüfung	Prüfungszeiten	Prüfungsform
Gesamtmodul	within 2 months of completing the course	Portfolio: 70% several quick tests, texts, presentations, 30% term paper Bonus system for active participation

Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Vorlesung		0.5	WiSe	7
Übung		3.5	WiSe	49
Präsenzzeit Modul insgesamt				56 h

gsw210 - Scientific Communication

Modulbezeichnung	Scientific Communication	
Modulkürzel	gsw210	
Kreditpunkte	6.0 KP	
Workload	180 h	
Verwendbarkeit des Moduls	Master's Programme Molecular Biomedicine (Master) > Skills Modules	
Zuständige Personen	- Plösch, Torsten (Modulverantwortung) - Plösch, Torsten (Prüfungsberechtigt) - Gibbs, Bernhard (Prüfungsberechtigt) - Dömer, Patrick (Prüfungsberechtigt) - Dittmann, Tim (Prüfungsberechtigt)	
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine	
Kompetenzziele	Goals of the module: Upon completion of this module, students - have improved their competencies in scientific writing - demonstrate effective communication and presentation skills (oral and written) - can defend their findings in scientific discussions or rebuttal letters - know about major communication pitfall Competencies: ++ scientific writing ++ data presentation and discussion + independent searching and knowledge of scientific literature + teamwork + critical and analytical thinking	
Modulinhalte	Seminar: - Introduction to scientific writing (analysis of scientific publications, structure of publications, common mistakes, logical story plots) - types of scientific communications: posters, oral presentations, journal papers, grant applications, CV/job application - Literature management (information search/ literature management tools/ plagiarism) - presentation techniques (how to structure your poster/presentation, how to reach your audience) - how to write your Master's thesis - job application (CV, application letter) - how do others perceive your message? - "don'ts" of scientific communication - social media for scientists - the perfect abstract Exercise - analysis of scientific publications - writing an abstract - presentation (poster, short talk)	
Literatureempfehlungen	A list will be distributed on forehand	
Links		
Unterrichtssprache	Englisch	
Dauer in Semestern	1 Semester	
Angebotsrhythmus Modul	winter term, summer term	
Aufnahmekapazität Modul	12	
Hinweise	The number of participants for this module is limited to 12. If there are more students registered than places available, lots will be drawn. Students which are enrolled in Master's programme Molecular Biomedicine will be preferred.	
Modulart	Wahlpflicht / Elective	
Modullevel	MM (Mastermodul / Master module)	
Lehr-/Lernform	Seminar and Exercise	
Vorkenntnisse	English level B2 according to Common European Framework of Reference for Languages (CEFR)	
Prüfung	Prüfungszeiten	Prüfungsform
Gesamtmodul	during seminar	portfolio (presentation, several exercises, active

Prüfung	Prüfungszeiten	Prüfungsform
		participation during discussions)
Lehrveranstaltungsform	Seminar und Übung	
SWS	4	
Angebotsrhythmus	SoSe oder WiSe	
Workload Präsenzzeit	56 h	

gsw220 - Bioinformatics and Omics

Modulbezeichnung	Bioinformatics and Omics		
Modulkürzel	gsw220		
Kreditpunkte	6.0 KP		
Workload	180 h		
Verwendbarkeit des Moduls	Master's Programme Molecular Biomedicine (Master) > Skills Modules		
Zuständige Personen	- Hitz, Marc-Phillip (Modulverantwortung) - Gieldon, Laura (Prüfungsberechtigt) - Hitz, Marc-Phillip (Prüfungsberechtigt) - Audain Martinez, Enrique (Prüfungsberechtigt)		
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine		
Kompetenzziele			
Modulinhalte			
Literaturempfehlungen	literature will be provided during the lecture/seminar; a list will be distributed on forehand		
Links			
Unterrichtssprachen			
Dauer in Semestern	1 Semester		
Angebotsrhythmus Modul			
Aufnahmekapazität Modul	25		
Modullevel	MM (Mastermodul / Master module)		
Vorkenntnisse	knowledge in statistics, coding, biology and mathematics		
Prüfung	Prüfungszeiten	Prüfungsform	
Gesamtmodul	will be announced in class; at the end of the course	Portfolio (exercises, active participation during discussions)	
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus
Seminar und Übung		2	--
Vorlesung		2	--
Präsenzzeit Modul insgesamt			56 h

gsw215 - Introduction to Academic Writing

Modulbezeichnung	Introduction to Academic Writing			
Modulkürzel	gsw215			
Kreditpunkte	3.0 KP			
Workload	90 h (Seminar 1SWS Übung 1SWS)			
Verwendbarkeit des Moduls	Master's Programme Molecular Biomedicine (Master) > Skills Modules			
Zuständige Personen	- Helgers, Simeon (Modulverantwortung) - Dömer, Patrick (Prüfungsberechtigt) - Helgers, Simeon (Prüfungsberechtigt)			
Teilnahmevoraussetzungen	Enrolment in Master's programme Molecular Biomedicine			
Kompetenzziele	Goals of this module: Upon successful completion of this module, students are familiar with the basic principles of academic practice including academic writing, data analysis, data presentation and general rules regarding ethics and laws. Skills to be acquired/ competencies: ++ independent searching and knowledge of scientific literature ++ ethics and professional behavior ++ data presentation and discussion (written and spoken) ++ data analysis skills + deepened knowledge of biological working methods + critical and analytical thinking + interdisciplinary thinking + teamwork			
Modulinhalte	The module focuses on the basic principles of academic practice. In theoretical and practical parts, the students will - learn how to structure and write protocols, articles, and thesis. - be introduced to general guidelines, plagiarism, national and international guidelines and good scientific practice. - learn how to manage, analyze, and present data sets in written and spoken form. - learn to work with scientific images/plots etc. - be introduced to application writing (ethic approvals, grant applications etc.) - learn about authorship and the process of publications. The module will consist of lectures and practical parts consisting of lab work, data analysis and writing assignments.			
Literaturempfehlungen				
Links				
Unterrichtssprache	Englisch			
Dauer in Semestern	1 Semester			
Angebotsrhythmus Modul				
Aufnahmekapazität Modul	25			
Modulart	Wahlpflicht / Elective			
Modullevel	MM (Mastermodul / Master module)			
Prüfung	Prüfungszeiten		Prüfungsform	
Gesamtmodul			PF Portfolio: (presentation, written protocol, active participation) - ungraded	
Lehrveranstaltungsform	Kommentar	SWS	Angebotsrhythmus	Workload Präsenz
Seminar		1	SoSe oder WiSe	0
Übung		1	SoSe oder WiSe	0
Präsenzzeit Modul insgesamt			0 h	

Masterabschlussmodul

mam - Master Thesis Module

Modulbezeichnung	Master Thesis Module	
Modulkürzel	mam	
Kreditpunkte	30.0 KP	
Workload	900 h (attendance in the lab meetings: 28 hours (2 SWS); theses work: 872 hours)	
Verwendbarkeit des Moduls	Master's Programme Molecular Biomedicine (Master) > Masterabschlussmodul	
Zuständige Personen		
Weitere verantwortliche Personen	all teachers of the curriculum	
Teilnahmevoraussetzungen	as defined in the admission and examination regulations	
Kompetenzziele	++ deepened biological and / or clinical expertise, ++ deepened knowledge of biological working methods and / or clinical diagnostics, ++ data analysis skills, + interdisciplinary thinking, ++ critical and analytical thinking, ++ independent searching and knowledge of scientific literature, ++ ability to perform independent biological research, ++ data presentation and discussion (written and spoken), + team work, + ethics and professional behaviour, ++ project and time management	
Modulinhalte	Preparation of the Master Thesis. There are several options for the lab projects, e.g. in the broad categories of: https://uol.de/en/neurosciences/ o https://uol.de/en/biochemistry/research/ o https://uol.de/en/neurogenetics/research/ o https://uol.de/en/retina/research/ https://uol.de/humanmedizin/ o https://uol.de/anatomie/forschung/ o https://uol.de/dermatologie/forschung/ o https://uol.de/humangenetik/research-and-clinical-collaborations/ https://uol.de/genetik-gehirnfehlbildungen/forschungsschwerpunkte/	
Literaturempfehlungen	Specific literature of the topics indicated above; original papers related to the current research question	
Links		
Unterrichtssprache	Englisch	
Dauer in Semestern	1 Semester	
Angebotsrhythmus Modul	recommended in semester 4, time is flexible and subject to individual arrangement	
Aufnahmekapazität Modul	unbegrenzt	
Modulart	Pflicht / Mandatory	
Modullevel	Abschlussmodul (Abschlussmodul / Conclude)	
Prüfung	Prüfungszeiten	Prüfungsform
Gesamtmodul		Masterarbeit (90%) und Abschlusskolloquium (10%)
Lehrveranstaltungsform	Kolloquium	

SWS	2
Angebotsrhythmus	SoSe oder WiSe
Workload Präsenzzeit	28 h
