### Modules for Molecular Biomedicine

#### Background Modules

**bio605 - Molecular Genetics and Cell Biology**

<table>
<thead>
<tr>
<th>Module label</th>
<th>Molecular Genetics and Cell Biology</th>
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<tbody>
<tr>
<td>Modulkürzel</td>
<td>bio605</td>
</tr>
<tr>
<td>Credit points</td>
<td>12.0 KP</td>
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<tr>
<td>Workload</td>
<td>360 h</td>
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</table>

**Verwendbarkeit des Moduls**

- Master's Programme Biology (Master) > Background Modules
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Molecular Biomedicine (Master) > Background Modules
- Master's Programme Neuroscience (Master) > Background Modules

**Zuständige Personen**

Koch, Karl-Wilhelm (Module responsibility)
Koch, Karl-Wilhelm (Prüfungsberechtigt)
Neidhardt, John (Prüfungsberechtigt)

**Prerequisites**

BSc (Biologie, Biochemie)

**Skills to be acquired in this module**

++ 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 in German and English (written and spoken)
+ teamwork
+ ethics and professional behaviour
+ project and time management

Addressing students with an emphasis on molecular biology, molecular genetics, cell biology, and neurobiology

**Module contents**

Lecture: To improve knowledge in molecular genetics, molecular biology and cell biology in correlation with human diseases.
Exercise: 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.
Subjects of the lecture and seminar: Molecular bases of neurodegenerative diseases, structure and function of DNA/RNA/proteins/membranes, cytoskeleton, cell cycle, programmed cell death, cells in the social structure.
Exercises: Learning current methods of molecular biology and human genetics; high throughput technologies, introduction to cell cultivation techniques.

**Literaturempfehlungen**

Textbooks of Cell Biology

**Links**

http://www.uni-oldenburg.de/humangenetik/

**Language of instruction**

English

**Duration (semesters)**

1 Semester

**Module frequency**

**Module capacity**

15

**Reference text**

associated with bio900

**Modullevel / module level**

MM (Mastermodul / Master module)

**Modulart / typ of module**

Wahlpflicht / Elective

**Lehr-/Lernform / Teaching/Learning method**

Vorkenntnisse / Previous knowledge: Zellbiologische Grundkenntnisse, Genetik, Biochemie

**Examination**

Prüfungszeiten

Type of examination

written examination (70 %), paper(s) presentation 30 %; not graded: signed lab protocols, regular active participation is required for the module to be passed.
<table>
<thead>
<tr>
<th>Form of teaching</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<tbody>
<tr>
<td>Lecture</td>
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<tr>
<td>Seminar</td>
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<td></td>
<td></td>
<td></td>
<td><strong>112 h</strong></td>
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</table>
bio695 - Biochemical concepts in signal transduction

Module label | Biochemical concepts in signal transduction
Modulkürzel | bio695
Credit points | 12.0 KP
Workload | 360 h

Verwendbarkeit des Moduls
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Molecular Biomedicine (Master) > Background Modules
- Master's Programme Neuroscience (Master) > Background Modules

Zuständige Personen
- Koch, Karl-Wilhelm (Module responsibility)
- Scholten, Alexander (Module counselling)

Prerequisites
- keine

Skills to be acquired in this module
- ++ 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 in German and English (written and spoken)
- teamwork
- project and time management

Module contents
- Lecture: Molecular fundamentals of cellular signal processes
- Seminar: Signal transduction
- Exercises: Experiments on cellular signal transduction and enzymology

Mechanisms of biochemical signal transduction are imparted theoretically and experimentally

Literaturempfehlungen
- Textbooks of cell biology and biochemistry. Current literature on topics of signal transduction (as announced in the preparatory meeting).

Links
- Language of instruction: English
- Duration (semesters): 1 Semester
- Module frequency:
- Module capacity: 20
- Modullevel / module level: MM (Mastermodul / Master module)
- Modulart / typ of module: Wahlpflicht / Elective

Vorkenntnisse / Previous knowledge

Examination | Prüfungszeiten | Type of examination
--- | --- | ---
Final exam of module | 90 minutes written exam | written examinaton (50%) protocols (50%)

Form of teaching | Comment | SWS | Frequency | Workload of compulsory attendance
--- | --- | --- | --- | ---
Lecture |  | 1 | WiSe | 14
Seminar |  | 1 | WiSe | 14
Exercises |  | 6 | WiSe | 84

Präsenzzeit Modul insgesamt | 112 h
gsw010 - Molecular Physiology

Module label: Molecular Physiology
Modulkürzel: gsw010
Credit points: 6.0 KP
Workload: 180 h

Verwendbarkeit des Moduls: Master's Programme Molecular Biomedicine (Master) > Background Modules
Zuständige Personen: Milenkovic, Ivan (Prüfungsberechtigt)
Prerequisites: as defined in the admission and examination regulations

Skills to be acquired in this module:
++ deepened biological expertise
++ deepened clinical/pathological expertise
++ deepened knowledge of biological working methods
+ data analysis skills
+ computer based data analysis
+ interdisciplinary thinking
+ ability to perform independent biological research
+ data presentation and discussion (written and spoken)

Module contents:

Emphasis on physiology of the cell, physiology of human organ systems in health and disease, homeostatic regulation mechanisms

Lecture:
cellular mechanisms of excitability, physiology of intercellular communication with emphasis on synaptic transmission, muscle contraction, heart – mechanical and electrical properties, cardiovascular system, lungs – mechanical properties and regulation of respiration, kidney – regulation of diuresis, homeostatic pH regulation, somatosensory system, hearing, vision, central nervous system

Exercise:
Patch clamp technique – recordings from neurons in acute brain tissue preparation, action potentials, excitatory (EPSCs) and inhibitory postsynaptic currents (IPSCs).
Calcium imaging – investigation of excitatory glutamatergic receptors on neurons.
In vivo recordings – single cell recordings from central auditory neurons in small rodents. In vivo properties of action potentials and synaptic transmission upon acoustic stimulation.

Literaturempfehlungen:
Guyton and Hall - Textbook of medical physiology
Kandler, Schwarz, Jessell - Principles of neural science
Pape, Kurz, Silbernagl - Physiologie
Schmidt, Lang, Heckmann - Physiologie des Menschen
Speckmann, Hescheler, Köhling - Physiologie

Links:
https://uol.de/physiologie

Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: Second half of the winter semester; annually
Module capacity: 12
Modullevel / module level: MM (Mastermodul / Master module)
Modulart / typ of module: Wahlpflicht / Elective
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<th>Lehr-/Lernform / Teaching/Learning method</th>
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<td>Basic knowledge in Physiology and cell biology</td>
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<td>Examination</td>
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<td>Prüfungszeiten</td>
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Präsenzzeit Modul insgesamt 84 h
### gsw020 - Cellular and Subcellular Structures

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**Workload**
180 h

**Verwendbarkeit des Moduls**
- Master's Programme Molecular Biomedicine (Master) > Background Modules

**Zuständige Personen**
Bräuer, Anja (Prüfungsberechtigt)

**Prerequisites**
as defined in the admission and examination regulations

**Skills to be acquired in this module**

- ++ 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

To know and understand cellular and subcellular structures and their function in the human body

**Module contents**

- basic overview of different subcellular structures and their function (e.g. Golgi etc.)
- basic overview of cellular function in different human tissues, including molecular and cellular functions

**Literaturempfehlungen**
- Lehrbuch der Histologie, Welsch
- Zellbiologie, Kleinig und Maier
- Histologie, Lüllmann-Rauch
- Histologische Differentialdiagnose, Rohen
- Anatomie und Physiologie, Tortora und Derrickson

**Links**
- https://uol.de/anatomie/forschung/

**Language of instruction**
- English

**Duration (semesters)**
- 1 Semester

**Module frequency**
- First half of the summer semester, annually

**Module capacity**
- 25

**Reference text**

For your notice: this course will **NOT** cover microscopic imaging techniques, if you are interested please see module gsw200_Microscopic Imaging in Biomedical Sciences.

**Modullevel / module level**
- MM (Mastermodul / Master module)

**Modulart / typ of module**
- Wahlpflicht / Elective

**Lehr-/Lernform / Teaching/Learning method**
<table>
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<td>written examination (45 min.)</td>
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<td>Exercises</td>
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gsw030 - Biophysical Chemistry

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<td>gsw030</td>
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<td>Workload</td>
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<td>Verwendbarkeit des Moduls</td>
<td>Master's Programme Molecular Biomedicine (Master) &gt; Background Modules</td>
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<td>Zuständige Personen</td>
<td>Winklhofer, Michael (Prüfungsberechtigt)</td>
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<td>Prerequisites</td>
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</table>
| Skills to be acquired in this module | ++ deepened biological expertise, 
+ data analysis skills, 
+ usage of databases and computational tools 
+ interdisciplinary thinking 
++ critical and analytical thinking, 
++ data presentation and discussion |

Understanding physical principles underlying biochemistry and cell biology

Module contents

Emphasis on Molecular Biophysics, Biophysical Chemistry, Biochemistry, Cell Biology 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)

Literatureempfehlungen
Principles of Biophysical Chemistry (van Holde et al., Pearson/Prentice Hall)
Physical chemistry (Atkins, Wiley VCH)
Biophysics - Searching for principles (Bialek, Princeton UP)

Links
Language of instruction | English
Duration (semesters) | 1 Semester
Module frequency | Second half of the summer semester, annually
Module capacity | 20
Module level / module level | MM (Mastermodul / Master module)
Modulart / typ of module | Wahlpflicht / Elective
Lehr-/Lernform / Teaching/Learning method
Vorkenntnisse / Previous knowledge | basic knowledge in biochemistry and physics
Examination | Prüfungszeiten
Type of examination | 15 min. short tests (75%) before each seminar
| Examination | Prüfungszeiten | Type of examination
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gsw040 - Molecular and Cellular Biology of Hearing and Deafness

Module label: Molecular and Cellular Biology of Hearing and Deafness

Modulkürzel: gsw040

Credit points: 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)

Prerequisites: as defined in the admission and examination regulations

Skills to be acquired in this module:

++ 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

Module contents:

Emphasis 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: Discussion of current topics in molecular and cellular biology of hearing and deafness

Exercise: Laboratory experiments to study mouse models of deafness/auditory processing disorders

Literaturempfehlungen:

Springer Handbook of Auditory Research Series Vol. 63:


Vona, B., Haaf, T. (Eds.), "Genetics of Deafness", 2016, Karger Publishers

Links:
https://uol.de/en/neurogenetics/research/

Language of instruction: English
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<td>Wahlpflicht / Elective</td>
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**Examination**

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<td>Final exam of module presentation (50%), written report (50%)</td>
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**Form of teaching**

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<th>Workload of compulsory attendance</th>
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<td>Lecture</td>
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<td>Practical training</td>
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<td>70</td>
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**Präsenzzzeit Modul insgesamt** 112 h
gsw050 - Current Topics of Genetics

Module label
Current Topics of Genetics

Modulkürzel
gsw050

Credit points
6.0 KP

Workload
180 h

Verwendbarkeit des Moduls
- Master's Programme Molecular Biomedicine (Master) > Background Modules

Zuständige Personen
Claußen, Maike (Prüfungsberechtigt)
Ebbers, Lena (Prüfungsberechtigt)

Prerequisites
as defined in the admission and examination regulations

Skills to be acquired in this module

++ 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

Module contents

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/

Language of instruction
English

Duration (semesters)
1 Semester

Module frequency
Second half of the winter semester; annually

Module capacity
20

Modullevel / module level
MM (Mastermodul / Master module)

Modulart / typ of module
Wahlpflicht / Elective

Lehr-/Lernform / Teaching/Learning method
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<th>basic knowledge in genetics</th>
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<td>Final exam of module</td>
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<td>Workload of compulsory attendance</td>
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<td>2</td>
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<td>Präsenzzeit Modul insgesamt</td>
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neu141 - Visual Neuroscience - Physiology and Anatomy

Module label: Visual Neuroscience - Physiology and Anatomy
Modulkürzel: neu141
Credit points: 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's Programme Biology (Master) > Background Modules
- Master's Programme Molecular Biomedicine (Master) > Background Modules
- Master's Programme Neuroscience (Master) > Background Modules

Zuständige Personen
- Greschner, Martin (Module responsibility)
- Greschner, Martin (Prüfungsberechtigt)
- Dedek, Karin (Prüfungsberechtigt)
- Janssen-Bienhold, Ulrike (Prüfungsberechtigt)
- Puller, Christian (Prüfungsberechtigt)

Prerequisites: Basic knowledge of neurobiology

Skills to be acquired in this module
- ++ 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)

Module contents: 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 neuranatomy 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

Language of instruction: English
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<tr>
<th>Duration (semesters)</th>
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<tbody>
<tr>
<td>Module frequency</td>
<td>annually, summer term, first half (full time)</td>
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<tr>
<td>Module capacity</td>
<td>12 - with Visual Neuroscience: Anatomy (Shared course components with (cannot be credited twice): neu151 BM Visual Neuroscience: Anatomy)</td>
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<td>MM (Mastermodul / Master module)</td>
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<td>Prüfungszeiten</td>
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<td>during the course (summer semester, first half) In addition, mandatory but ungraded: seminar presentation</td>
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### neu150 - Visual Neuroscience - Anatomy

<table>
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#### Verwendbarkeit des Moduls
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Molecular Biomedicine (Master) > Background Modules
- Master's Programme Neuroscience (Master) > Background Modules

#### Zuständige Personen
- Janssen-Bienhold, Ulrike (Module responsibility)
- Dedek, Karin (Module counselling)
- Janssen-Bienhold, Ulrike (Prüfungsberechtigt)
- Dedek, Karin (Prüfungsberechtigt)

#### Prerequisites
- attendance in pre-meeting

#### Skills to be acquired in this module
- Neurosci. knowlg. Expt. methods Independent research + Scient. literature + Social skills
- Interdiscipl. knowlg. Maths/Stats/Progr. + Data present./disc. + Scientific English Ethics
- Theory: Improved theoretical and methodological knowledge in neurobiology. Discussion of scientific work and presentation of own results.
- Practice: Performing neuroanatomical experiments. Gaining modern methodological skills.

#### Module contents
- Lecture: 14 h Introduction to current neurobiological approaches and results.
- Seminar: 14 h Discussion of background literature and results of own experiments.
- Lab course: 3 weeks, each 24 h neuroanatomical experiments in small groups on vertebrate retina and brain.

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

#### Links
- Language of instruction: English
- Duration (semesters): 1 Semester
- Module frequency: jährlich
- Module capacity: unlimited

#### Reference text
Course in the first half of the semester
Regular active participation and presentation(s) within the scope of the seminar are required to pass the module

#### Modullevel / module level
BC (Basiscurriculum / Base curriculum)

#### Modulart / typ of module
je nach Studiengang Pflicht oder Wahlpflicht

### Vorkenntnisse / Previous knowledge

#### Examination
<table>
<thead>
<tr>
<th>Prüfungszeiten</th>
<th>Type of examination</th>
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<tbody>
<tr>
<td>summer semester, first half</td>
<td>Portfolio (75 %), report (25%)</td>
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#### Final exam of module

<table>
<thead>
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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
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<td>SoSe</td>
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<td>14</td>
</tr>
<tr>
<td>Seminar</td>
<td>1</td>
<td>SoSe</td>
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<td>14</td>
</tr>
<tr>
<td>Practical training</td>
<td>3</td>
<td>SoSe</td>
<td></td>
<td>42</td>
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</table>

#### Präsenzzzeit Modul insgesamt
70 h
Clinical Modules

gsw070 - Gene-based Therapies in Human diseases

<table>
<thead>
<tr>
<th>Module label</th>
<th>Gene-based Therapies in Human diseases</th>
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<tr>
<td>Modulkürzel</td>
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<td>Verwendbarkeit des Moduls</td>
<td>Master's Programme Molecular Biomedicine (Master) &gt; Clinical Modules</td>
</tr>
<tr>
<td>Zuständige Personen</td>
<td>Jüschke, Christoph (Prüfungsberechtigt)</td>
</tr>
<tr>
<td></td>
<td>Neidhardt, John (Prüfungsberechtigt)</td>
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</table>

Prerequisites

as defined in the admission and examination regulations

Skills to be acquired in this module

++ 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.

Module contents

**Emphasis 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/

Language of instruction

English
<table>
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<td>Wahlpflicht / Elective</td>
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<tr>
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<tr>
<td>Vorkenntnisse / Previous knowledge</td>
<td>Basic knowledge of Cell Biology, Genetics</td>
</tr>
<tr>
<td>Examination</td>
<td>Prüfungszeiten</td>
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</table>

**Final exam of module**

- written examination (90 min.)
- additionally ungraded: signed lab protocols and regular active participation is required for the module to be passed

<table>
<thead>
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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<td>Präsenzzeit Modul insgesamt</td>
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<td></td>
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<td>56 h</td>
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**gw080 - Genetic Diagnostics: from chromosomal aberrations to gene mutations**

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<tr>
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<th>Genetic Diagnostics: from chromosomal aberrations to gene mutations</th>
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<tr>
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<td>Zuständige Personen</td>
<td>Owczarek-Lipska, Marta (Prüfungsberechtigt)</td>
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<tr>
<td>Skills to be acquired in this module</td>
<td>++ ability to perform independent biological research</td>
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<tr>
<td></td>
<td>+ data presentation and discussion (written and spoken)</td>
</tr>
<tr>
<td></td>
<td>+ teamwork</td>
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<td></td>
<td>+ project and time management</td>
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</table>

To expand the knowledge about classical cytogenetics and molecular genetics as well as modern cyto- and molecular genetics techniques applied in clinical diagnostics and research.

**Module contents**

Emphasis 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**

- Chromosomen: Klassische und molekulare Cytogenetik. Springer-Lehrbuch, W. Traut, EAN: 9783540533191
- Klassische und molekulare Genetik, C. Bresch, R. Hausmann, EAN: 9783540058021
- Molekulare Biotechnologie. Konzepte und Methoden, M. Wink, EAN: 9783527309924
- Essentials of medical genomics. S. M. Brown, EAN: 9780471270614

**Links**

https://uol.de/genetik-gehirnfehlbildungen/forschungsschwerpunkte/

**Language of instruction**

English

**Duration (semesters)**

1 Semester

**Module frequency**

Second half of the winter semester; annually

**Module capacity**

15

**Modulart / typ of module**

M (Mastermodul / Master module)

**Lehr-/Lernform / Teaching/Learning method**

Wahlpflicht / Elective

**Vorkenntnisse / Previous knowledge**

basic knowledge of genetics and cell biology

**Examination**

Prüfungszeiten

**Type of examination**

written examination (90 min., 70%), presentation (30%)
additionally ungraded: signed lab protocols
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<th>Workload of compulsory attendance</th>
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<td>Seminar</td>
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<td><strong>Präsenzzeit Modul insgesamt</strong></td>
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</table>
gsw090 - Current Topics in Clinical Research

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Verwendbarkeit des Moduls
- Master's Programme Molecular Biomedicine (Master) > Clinical Modules

Zuständige Personen
- Heep, Axel (Prüfungsberechtigt)
- Dörner, Patrick (Prüfungsberechtigt)
- Heinen, Christian (Prüfungsberechtigt)
- Pötsch, Torsten (Prüfungsberechtigt)
- Loser, Karin (Prüfungsberechtigt)
- Hinz, Cornelia (Prüfungsberechtigt)
- Dübbel, Lena (Prüfungsberechtigt)
- Hamprecht, Axel (Prüfungsberechtigt)
- Noster, Janina (Prüfungsberechtigt)

Prerequisites
- as defined in the admission and examination regulations

Skills to be acquired in this module
- ++ deepened clinical expertise
- ++ deepened knowledge of biological working methods and clinical diagnostics
- + data analysis skills
- ++ interdisciplinary thinking,
- ++ critical and analytical thinking,
- + independent searching and knowledge of scientific literature
- + ethics and professional behavior

Module contents

**Emphasis on foetal and early postnatal life, n.n.**

The module will focus on molecular aspects as part of current clinical research in different fields, e.g.:

Molecular insights in the functional brain development, Neural cell migration, synaptogenesis and the development of the connectome are principle mechanisms during foetal and early postnatal life. The goal will be to learn about methods we are using to study molecular intercellular signalling (Nano vesicles, signalling molecules) and about non-invasive methods to study functional brain development (blood oxygenation level dependent response / BOLD / neonatal functional MRI)

Literatureempfehlungen
- Current literature on topics will be provided via Stud.IP

Links
- Language of instruction: English
- Duration (semesters): 1 Semester
- Module frequency: First half of the winter semester, annually
- Module capacity: 25
- Modulelevel / module level: MM (Mastermodul / Master module)
- Modular / typ of module: Wahlpflicht / Elective
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<td>Prüfungszeiten</td>
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<td>Type of examination</td>
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<td>Workload Präsenzzzeit</td>
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gsw100 - Immunology and Inflammation

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<td>Zuständige Personen</td>
<td>Gibbs, Bernhard (Prüfungsberechtigt)</td>
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<td></td>
<td>Raap, Ulrike (Prüfungsberechtigt)</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>as defined in the admission and examination regulations</td>
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</table>

Skills to be acquired in this module

++ 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

Module contents

**Emphasis on dermatology, immunology, 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)

Literaturverzeichnis

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)


Links

https://uol.de/dermatologie/forschung/

Language of instruction

English

Duration (semesters)

1 Semester

Module frequency

First half of the winter semester, annually

Module capacity

25

Module level / module level

MM (Mastermodul / Master module)

Modalart / typ of module

Wahlpflicht / Elective

Lehr-/Lernform / Teaching/Learning
### Vorkenntnisse / Previous knowledge

- basic knowledge in immunology

### Examination

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<th>Workload of compulsory attendance</th>
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<td>WiSe</td>
<td>21</td>
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**Präsenzzeit Modul insgesamt** 56 h

written examination (60 min, 60%), coursework (short review in English in the style "News and Views" article, 40%), additionally (ungraded): formative feedback given for presentations
gsw110 - Clinical Aspects of Degenerative Diseases

<table>
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<tr>
<td>Verwendbarkeit des Moduls</td>
<td>Master's Programme Molecular Biomedicine (Master) &gt; Clinical Modules</td>
</tr>
</tbody>
</table>

Zuständige Personen

- Zieschang, Tania (Prüfungsberechtigt)
- Dewald, Oliver (Prüfungsberechtigt)
- Koschate, Jessica (Prüfungsberechtigt)
- Eichstaedt, Harald (Prüfungsberechtigt)
- Meier, Fritz (Prüfungsberechtigt)
- Ort, Katharina (Prüfungsberechtigt)
- Sahlmann, Bianca (Prüfungsberechtigt)
- Sander-Sandersfeld, Carina (Prüfungsberechtigt)
- Lau, Sandra (Prüfungsberechtigt)
- Hackbarth, Michel (Prüfungsberechtigt)
- Brümleve, Nils (Prüfungsberechtigt)

Prerequisites

as defined in the admission and examination regulations

Skills to be acquired in this module

++ 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

Module contents

Emphasis on geriatric medicine

Lectures: 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

Seminars: 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

Language of instruction
English

Duration (semesters)
1 Semester

Module frequency
First half of the winter semester, annually

Module capacity
20

Module level / module level
MM (Mastermodul / Master module)

Module art / typ of module
Wahlpflicht / Elective

Lehr-/Lernform / Teaching/Learning method

Vorkenntnisse / Previous knowledge
Physiology and cardiovascular system

Examination
Prüfungszeiten
written examination (60 min, 70%), case presentation (30%)

Form of teaching
Comment
SWS
Frequency
Workload of compulsory attendance

Lecture
1.5
WiSe
21

Seminar
1.5
WiSe
21

Study trip
1
WiSe
14

Präsenzzzeit Modul insgesamt
56 h
Module label: Tumor Biology

Module kürzel: gsw120

Credit points: 6.0 KP

Workload: 180 h

Verwendbarkeit des Moduls: Master's Programme Molecular Biomedicine (Master) > Clinical Modules

Zuständige Personen:
- Roeper, Julia (Prüfungsberechtigt)
- Griesinger, Frank (Prüfungsberechtigt)

Prerequisites: as defined in the admission and examination regulations

Skills to be acquired in this module:
- deepened biological expertise
- deepened knowledge of biological working methods and clinical diagnostics
- data analysis skills
- usage of databases and computational tools
- 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

Module contents:

Emphasis on oncology

Vorlesung: große Tumorentitäten, Strategien der Therapie, Grundlagen der Karzinogenese und therapeutische Umsetzung.

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)

Note: The lectures are part of the study program Human Medicine and will be held in German.

Literaturempfehlungen:


Current literature will be uploaded on Stud.IP

Languages of instruction: English, German
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<tr>
<td><strong>Module frequency</strong></td>
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<tr>
<th><strong>Vorkenntnisse / Previous knowledge</strong></th>
<th>Basic knowledge of genetics and cell-biology</th>
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<th><strong>Type of examination</strong></th>
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<tbody>
<tr>
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<td>written examination (45 min., 75%), presentation (25%)</td>
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<th><strong>Frequency</strong></th>
<th><strong>Workload of compulsory attendance</strong></th>
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<tr>
<th><strong>Präsenzzeit Modul insgesamt</strong></th>
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### gsw130 - Regenerative Medicine in Ophthalmology

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>Modulkürzel</td>
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<tr>
<td>Credit points</td>
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<tr>
<td>Workload</td>
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<tr>
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<td>Mertsch, Sonja (Prüfungsberechtigt)</td>
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<td>Prerequisites</td>
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<tr>
<td>Skills to be acquired in this module</td>
<td>++ comprehensive understanding of the fundamentals of regenerative ophthalmology research  &lt;br&gt;++ Deepened knowledge of clinical aspects of eye diseases  &lt;br&gt;++ deepened knowledge of biological working methods and clinical diagnostics (classical tissue engineering, cell culture and molecular laboratory methods)  &lt;br&gt;++ Systematic understanding in translational research  &lt;br&gt;+ Interdisciplinary thinking  &lt;br&gt;++ Critical and analytical thinking  &lt;br&gt;+ data analysis and interpretation skills  &lt;br&gt;+ data presentation and discussion (written and spoken)  &lt;br&gt;+ teamwork  &lt;br&gt;+ time management</td>
</tr>
</tbody>
</table>

### Module contents

**Emphasis on Regenerative Medicine in Ophthalmology**

- Lectures: Fundamentals of ophthalmologic diseases and insights of current ophthalmologic research projects including tissue engineering methods
- 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, PCR, Paraffin sectioning, HE-staining

### Literatureempfehlungen

Textbooks of ophthalmology, anatomy, current literature concerning tissue engineering methods in ophthalmology. Primary and secondary literature of the field will be provided and introduced at the first meeting

### Links

<table>
<thead>
<tr>
<th>Language of instruction</th>
<th>English</th>
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<tbody>
<tr>
<td>Duration (semesters)</td>
<td>1 Semester</td>
</tr>
<tr>
<td>Module frequency</td>
<td>winter semester, annually</td>
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<tr>
<td>Module capacity</td>
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<td>MM (Mastermodul / Master module)</td>
</tr>
<tr>
<td>Modulart / typ of module</td>
<td>Wahlpflicht / Elective</td>
</tr>
</tbody>
</table>

### Vorkenntnisse / Previous knowledge

basic knowledge of cell culture methods, protein and mRNA isolation methods

### Examination

<table>
<thead>
<tr>
<th>Type of examination</th>
<th>Prüfungszeiten</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final exam of module</td>
<td>portfolio: short written lab report (max. 8 pages) and presentation (20 min.) of recent research papers</td>
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</table>

### Workload of compulsory attendance

<table>
<thead>
<tr>
<th>Form of teaching</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
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<td>SWS</td>
<td>Frequency</td>
<td>Workload of compulsory attendance</td>
</tr>
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</tr>
<tr>
<td>Präsenzzeit Modul insgesamt</td>
<td></td>
<td></td>
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<td>56 h</td>
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Research Modules

gsw150 - Research Project Molecular Biomedicine

<table>
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<th>Module label</th>
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</thead>
<tbody>
<tr>
<td>Modulkürzel</td>
<td>gsw150</td>
</tr>
<tr>
<td>Credit points</td>
<td>15.0 KP</td>
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<tr>
<td>Workload</td>
<td>450 h</td>
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</table>

Verwendbarkeit des Moduls
- Master's Programme Molecular Biomedicine (Master) > Research Modules

Zuständige Personen
- Koch, Karl-Wilhelm (Module responsibility)

Further responsible persons
- all teachers of the curriculum

Prerequisites
- as defined in the admission and examination regulations

Skills to be acquired in this module
- 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

Module contents

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/humangenetik/research-and-clinical-collaborations/
- https://uol.de/genetik-gehirnfelbilden/forschungsschwerpunkte/
- https://uol.de/augenheilkunde/forschungsschwerpunkte

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

<table>
<thead>
<tr>
<th>Links</th>
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<tbody>
<tr>
<td>Language of instruction</td>
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<tr>
<td>Duration (semesters)</td>
</tr>
<tr>
<td>Module frequency</td>
</tr>
<tr>
<td>Module capacity</td>
</tr>
<tr>
<td>Module level / module level</td>
</tr>
<tr>
<td>Module Art / typ of module</td>
</tr>
</tbody>
</table>

| Language of instruction                                              | English                           |
| Duration (semesters)                                                 | 1 Semester                        |
| Module frequency                                                      | every semester, time is flexible and subject to individual arrangement |
| Module capacity                                                       | unlimited                         |
| Module level / module level                                          | MM (Mastermodul / Master module)  |
| Module Art / typ of module                                           | Wahlpflicht / Elective            |

| Previous knowledge                                                   | Basic knowledge of Cell Biology, Genetics, Biochemistry or Clinical Biomedicine |

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<th>Prüfungszeiten</th>
<th>Type of examination</th>
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<td>signed project report</td>
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<td></td>
<td>additionally (ungraded): participation in seminar and 30 min. presentation during the semester on a topic depending on the chosen option</td>
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<thead>
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<tr>
<td>Project (Individuelles</td>
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<td>Sose oder WiSe</td>
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<tr>
<td>Forschungsprojekt)</td>
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| Präsenzzeit Modul insgesamt | 140 h   |
**gsw160 - External Research Project Molecular Biomedicine**

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<td>Master's Programme Molecular Biomedicine (Master) &gt; Research Modules</td>
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<tr>
<td>Zuständige Personen</td>
<td>Koch, Karl-Wilhelm (Module responsibility)</td>
</tr>
<tr>
<td>Further responsible persons</td>
<td>all teachers of the curriculum</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>as defined in the admission and examination regulations</td>
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</table>
| Skills to be acquired in this module | **++ 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 |
| Module contents | **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 | **Language of instruction** | English |
|      | **Duration (semesters)** | 1 Semester |
|      | **Module frequency** | every semester, time is flexible and subject to individual arrangement |
|      | **Module capacity** | unlimited |
|      | **Modullevel / module level** | MM (Mastermodul / Master module) |
|      | **Modulart / typ of module** | Wahlpflicht / Elective |
|      | **Lehr-/Lernform / Teaching/Learning method** |  |
|      | **Vorkenntnisse / Previous knowledge** | Basic knowledge of Cell Biology, Genetics, Biochemistry or Clinical Biomedicine |
|      | **Examination** | Prüfungszeiten |
|      | **Type of examination** | signed project report  
Additionally (ungraded): participation in seminar and 30 min. presentation during the semester on a topic depending on the chosen option |
<p>|      | <strong>Form of teaching</strong> |  |
|      | <strong>Comment</strong> |  |
|      | <strong>SWS</strong> |  |
|      | <strong>Frequency</strong> |  |
|      | <strong>Workload of compulsory attendance</strong> |  |</p>
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<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<tbody>
<tr>
<td>Seminar</td>
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<td>Sose oder WiSe</td>
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</tr>
<tr>
<td>Project (Individuelles</td>
<td>Forschungsprojekt)</td>
<td>9.5</td>
<td>Sose oder WiSe</td>
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</tr>
<tr>
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<td></td>
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Skills Modules

**gsw170 - Research Techniques Molecular Biomedicine**

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<td>Zuständige Personen</td>
<td>Hartmann, Anna-Maria (Prüfungsberechtigt)</td>
</tr>
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<td>Prerequisites</td>
<td>as defined in the admission and examination regulations</td>
</tr>
</tbody>
</table>

**Skills to be acquired in this module**

++ 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 neuroscience

**Module contents**

**Emphasis on Competence in Research Methods**

Seminar Topics:  
1. Hybridization and Detection of Nucleic Acid  
2. Polymerase Chain Reaction  
3. Nucleic acid sequencing  
4. analyses of epigenetic modifications  
5. protein-Nucleic Acid Interaction  
6. Immunological Techniques  
7. Light Microscopy Techniques  
8. Mass Spectrometry Analyses  
9. Protein-Protein Interactions  
10. Fluorescence in situ Hybridization  

Practical course: molecular biological techniques (PCR, Agarose gel, plasmid preparation, restriction), immunological methods (cell culturing, cytochemistry), biochemistry techniques (SDS gel, western blotting, protein purification, photometry)

**Literaturempfehlungen**


**Links**

Language of instruction: English  
Duration (semesters): 1 Semester  
Module frequency: Second half of the winter semester; annually  
Module capacity: 25  
Modullevel / module level: MM (Mastermodul / Master module)  
Modultyp / typ of module: Wahlpflicht / Elective

**Vorkenntnisse / Previous knowledge**

**Examination**

Prüfungszeiten: 20 min. presentation (talk about one seminar topic)
<table>
<thead>
<tr>
<th>Form of teaching</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<td>WiSe</td>
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**gsw180 - Ethics in Medicine**

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<td>Credit points</td>
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<tr>
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<tr>
<td>Zuständige Personen</td>
<td>Schweda, Mark (Prüfungsberechtigt)</td>
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<td>Prerequisites</td>
<td>as defined in the admission and examination regulations</td>
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</tbody>
</table>
| Skills to be acquired in this module | ++ 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 |

**Module contents**

- 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)
- Central research ethical concepts (informed consent, risk assessment, confidentiality, data protection)

**Literaturempfehlungen**


**Links**

https://uol.de/medizinethik/

**Language of instruction**

English

**Duration (semesters)**

1 Semester

**Module frequency**

Second half of the winter semester; annually

**Module capacity**

25

**Modullevel / module level**

MM (Mastermodul / Master module)

**Modulart / typ of module**

Wahlpflicht / Elective

**Lehr-/Lernform / Teaching/Learning method**

Vorkenntnisse / Previous knowledge

<table>
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<th>Type of examination</th>
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<tbody>
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</table>

**Form of teaching**

Lecture

**SWS**

2

**Frequency**

WiSe
| Workload Präsenzzeit | 28 h |
gsw190 - Journal Club

Module label: Journal Club
Modulkürzel: gsw190
Credit points: 3.0 KP
Workload: 90 h

Verwendbarkeit des Moduls: Master's Programme Molecular Biomedicine (Master) > Skills Modules

Zuständige Personen:
- Mertsch, Sonja (Module responsibility)
- Koch, Karl-Wilhelm (Prüfungsberechtigt)

Further responsible persons: all teachers of the curriculum

Prerequisites: as defined in the admission and examination board

Skills to be acquired in this module:
- ++ 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)

Module contents:

Emphasis on current topics in molecular cell biology and biomedicine

Original literature of molecular life science related to health and disease

Specific literature of the topics indicated above; original papers related to the current research question; will be different for every student and every year. Textbooks of Cell Biology, Biochemistry, Genetics: Alberts et al. Molecular Biology of the Cell (5th Edition or later); Stryer Biochemistry (7th Edition or later); Lehninger Biochemistry (4th Edition or later). These textbooks are updated almost every 3 or 4 years.

Links:
Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: recommended in semester 3, time is flexible and subject to individual arrangement
Module capacity: unlimited
Modullevel / module level: MM (Mastermodul / Master module)
Modulart / typ of module: Wahlpflicht / Elective

Lehr-/Lernform / Teaching/Learning method:

Vorkenntnisse / Previous knowledge: Basic knowledge of Cell Biology, Genetics, Biochemistry
Examination: Prüfungszeiten
Type of examination: Portfolio; Presentation of journal articles, 2 presentations à 20 min.

Form of teaching: Seminar

SWS: 2
<table>
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<tr>
<th>Frequency</th>
<th>Sose oder WiSe</th>
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<tbody>
<tr>
<td>Workload Präsenzzeit</td>
<td>28 h</td>
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</table>
gsw200 - Microscopic Imaging in Biomedical Sciences

Module label: Microscopic Imaging in Biomedical Sciences
Module code: gsw200
Credit points: 3.0 KP
Workload: 90 h

Verwendbarkeit des Moduls: Master's Programme Molecular Biomedicine (Master) > Skills Modules

Zuständige Personen:
- Dedek, Karin (Prüfungsberechtigt)
- Groß, Petra (Prüfungsberechtigt)

Prerequisites:
as defined in the admission and examination regulations

Skills to be acquired in this module:
- 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

Module contents:

**Emphasis on Microscopy, Imaging, Methods of Microscopy**

Lectures: 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.

Literaturempfehlungen: Literature will be provided during the lecture/seminar

Links:
- Language of instruction: English
- Duration (semesters): 1 Semester
- Module frequency: afternoon event during winter semester
- Module capacity: 16 (Selection criteria: attendance at first meeting)

Modullevel / module level: MM (Mastermodul / Master module)
Modulart / typ of module: Wahlpflicht / Elective

Lehr-/Lernform / Teaching/Learning method:

Vorkenntnisse / Previous knowledge: Basic physics, basic cell biology

Examination:
- Prüfungszeiten
- Type of examination

Final exam of module:
Journal presentation (40%), written examination (60%)

41 / 49
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<th>Examination</th>
<th>Prüfungszeiten</th>
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<tr>
<td>Type of examination</td>
<td>min., 60%</td>
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</table>

Note: to qualify for the exam, regular participation during the semester is mandatory, no more than 2 days of absence

<table>
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<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<td>WiSe</td>
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<td>WiSe</td>
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**Präsenzzeit Modul insgesamt**

28 h
neu751 - Laboratory Animal Science

Module label: Laboratory Animal Science
Modulkürzel: neu751
Credit points: 3.0 KP

Workload: 90 h
  - one 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's Programme Biology (Master) > Skills Modules
- Master's Programme Molecular Biomedicine (Master) > Skills Modules
- Master's Programme Neuroscience (Master) > Skills Modules

Zuständige Personen

- Köppl, Christine (Module responsibility)
- Köppl, Christine (Prüfungsberechtigt)
- Langemann, Ulrike (Prüfungsberechtigt)
- Nolte, Arne (Prüfungsberechtigt)
- Heyers, Dominik (Prüfungsberechtigt)
- Ebbers, Lena (Prüfungsberechtigt)
- Dedek, Karin (Prüfungsberechtigt)

Prerequisites: none

Skills to be acquired in this module

++ Expt. Methods
+ Independent Research
+ Scient. Literature
++ Social skills
++ Interdiscipl. knowlg
++ 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“.

Module contents

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

<table>
<thead>
<tr>
<th>Literatureempfehlungen</th>
<th>&quot;LAS interactive&quot; internet-based learning platform</th>
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<td>Duration (semesters)</td>
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<tr>
<td>Examination</td>
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| Präsenzzeit Modul insgesamt | 28 h |

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|     |           |                                   |
|     |           |                                   |
neu760 - Scientific English

Module label: Scientific English

Modulkürzel: neu760

Credit points: 6.0 KP

Workload:
- 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's Programme Biology (Master) > Skills Modules
- Master's Programme Molecular Biomedicine (Master) > Skills Modules
- Master's Programme Neuroscience (Master) > Skills Modules

Zuständige Personen:
- Köppl, Christine (Module responsibility)
- Hildebrandt, Jannis (Prüfungsberechtigt)
- Köppl, Christine (Prüfungsberechtigt)

Prerequisites:
- non-native speakers

Skills to be acquired in this module:
- + 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.

Module contents:
- 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.

Literaturempfehlungen:

Links:

Language of instruction: English

Duration (semesters): 1 Semester

Module frequency: annually, semester break

Module capacity: 12

Reference text:
- 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 / module level:
- je nach Studiengang Pflicht oder Wahlpflicht

Lehr-/Lernform / Teaching/Learning method:
- minimum English level B2 (C1 preferred) according to Common European Framework of Reference for Languages (CEFR)
- priority to non-native speakers, higher semester
### Examination

<table>
<thead>
<tr>
<th>Examination</th>
<th>Prüfungszeiten</th>
<th>Type of examination</th>
</tr>
</thead>
</table>
| Final exam of module | within 2 months of completing the course | Portfolio: 70% several quick tests, texts, presentations, 30% term paper  
|                      |                                 | Bonus system for active participation                    |

<table>
<thead>
<tr>
<th>Form of teaching</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<td>Exercises</td>
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<td>WiSe</td>
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**Präsenzzeit Modul insgesamt**  
56 h
Masterabschlussmodul

mam - Master Thesis Module

<table>
<thead>
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<th>Modulkürzel</th>
<th>mam</th>
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<td>Modulkürzel</td>
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<td>Credit points</td>
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<td>Workload</td>
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<td>Further responsible persons</td>
<td>all teachers of the curriculum</td>
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<tr>
<td>Prerequisites</td>
<td>as defined in the admission and examination regulations</td>
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Skills to be acquired in this module

++ 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

Module contents

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/
- 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/humangenetik/research-and-clinical-collaborations/
- https://uol.de/genetik-gehirnfehlbildungen/forschungsschwerpunkte/

Literatureempfehlungen

Specific literature of the topics indicated above; original papers related to the current research question
<table>
<thead>
<tr>
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<tr>
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<td>Prüfungszeiten</td>
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<tr>
<td>Type of examination</td>
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<tr>
<td>Final exam of module</td>
<td>Master Thesis (90%), oral presentation (colloquium, 10%)</td>
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<tr>
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