# 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>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</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>
| Applicability of the module| 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 |
| Responsible persons        | Neidhardt, John (Module responsibility)  
Neidhardt, John (Authorized examiners)  
Koch, Karl-Wilhelm (Authorized examiners) |
| 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 |
| 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. |
| Reader's advisory          | 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              |
| Modulelevel / 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                | Time of examination                 |
| 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>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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</thead>
<tbody>
<tr>
<td>Lecture</td>
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<td>2</td>
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<tr>
<td>Seminar</td>
<td></td>
<td>1</td>
<td>WiSe</td>
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<tr>
<td>Exercises</td>
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</table>

**Total time of attendance for the module** 112 h
Biochemical concepts in signal transduction

Module code: bio695
Credit points: 12.0 KP
Workload: 360 h

Module label: Biochemical concepts in signal transduction

Module description:

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.

Reader's advisory:

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

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

Module frequency:

1 Semester

Module capacity:

20

Module level / module level:

MM (Mastermodul / Master module)

Module type / type of module:

Wahlpflicht / Elective

Vorkenntnisse / Previous knowledge:

Time of examination:

90 minutes written exam

Type of examination:

written examination (50%) protocols (50%)

Course type:

Lecture: 1 SWS
Seminar: 1 SWS
Exercises: 6 SWS

Frequency:

WiSe

Workload of compulsory attendance:

14

Total time of attendance for the module:

112 h
gsw010 - Molecular Physiology

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

Applicability of the module: Master's Programme Molecular Biomedicine (Master) > Background Modules

Responsible persons:
Milenkovic, Ivan (Module responsibility)
Milenkovic, Ivan (Authorized examiners)

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.

Reader's advisory:
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)
<table>
<thead>
<tr>
<th>Modulart / typ of module</th>
<th>Wahl / Elective</th>
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</thead>
<tbody>
<tr>
<td>Lehr-/Lernform / Teaching/Learning method</td>
<td></td>
</tr>
<tr>
<td>Vorkenntnisse / Previous knowledge</td>
<td>Basic knowledge in Physiology and cell biology</td>
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<tr>
<td>Examination</td>
<td>Time of examination</td>
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<tr>
<td>Final exam of module</td>
<td>Oral examination (20 min.)</td>
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<th>Workload of compulsory attendance</th>
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<td>Lecture</td>
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<td>2</td>
<td>WiSe</td>
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<tr>
<td>Practical training</td>
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<td>4</td>
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</table>

Total time of attendance for the module 56 h
**gs020 - Cellular and Subcellular Structures**

**Module label**  Cellular and Subcellular Structures  
**Module code**  gsw020  
**Credit points**  6.0 KP  
**Workload**  180 h  

**Applicability of the module**  
- Master's Programme Molecular Biomedicine (Master) > Background Modules

**Responsible persons**  
Bräuer, Anja (Module responsibility)  
Bräuer, Anja (Authorized examiners)

**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

**Reader's advisory**
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.
**Vorkenntnisse / Previous knowledge**

basic knowledge in biology, chemistry, mathematics

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<tr>
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<th>Time of examination</th>
<th>Type of examination</th>
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<tbody>
<tr>
<td>Final exam of module</td>
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<td>written examination (45 min.)</td>
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<td>SuSe</td>
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<tr>
<td>Exercises</td>
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<td>SuSe</td>
<td>28</td>
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</table>

**Total time of attendance for the module**

56 h
gsw030 - Biophysical Chemistry

Module label: Biophysical Chemistry
Module code: gsw030
Credit points: 6.0 KP
Workload: 180 h

Applicability of the module:
- Master's Programme Molecular Biomedicine (Master) > Background Modules

Responsible persons:
- Winklhofer, Michael (Module responsibility)
- Winklhofer, Michael (Authorized examiners)

Prerequisites:
as defined in the admission and examination regulations

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)

Reader's advisory:
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
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<th>Type of examination</th>
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<td>Final exam of module</td>
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<td>15 min. short tests (75%) before each seminar session + oral presentation (25%)</td>
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<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<td>SuSe</td>
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<tr>
<td>Seminar</td>
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<td>2</td>
<td>SuSe</td>
<td>28</td>
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**Total time of attendance for the module** 56 h
gsw040 - Molecular and Cellular Biology of Hearing and Deafness

Module label: Molecular and Cellular Biology of Hearing and Deafness
Module code: gsw040
Credit points: 12.0 KP
Workload: 360 h

Applicability of the module:
- Master's Programme Molecular Biomedicine (Master) > Background Modules

Responsible persons:
- Ebbers, Lena (Module responsibility)
- Ebbers, Lena (Authorized examiners)
- Claußen, Maike (Authorized examiners)

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

Reader's advisory:

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/
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<th>Language of instruction</th>
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<td>Duration (semesters)</td>
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<td>Module frequency</td>
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<td>Module capacity</td>
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<td>Module level / module level</td>
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<td>Moduleart / typ of module</td>
<td>Wahlpflicht / Elective</td>
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<td>Lehr-/Lernform / Teaching/Learning method</td>
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<td>Vorkenntnisse / Previous knowledge</td>
<td>basic knowledge in neurogenetics</td>
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<tr>
<td>Examination</td>
<td>Time of examination</td>
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<td>Final exam of module</td>
<td>presentation (50%), written report (50%)</td>
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<td>Lecture</td>
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<td>SuSe</td>
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<td>Seminar</td>
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<td>SuSe</td>
<td>28</td>
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<tr>
<td>Practical training</td>
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<td>70</td>
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Total time of attendance for the module 112 h
gsw050 - Current Topics of Genetics

Module label | Current Topics of Genetics
---|---
Module code | gsw050
Credit points | 6.0 KP
Workload | 180 h
Applicability of the module | Master's Programme Molecular Biomedicine (Master) > Background Modules
Responsible persons | Claußen, Maike (Authorized examiners)
| Ebbers, Lena (Authorized examiners)
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

Reader's advisory

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 |
### Vorkenntnisse / Previous knowledge
- basic knowledge in genetics

### Examination
- **Type of examination:**
  - Final exam of module: written examination (50%), portfolio (50% - concept paper and short presentation)

### Course type

<table>
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<td>SuSe</td>
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<tr>
<td>Seminar</td>
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| Total time of attendance for the module | 56 h |
neu141 - Visual Neuroscience - Physiology and Anatomy

**Module label**
Visual Neuroscience - Physiology and Anatomy

**Module code**
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

**Applicability of the module**
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Molecular Biomedicine (Master) > Background Modules
- Master's Programme Neuroscience (Master) > Background Modules

**Responsible persons**
- Greschner, Martin (Module responsibility)
- Greschner, Martin (Authorized examiners)
- Dedek, Karin (Authorized examiners)
- Janssen-Bienhold, Ulrike (Authorized examiners)
- Puller, Christian (Authorized examiners)

**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

**Reader's advisory**
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
<table>
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<tr>
<th>Duration (semesters)</th>
<th>1 Semester</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>Modullevel / module level</td>
<td>MM (Mastermodul / Master module)</td>
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<td>Modulart / typ of module</td>
<td>Wahlpflicht / Elective</td>
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<tr>
<td>Vorkenntnisse / Previous knowledge</td>
<td>Basic knowledge in neurobiology</td>
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<tr>
<td>Examination</td>
<td>Time of examination</td>
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<tr>
<td>Final exam of module</td>
<td>during the course (summer semester, first half) In addition, mandatory but ungraded: seminar presentation</td>
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<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<td>Lecture</td>
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<td>SoSe oder WiSe</td>
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<td>Seminar</td>
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<td>SoSe oder WiSe</td>
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<tr>
<td>Exercises</td>
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<td>2</td>
<td>SoSe oder WiSe</td>
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Total time of attendance for the module 84 h
neu150 - Visual Neuroscience - Anatomy

Module label: Visual Neuroscience - Anatomy
Module code: neu150
Credit points: 6.0 KP
Workload: 180 h

Applicability of the module:
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Molecular Biomedicine (Master) > Background Modules
- Master's Programme Neuroscience (Master) > Background Modules

Responsible persons:
- Janssen-Bienhold, Ulrike (Module responsibility)
- Dedek, Karin (Module counselling)
- Janssen-Bienhold, Ulrike (Authorized examiners)
- Dedek, Karin (Authorized examiners)

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.

Reader's advisory:
- 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
- Modulelevel / module level: BC (Basiscurriculum / Base curriculum)
- Modulart / typ of module: je nach Studiengang Pflicht oder Wahlpflicht

Vorkenntnisse / Previous knowledge:
- Examination:
  - Time of examination: summer semester, first half
  - Type of examination: Portfolio (75 %), report (25%)

Course type | Comment | SWS | Frequency | Workload of compulsory attendance |
---|---|---|---|---|
Lecture | | 1 | SuSe | 14 |
Seminar | | 1 | SuSe | 14 |
Practical training | | 3 | SuSe | 42 |

Total time of attendance for the module: 70 h
Clinical Modules

gsw070 - Gene-based Therapies in Human diseases

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<th>Gene-based Therapies in Human diseases</th>
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<tr>
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<td>Applicability of the module</td>
<td>Master's Programme Molecular Biomedicine (Master) &gt; Clinical Modules</td>
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<tr>
<td>Responsible persons</td>
<td>Neidhardt, John (Module responsibility)</td>
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<td>Neidhardt, John (Authorized examiners)</td>
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<td>Jüschke, Christoph (Authorized examiners)</td>
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<td>Prerequisites</td>
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<td>Skills to be acquired in this module</td>
<td>++ deepened biological expertise</td>
</tr>
<tr>
<td></td>
<td>++ deepened clinical expertise,</td>
</tr>
<tr>
<td></td>
<td>++ deepened knowledge of biological working methods</td>
</tr>
<tr>
<td></td>
<td>+ deepened knowledge of clinical diagnostics,</td>
</tr>
<tr>
<td></td>
<td>+ data analysis skills</td>
</tr>
<tr>
<td></td>
<td>+ interdisciplinary thinking,</td>
</tr>
<tr>
<td></td>
<td>++ critical and analytical thinking,</td>
</tr>
<tr>
<td></td>
<td>+ independent searching and knowledge of scientific literature</td>
</tr>
<tr>
<td></td>
<td>++ ability to perform independent biological research</td>
</tr>
<tr>
<td></td>
<td>+ data presentation and discussion (written and spoken)</td>
</tr>
<tr>
<td></td>
<td>+ team work</td>
</tr>
<tr>
<td></td>
<td>+ project and time management</td>
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</tbody>
</table>

Addressing 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.

Reader's advisory | Molecular Biology of the Cell (Alberts et al., 6th edition) |
Links | https://uol.de/humangenetik/research-and-clinical-collaborations/ |
<table>
<thead>
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<th><strong>Language of instruction</strong></th>
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<td>Basic knowledge of Cell Biology, Genetics</td>
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<td><strong>Total time of attendance for the module</strong></td>
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### gsw080 - Genetic Diagnostics: from chromosomal aberrations to gene mutations

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<tr>
<td>Responsible persons</td>
<td>Owczarek-Lipska, Marta (Module responsibility)</td>
</tr>
<tr>
<td></td>
<td>Owczarek-Lipska, Marta (Authorized examiners)</td>
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<td>+ data presentation and discussion (written and spoken)</td>
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<td>+ team work</td>
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<td>+ project and time management</td>
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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

### Reader's advisory

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-gehirnfelbildungen/forschungsschwerpunkte/

### Language of instruction

English

### Duration (semesters)

1 Semester

### Module frequency

Second half of the winter semester; annually

### Module capacity

15

### Modullevel / module level

MM (Mastermodul / Master module)

### Modulart / typ of module

Wahlpflicht / Elective

### Vorkenntnisse / Previous knowledge

basic knowledge of genetics and cell biology

### Examination

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### Final exam of module
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**Total time of attendance for the module** 56 h
**gswo90 - Current Topics in Clinical Research**

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<td>Responsible persons</td>
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<tr>
<td>Dömer, Patrick (Module responsibility)</td>
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<tr>
<td>Dömer, Patrick (Authorized examiners)</td>
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<tr>
<td>Heep, Axel (Authorized examiners)</td>
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<td>Heinen, Christian (Authorized examiners)</td>
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<td>Plösch, Torsten (Authorized examiners)</td>
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<td>Loser, Karin (Authorized examiners)</td>
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<td>Hinz, Cornelia (Authorized examiners)</td>
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<td>Dübbel, Lena (Authorized examiners)</td>
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<td>Hamprecht, Axel (Authorized examiners)</td>
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<td>Noster, Janina (Authorized examiners)</td>
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<td>++ deepened clinical expertise</td>
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<td>++ deepened knowledge of biological working methods and clinical diagnostics</td>
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<td>+ data analysis skills</td>
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<tr>
<td>++ interdisciplinary thinking,</td>
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<td>++ critical and analytical thinking,</td>
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<tr>
<td>+ independent searching and knowledge of scientific literature</td>
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<tr>
<td>+ ethics and professional behavior</td>
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</table>

**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)

**Reader's advisory**

Current literature on topics will be provided via Stud.IP

**Links**

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<td>Module capacity</td>
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<td>Examination</td>
<td>Time of examination</td>
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<td>written examination (90 min.)</td>
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## gsw100 - Immunology and Inflammation

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### Applicability of the module
- Master's Programme Molecular Biomedicine (Master) > Clinical Modules

### Responsible persons
- Gibbs, Bernhard (Authorized examiners)
- Raap, Ulrike (Authorized examiners)
- Raap, Ulrike (Module responsibility)

### Prerequisites
As defined in the admission and examination regulations

### 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-oriented learning)

### Reader's advisory

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/](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

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

### Modular / typ of module
- Wahlpflicht / Elective
<table>
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<tr>
<td></td>
<td>basic knowledge in immunology</td>
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<td></td>
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<td>Type of examination</td>
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<td>Final exam of module</td>
<td></td>
<td>written examination (60 min, 60%), coursework</td>
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<tr>
<td></td>
<td></td>
<td>(short review in English in the style &quot;News and</td>
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<td>Views&quot; article, 40%)</td>
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<td></td>
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<td>additionally (ungraded): formative feedback given</td>
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**Total time of attendance for the module**: 56 h
### gsw110 - Clinical Aspects of Degenerative Diseases

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<td>Zieschang, Tania (Module responsibility)</td>
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<td>Dewald, Oliver (Module responsibility)</td>
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<td>Koschate, Jessica (Authorized examiners)</td>
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<td>Sahlmann, Bianca (Authorized examiners)</td>
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<td>Sander-Sandersfeld, Carina (Authorized examiners)</td>
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<td>Lau, Sandra (Authorized examiners)</td>
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<tr>
<td>Hackbarth, Michel (Authorized examiners)</td>
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<tr>
<td>Brümleve, Nils (Authorized examiners)</td>
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| 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

Reader's advisory

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. Ziener, Haverich: Herzchirurgie

Scientific papers related to current research topics will be available in Stud.IP

Links

https://www.aortenklappenregister.de/publikationen-des-registers.html

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Total time of attendance for the module 56 h
gsw120 - Tumor Biology

Module label: Tumor Biology
Module code: gsw120
Credit points: 6.0 KP
Workload: 180 h

Applicability of the module: Master's Programme Molecular Biomedicine (Master) > Clinical Modules

Responsible persons:
- Griesinger, Frank (Module responsibility)
- Griesinger, Frank (Authorized examiners)
- Roeper, Julia (Authorized examiners)

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.

Reader's advisory:


Current literature will be uploaded on Stud.IP

Links
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<tr>
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<td>Basic knowledge of genetics and cell-biology</td>
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**Module label**: Regenerative Medicine in Ophthalmology  

**Module code**: gsW130  

**Credit points**: 6.0 KP  

**Workload**: 180 h  

**Applicability of the module**  
- Master's Programme Molecular Biomedicine (Master) > Clinical Modules  

**Responsible persons**  
- Mertsch, Sonja (Module responsibility)  
- Mertsch, Sonja (Authorized examiners)  

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

**Skills to be acquired in this module**  
- ++ comprehensive understanding of the fundamentals of regenerative ophthalmology research  
- ++ Deepened knowledge of clinical aspects of eye diseases  
- ++ deepened knowledge of biological working 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  

**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  

**Reader's advisory**  
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**  

**Language of instruction**: English  

**Duration (semesters)**: 1 Semester  

**Module frequency**: winter semester, annually  

**Module capacity**: 5  

**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 culture methods, protein and mRNA isolation methods  

**Examination**  

**Time of examination**:  

**Type of examination**: Final exam of module portfolio: short written lab report (max. 8 pages) and presentation (20 min.) of recent research papers  

**Course type**: Lecture  

**Comment**:  

<table>
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<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<tr>
<td>Exercises</td>
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</table>

**Total time of attendance for the module**

56 h
Research Modules

gsw150 - Research Project Molecular Biomedicine

<table>
<thead>
<tr>
<th>Module label</th>
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</thead>
<tbody>
<tr>
<td>Module code</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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Applicability of the module
- Master's Programme Molecular Biomedicine (Master) > Research Modules

Responsible persons
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/
  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/
  o https://uol.de/genetik-gehirnfehlbildungen/forschungsschwerpunkte/
  https://uol.de/augeheilkunde/forschungsschwerpunkte

Reader's advisory
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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<td>Module frequency</td>
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<td>Module capacity</td>
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<td>Module level / module level</td>
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<td>Module type / typ of module</td>
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<tr>
<td>Vorkenntnisse / Previous knowledge</td>
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<tr>
<td>Course type</td>
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<tr>
<td>Comment</td>
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<tr>
<td>Seminar</td>
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<tr>
<td>Project (Individuelles Forschungsprojekt)</td>
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<tr>
<td>Total time of attendance for the module</td>
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</tbody>
</table>
gsw160 - External Research Project Molecular Biomedicine

Module label: External Research Project Molecular Biomedicine
Module code: gsw160
Credit points: 15.0 KP
Workload: 450 h

Applicability of the module: Master's Programme Molecular Biomedicine (Master) > Research Modules

Responsible persons: 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).

Reader's advisory: 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

Vorkenntnisse / Previous knowledge: Basic knowledge of Cell Biology, Genetics, Biochemistry or Clinical Biomedicine

Examination: Time of examination
Type of examination: signed project report (participation in seminar and) 30 min. presentation during the semester on a topic depending on the chosen option

Course type: Comment: SWS Frequency Workload of compulsory attendance

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
<table>
<thead>
<tr>
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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<tr>
<td>Seminar</td>
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<td>2</td>
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<td>28</td>
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<tr>
<td>Project (Individuelles Forschungsprojekt)</td>
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<td>8</td>
<td>SoSe oder WiSe</td>
<td>112</td>
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**Total time of attendance for the module** 140 h
Skills Modules

gsw170 - Research Techniques Molecular Biomedicine

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<th>Module label</th>
<th>Research Techniques Molecular Biomedicine</th>
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<tr>
<td>Credit points</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
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<td>Applicability of the module</td>
<td>Master's Programme Molecular Biomedicine (Master) &gt; Skills Modules</td>
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<tr>
<td>Responsible persons</td>
<td>Hartmann, Anna-Maria (Module responsibility)</td>
</tr>
<tr>
<td></td>
<td>Hartmann, Anna-Maria (Authorized examiners)</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>as defined in the admission and examination regulations</td>
</tr>
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</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**


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)

Reader's advisory


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)

Modulart / typ of module

Wahlpflicht / Elective

Lehr-/Lernform / Teaching/Learning method

Vorkenntnisse / Previous knowledge

Examination

Time of examination

Type of examination

Final exam of module

20 min. presentation (talk about one seminar topic)
<table>
<thead>
<tr>
<th>Course type</th>
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<th>SWS</th>
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<th>Workload of compulsory attendance</th>
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<tr>
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<tr>
<td>Practical training</td>
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**Total time of attendance for the module**  
56 h
### gsw180 - Ethics in Medicine

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<td>Workload</td>
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<td>Applicability of the module</td>
<td>Master's Programme Molecular Biomedicine (Master) &gt; Skills Modules</td>
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**Responsible persons**
- Schweda, Mark (Module responsibility)
- Schweda, Mark (Authorized examiners)

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

**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)

**Reader's advisory**

**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**

**Examination**
<table>
<thead>
<tr>
<th>Time of examination</th>
<th>Type of examination</th>
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<tbody>
<tr>
<td>Final exam of module</td>
<td>written examination (60 min.)</td>
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**Course type**
- Lecture

**SWS**
- 2
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<th>Frequency</th>
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<td>Workload attendance</td>
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gsw190 - Journal Club

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<td>Workload</td>
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Applicability of the module
- Master's Programme Molecular Biomedicine (Master) > Skills Modules

Responsible persons
- Mertsch, Sonja (Module responsibility)
- Koch, Karl-Wilhelm (Authorized examiners)
- Mertsch, Sonja (Authorized examiners)

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

Reader's advisory

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

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
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<tbody>
<tr>
<td>Final exam of module</td>
<td>Portfolio: Presentation of journal articles, 2 presentations à 20 min.</td>
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Course type: Seminar
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<tr>
<td><strong>SWS</strong></td>
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<tr>
<td><strong>Frequency</strong></td>
<td>SoSe oder WiSe</td>
</tr>
<tr>
<td><strong>Workload attendance</strong></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

Applicability of the module:
- Master's Programme Molecular Biomedicine (Master) > Skills Modules
- Master's Programme Neuroscience (Master) > Skills Modules

Responsible persons:
- Dedek, Karin (Module responsibility)
- Dedek, Karin (Authorized examiners)
- Groß, Petra (Authorized examiners)

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.

Reader's advisory:
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:
Time of examination
Type of examination

Final exam of module
### Examination

<table>
<thead>
<tr>
<th>Time of examination</th>
<th>Type of examination</th>
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<tr>
<td></td>
<td>Journal presentation (40%), written examination (60 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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<tr>
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<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>WiSe</td>
<td>28 h</td>
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**Total time of attendance for the module**

28 h
## neu751 - Laboratory Animal Science

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<tr>
<td>Workload</td>
<td>90 h</td>
</tr>
<tr>
<td></td>
<td>one week full-time in semester break + flexible time for studying and exam preparation</td>
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<tr>
<td></td>
<td>1 SWS Lecture</td>
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<tr>
<td></td>
<td>total workload 45h: 2h contact / 20h background reading / 23h exam preparation</td>
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<tr>
<td></td>
<td>1 SWS Supervised exercise</td>
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<td>total workload 45h: 35h contact / 10h background reading</td>
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### Applicability of the module
- Master's Programme Biology (Master) > Skills Modules
- Master's Programme Molecular Biomedicine (Master) > Skills Modules
- Master's Programme Neuroscience (Master) > Skills Modules

### Responsible persons
- Köppl, Christine (Module responsibility)
- Köppl, Christine (Authorized examiners)
- Langemann, Ulrike (Authorized examiners)
- Notte, Arne (Authorized examiners)
- Heyers, Dominik (Authorized examiners)
- Ebbers, Lena (Authorized examiners)
- Dedek, Karin (Authorized examiners)

### Prerequisites
- none

### Skills to be acquired in this module
- ++ Expt. Methods
- + Independent Research
- + Scien. 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

Reader's advisory

“LAS interactive” internet-based learning platform

Links

Language of instruction

English

Duration (semesters)

1 Semester

Module frequency

semester break, every semester

Module capacity

10 (Registration procedure / selection criteria: StudIP, sequence of registration)

Modullevel / module level

je nach Studiengang Pflicht oder Wahlpflicht

Lehr-/Lernform / Teaching/Learning method

Previous knowledge

Examination

Time of examination

immediately before the practical part

Type of examination

written exam of 90 minutes

Final exam of module

immediately before the practical part

write exam of 90 minutes

Course type

Comment

SWS

Frequency

Workload of compulsory attendance

Lecture

1

SoSe und WiSe

14

Exercises

1

SoSe und WiSe

14

Total time of attendance for the module

28 h
### neu760 - Scientific English

<table>
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<tr>
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<th>Scientific English</th>
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<tr>
<td>Workload</td>
<td>180 h</td>
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<td>0.5 SWS Lecture (VO)</td>
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<tr>
<td></td>
<td>Total workload 23h: 8h contact / 15h research for term paper</td>
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<tr>
<td></td>
<td>3.5 SWS Supervised exercise (UE)</td>
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<tr>
<td></td>
<td>Total workload 158h: 46h contact / 46h preparation of texts and presentations / 66h term paper</td>
</tr>
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</table>

#### Applicability of the module
- Master's Programme Biology (Master) > Skills Modules
- Master's Programme Molecular Biomedicine (Master) > Skills Modules
- Master's Programme Neuroscience (Master) > Skills Modules

#### Responsible persons
- Köppl, Christine (Module responsibility)
- Hildebrandt, Jannis (Authorized examiners)
- Köppl, Christine (Authorized examiners)

#### 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.

#### Reader's advisory
http://users.wpi.edu/~nab/sci_eng/ScientificEnglish.pdf

#### 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.

#### Modular / module level
je nach Studiengang Pflicht oder Wahlpflicht

#### Lehr-/Lernform / Teaching/Learning method

#### Vorkenntnisse / Previous knowledge
minimum English level B2 (C1 preferred) according to Common European Framework of Reference for Languages (CEFR)
priority to non-native speakers, higher semester
<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</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>
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<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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**Total time of attendance for the module** 56 h
Masterabschlussmodul

mam - Master Thesis Module

Module label: Master Thesis Module
Module code: mam
Credit points: 30.0 KP
Workload: 900 h
(attendance in the lab meetings: 14 hours (1 SWS); theses work: 886 hours)

Applicability of the module
- Master's Programme Molecular Biomedicine (Master) > Masterabschlussmodul

Responsible persons
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

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/

Reader's advisory
Specific literature of the topics indicated above; original papers related to the current research question
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<td>recommended in semester 4, time is flexible and subject to individual arrangement</td>
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