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# Modules for Molecular Biomedicine

## Background Modules

### bio605 - Molecular Genetics and Cell Biology

<table>
<thead>
<tr>
<th><strong>Module label</strong></th>
<th>Molecular Genetics and Cell Biology</th>
</tr>
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<tbody>
<tr>
<td><strong>Module code</strong></td>
<td>bio605</td>
</tr>
<tr>
<td><strong>Credit points</strong></td>
<td>12.0 KP</td>
</tr>
</tbody>
</table>

**Workload**: 360 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**
- 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

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.

**Reader's advisory**
- Textbooks of Cell Biology

**Links**
- [http://www.uni-oldenburg.de/humangenetik/](http://www.uni-oldenburg.de/humangenetik/)

**Language of instruction**
- English

**Duration (semesters)**
- 1 Semester

**Module frequency**
- 15

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

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

**Vorkenntnisse / Previous knowledge**
- Zellbiologische Grundkenntnisse, Genetik, Biochemie

**Examination**
- **Time of examination**: 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>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>2</td>
<td>WiSe</td>
<td>28</td>
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<tr>
<td>Seminar</td>
<td></td>
<td>1</td>
<td>WiSe</td>
<td>14</td>
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<td>Exercises</td>
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<td>5</td>
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**Total time of attendance for the module** 112 h
### Bio695 - Biochemical concepts in signal transduction

<table>
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<tbody>
<tr>
<td>Module code</td>
<td>bio695</td>
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<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 Molecular Biomedicine (Master) > Background Modules
- Master's Programme Neuroscience (Master) > Background Modules

**Responsible persons**
- Koch, Karl-Wilhelm (Module responsibility)
- Koch, Karl-Wilhelm (Authorized examiners)
- Scholten, Alexander (Authorized examiners)
- 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

**Reader's advisory**
- 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: 20
- Modullevel / module level: MM (Mastermodul / Master module)
- Modulart / typ of module: Wahlpflicht / Elective

**Vorkenntnisse / Previous knowledge**

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
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<tbody>
<tr>
<td>Final exam of module</td>
<td>90 minutes written exam</td>
<td>written examination (50%) protocols (50%)</td>
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**Course type**

<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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</thead>
<tbody>
<tr>
<td>Lecture</td>
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<td>1</td>
<td>WiSe</td>
<td>14</td>
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<tr>
<td>Seminar</td>
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<td>1</td>
<td>WiSe</td>
<td>14</td>
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<td>Exercises</td>
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<td>6</td>
<td>WiSe</td>
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**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)
Radulovic, Tamara (Authorized examiners)
Radulovic, Tamara (Module counselling)
Milenkovic, Ivan (Module counselling)

Prerequisites
Enrolment in Master’s programme Molecular Biomedicine

Skills to be acquired in this module

Goals of the Module:
Upon successful completion of this module, students
- know molecular mechanisms of cellular physiology
- know physiology of the following human body organ systems, muscular system, nervous system, cardiovascular system, respiratory system, urinary system
- understand pathophysiology of certain diseases
- know basic principles of functional tests for certain organ systems.

Competencies:
++ deepened biological expertise  
++ deepened clinical/pathological expertise  
++ deepened knowledge of 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

The module focuses on physiology of the cell, physiology of human organ systems in health and disease, and homeostatic regulation mechanisms.

Lecture topics:
1. Cellular mechanisms of excitability
2. Synaptic transmission
3. Muscle contraction
4. Spinal cord reflexes
5. Motor skills
6. Basic principles of circulatory function
7. Pulmonary ventilation
8. Regulation of respiration
9. General sensory physiology
10. Physiology of special senses
11. Kidneys
12. Water homeostasis and osmoregulation

Exercise:
1. Excitability of nerve cells and AP propagation
2. Reflexes
3. Electrocardiography
4. Pulmonary function tests and regulation of respiration
5. Functional tests for sensory systems
6. Water and osmolarity homeostasis

Reader's advisory
Guyton and Hall - Textbook of medical physiology
**Links**
https://uol.de/physiologie

**Language of instruction**
English

**Duration (semesters)**
1 Semester

**Module frequency**
winter and summer semester

**Module capacity**
10 (participation at lectures is not restricted)

**Reference text**
The number of participants for the practical part of this module is limited to 10. Students which are enrolled in Master’s programme Molecular Biomedicine will be preferred.

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

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

**Lehr-/Lernform / Teaching/Learning method**
Lecture and Exercise

**Vorkenntnisse / Previous knowledge**
Basic knowledge in physiology and cell biology

<table>
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<tr>
<th>Examination</th>
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<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final exam of module</td>
<td>Oral examination (20 min.)</td>
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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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<td>2</td>
<td>SoSe und WiSe</td>
<td>28</td>
</tr>
<tr>
<td>Practical training</td>
<td></td>
<td>2</td>
<td>SoSe und WiSe</td>
<td>28</td>
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**Total time of attendance for the module**
56 h
# gsw020 - Cellular and Subcellular Structures

<table>
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<th>Cellular and Subcellular Structures</th>
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<tbody>
<tr>
<td>Module code</td>
<td>gsw020</td>
</tr>
<tr>
<td>Credit points</td>
<td>6.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>180 h</td>
</tr>
<tr>
<td>Applicability of the module</td>
<td>Master's Programme Molecular Biomedicine (Master) &gt; Background Modules</td>
</tr>
<tr>
<td>Responsible persons</td>
<td>Bräuer, Anja (Module responsibility)</td>
</tr>
<tr>
<td></td>
<td>Bräuer, Anja (Authorized examiners)</td>
</tr>
<tr>
<td></td>
<td>Maier, Esther Christine (Authorized examiners)</td>
</tr>
<tr>
<td></td>
<td>Maier, Esther Christine (Module counselling)</td>
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<tr>
<td>Prerequisites</td>
<td>Enrolment in Master’s programme Molecular Biomedicine</td>
</tr>
<tr>
<td>Skills to be acquired in this module</td>
<td>Goals of the Module: Upon successful completion of this module, students know and understand cellular and subcellular structures and their function in the human body.</td>
</tr>
<tr>
<td></td>
<td>Competencies:</td>
</tr>
<tr>
<td></td>
<td>++ deepened biological expertise</td>
</tr>
<tr>
<td></td>
<td>++ deepened clinical / pathological expertise,</td>
</tr>
<tr>
<td></td>
<td>++ deepened knowledge of biological working methods</td>
</tr>
<tr>
<td></td>
<td>++ deepened knowledge of clinical / pathological diagnostics,</td>
</tr>
<tr>
<td></td>
<td>+ interdisciplinary thinking,</td>
</tr>
<tr>
<td></td>
<td>+ critical and analytical thinking,</td>
</tr>
<tr>
<td></td>
<td>+ ability to perform independent biological research</td>
</tr>
<tr>
<td></td>
<td>+ ethics and professional behaviour</td>
</tr>
<tr>
<td>Module contents</td>
<td>The module aims to give students an insight into microscopic functional anatomy. In this module, we will cover aspects of cell compartmentalisation and tissue organisation as the basis for normal function and homeostasis. In addition, we will cover examples of organ organisation and organ function. To introduce students to clinical concepts, and to deepen their understanding of the functional roles of cells and tissues, we will also cover aspects of the pathological basis of disease for selected organs and organelles.</td>
</tr>
<tr>
<td></td>
<td>In the accompanying seminar, students will have the chance to work on light and electron microscopic pictures, to practice annotation and identification of cells and tissues. In addition, the students will read and present original literature. This will introduce select aspects of disease, but also introduce research methodology and scientific thinking.</td>
</tr>
<tr>
<td></td>
<td>This course is not a full histology course, but it serves as an introduction to the topic, recapitulates aspects of cell biology and introduces a few select aspects of pathology. Thus, this module is aimed at students with little experience in cell biology.</td>
</tr>
<tr>
<td>Reader's advisory</td>
<td>Molecular Biology of the Cell (Alberts et al., 6th ed.)</td>
</tr>
<tr>
<td></td>
<td>Junqueira’s Basic Histology: Text and Atlas (Mescher, 14th ed.)</td>
</tr>
<tr>
<td></td>
<td>Robbins Basic Pathology (Kumar et al., 9th ed.)</td>
</tr>
<tr>
<td>Links</td>
<td><a href="https://uol.de/anatomie/forschung/">https://uol.de/anatomie/forschung/</a></td>
</tr>
<tr>
<td>Language of instruction</td>
<td>English</td>
</tr>
<tr>
<td>Duration (semesters)</td>
<td>1 Semester</td>
</tr>
<tr>
<td>Module frequency</td>
<td>summer semester</td>
</tr>
<tr>
<td>Module capacity</td>
<td>25</td>
</tr>
<tr>
<td>Reference text</td>
<td>For your notice: this course will NOT cover microscopic imaging techniques, if you are interested please see module gsw200_Microscopic Imaging in Biomedical Sciences.</td>
</tr>
<tr>
<td>Module level / module level</td>
<td>MM (Mastermodul / Master module)</td>
</tr>
<tr>
<td>Modulart / typ of module</td>
<td>Wahlpflicht / Elective</td>
</tr>
<tr>
<td>Lehr-/Lernform / Teaching/Learning method</td>
<td>Lecture and Seminar</td>
</tr>
<tr>
<td>Vorkenntnisse / Previous knowledge</td>
<td>Basic knowledge in biology, chemistry, mathematics</td>
</tr>
<tr>
<td>Examination</td>
<td>Time of examination</td>
</tr>
<tr>
<td></td>
<td>written examination (45 min.)</td>
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<tr>
<td>Course type</td>
<td>Comment</td>
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<tr>
<td>-------------</td>
<td>---------</td>
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<tr>
<td>Lecture</td>
<td></td>
</tr>
<tr>
<td>Exercises</td>
<td></td>
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<tr>
<td><strong>Total time of attendance for the module</strong></td>
<td></td>
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</table>
## gsw030 - Biophysical Chemistry

<table>
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<tr>
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<th>Biophysical Chemistry</th>
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<tbody>
<tr>
<td>Module code</td>
<td>gsw030</td>
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<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
</tr>
<tr>
<td>Applicability of the module</td>
<td>Master's Programme Molecular Biomedicine (Master) &gt; Background Modules</td>
</tr>
</tbody>
</table>
| Responsible persons | Winklhofer, Michael (Module responsibility)  
    Winklhofer, Michael (Authorized examiners) |
| Prerequisites | Enrolment in Master’s programme Molecular Biomedicine |
| Skills to be acquired in this module | **Goals of the Module:**  
Upon successful completion of this module, students understand physical principles underlying biochemistry and cell biology.  
**Competencies:**  
++ deepened biological expertise  
+ data analysis skills  
+ usage of databases and computational tools  
+ interdisciplinary thinking  
++ critical and analytical thinking  
++ data presentation and discussion |
| Module contents | The module focuses on Molecular Biophysics, Biophysical Chemistry, Biochemistry & Cell Biology.  
Dynamics of single molecules, molecular thermodynamics, statistical thermodynamics; diffusion; chemical equilibria involving macromolecules, signal amplification;  
Spectroscopical techniques (molecular vibration and rotation spectroscopy, electronic absorption and fluorescence spectroscopy, FRET, NMR, Atomic force microscopy) |
| 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 | summer semester |
| Module capacity | 20 |
| Module/ module level | MM (Mastermodul / Master module) |
| Modulart / typ of module | Wahlpflicht / Elective |
| Lehr-/Lernform / Teaching/Learning method | Lecture and Seminar |
| Vorkenntnisse / Previous knowledge | basic knowledge in biochemistry and physics |
| Examination | Time of examination | Type of examination |
| Final exam of module | 15 min. short tests (75%) before each seminar session + oral presentation (25%) |
| Course type | Comment | SWS | Frequency | Workload of compulsory attendance |
| Lecture | | 2 | SuSe | 28 |
| Seminar | | 2 | SuSe | 28 |
| Total time of attendance for the module | 56 h |
## gsw040 - Molecular and Cellular Biology of Hearing and Deafness

<table>
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<th>Molecular and Cellular Biology of Hearing and Deafness</th>
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<tbody>
<tr>
<td>Module code</td>
<td>gsw040</td>
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<td>Credit points</td>
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<td>Workload</td>
<td>360 h</td>
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<td>Applicability of the module</td>
<td>Master's Programme Molecular Biomedicine (Master) &gt; Background Modules</td>
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<tr>
<td>Responsible persons</td>
<td>Claußen, Maike (Authorized examiners)</td>
</tr>
<tr>
<td></td>
<td>Ebbers, Lena (Authorized examiners)</td>
</tr>
<tr>
<td></td>
<td>Ebbers, Lena (Module responsibility)</td>
</tr>
<tr>
<td></td>
<td>Claußen, Maike (Module responsibility)</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>Enrolment in Master’s programme Molecular Biomedicine</td>
</tr>
</tbody>
</table>

**Skills to be acquired in this module**

**Competencies:**
- ++ deepened biological expertise
- ++ deepened knowledge of biological working methods
- ++ data analysis skills
- + interdisciplinary thinking
- ++ critical and analytical thinking
- ++ independent searching and knowledge of scientific literature
- + data presentation and discussion (written and spoken)

**Module contents**

The module focuses on auditory neuroscience, molecular and cellular neurobiology.

**Lecture:**
Development, anatomy and function of the auditory system (cochlea to cortex), classification, molecular causes and inheritance of auditory disorders, investigation of these disorders in animal models, insights into possibilities of treatment/therapy

**Seminar:**
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/

**Language of instruction**
English

**Duration (semesters)**
1 Semester

**Module frequency**
Second half of the summer semester
**Module capacity**  
8

**Reference text**  
The number of participants for this module is limited to 8. If there are more students registered than places available, lots will be drawn. Students which are enrolled in Master’s programme Molecular Biomedicine will be preferred.

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

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

**Lehr-/Lernform / Teaching/Learning method**  
Lecture, Seminar and Exercise

**Vorkenntnisse / Previous knowledge**  
basic knowledge in neurogenetics

**Examination**  
**Time of examination**  
**Type of examination**

<table>
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<tr>
<th>Final exam of module</th>
<th>Time of examination</th>
<th>Type of examination</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>presentation (50%), written report (50%)</td>
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**Course type**  
**Comment**  
**SWS**  
**Frequency**  
**Workload of compulsory attendance**

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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>
<td>1</td>
<td>SuSe</td>
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<td>14</td>
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<tr>
<td>Seminar</td>
<td>2</td>
<td>SuSe</td>
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<td>28</td>
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<tr>
<td>Practical training</td>
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<td>SuSe</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: Ebbers, Lena (Authorized examiners)
Ebbers, Lena (Module responsibility)
Prerequisites: Enrolment in Master's programme Molecular Biomedicine
Skills to be acquired in this module

Competencies:
++ deepened biological expertise
++ deepened knowledge of biological working methods
+ data analysis skills
+ interdisciplinary thinking
++ critical and analytical thinking
++ independent searching and knowledge of scientific literature
++ data presentation and discussion (written and spoken)
+ team work

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
Module capacity: 20
Module level / module level: MM (Mastermodul / Master module)
Modulart / typ of module: Wahlpflicht / Elective
Lehr-/Lernform / Teaching/Learning method: Lecture and Seminar
Vorkenntnisse / Previous knowledge: basic knowledge in genetics
Examination: Time of examination
Type of examination: written examination (50%), portfolio (50% - concept

Final exam of module
<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination (paper and short presentation)</th>
</tr>
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<tbody>
<tr>
<td>Course type</td>
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<td>SWS</td>
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<tr>
<td>Lecture</td>
<td>2</td>
<td>SuSe</td>
</tr>
<tr>
<td>Seminar</td>
<td>2</td>
<td>SuSe</td>
</tr>
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</table>

**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:
- 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 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. knowlq.
++ 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
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<thead>
<tr>
<th><strong>Duration (semesters)</strong></th>
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<tbody>
<tr>
<td><strong>Module frequency</strong></td>
<td>annually, summer term, first half (full time)</td>
</tr>
<tr>
<td><strong>Module capacity</strong></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><strong>Examination</strong></td>
<td>Time of examination</td>
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<th><strong>Frequency</strong></th>
<th><strong>Workload of compulsory attendance</strong></th>
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<td>Seminar</td>
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<td>2</td>
<td>SoSe oder WiSe</td>
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<td>Exercises</td>
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**Total time of attendance for the module** 84 h
### neu150 - Visual Neuroscience - Anatomy

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### 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

### Module level / module level
- BC (Basiscurriculum / Base curriculum)

### Modulant / typ of module
- je nach Studiengang Pflicht oder Wahlpflicht

### Vorkenntnisse / Previous knowledge

### Examination

<table>
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<tr>
<th>Course type</th>
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<th>Portfolio (75%), report (25%)</th>
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<td>SuSe</td>
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<tr>
<td>Practical training</td>
<td>3</td>
<td>SuSe</td>
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### Total time of attendance for the module
- 70 h
neu220 - Neurosensory Science and Behaviour - Part B

Module label: Neurosensory Science and Behaviour - Part B
Module code: neu220
Credit points: 6.0 KP
Workload: 180 h
- 3 SWS Lecture (VO) "Introd. to Cognitive Neuroscience" and "Psychopharmacol." Total workload 135h: 45h contact/ 45 background reading/ 45h exam preparation
- 1 SWS Supervised exercise (UE) Total workload 45h: 14h contact/ 31h paper reading

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
- Thiel, Christiane Margarete (Module responsibility)
- Thiel, Christiane Margarete (Module counselling)
- Thiel, Christiane Margarete (Authorized examiners)
- Gießing, Carsten (Authorized examiners)

Prerequisites

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

Upon successful completion of this course, students
- know the fundamentals of neurotransmission
- know the basic neural mechanisms underlying attention, learning, emotion, language and executive functions
- understand the relationship between disturbances in neurotransmitter systems, cognitive functions and psychiatric disease
- know the principles of drug treatment for psychiatric disorders
- have in-depth knowledge in selected areas of these topics
- are able to understand, explain and critically assess neuroscientific approaches in animals and humans
- are able to understand and critically assess published work in the area of cognitive neuroscience

Module contents
The lecture "Introduction to Cognitive Neuroscience" gives a short introduction into neuroanatomy and cognitive neuroscience methods and then covers different cognitive functions.
- Lecture topics:
  - History of cognitive neuroscience
  - Methods of cognitive neuroscience
  - Attention
  - Learning
  - Emotion
  - Language
  - Executive functions.

The supervised exercise either deepens that knowledge by exercises or discussions of recent papers/talks on the respective topic covered during that week.

The lecture "Psychopharmacology" illustrates the connection between neurotransmitters and behaviour and its links to psychiatric disease.
- Lecture topics:
  - Introduction to Terms and Definitions in Drug Research
  - Dopaminergic and Noradrenergic System
  - Cholinergic and Serotonergic System
  - GABAergic and Glutamatergic System
  - Addiction
  - Depression
  - Schizophrenia
  - Anxiety
  - Alzheimer's Disease

Reader's advisory

Links

Language of instruction: English
Duration (semesters) | 1 Semester
Module frequency | jährlich
Module capacity | 30
Recommended in combination with neu210 "Neurosensoric Science and Behaviour", neu300 "Functional MRI data analysis" Shared course components with (cannot be credited twice): bio610 and psy181 (5.02.614 "Introduction to Cognitive Neuroscience", 5.02.615 "Psychopharmacology")
Reference text | Course in the second half of the semester
Regular active participation is required to pass the module.
Modulelevel / module level | je nach Studiengang Pflicht oder Wahlpflicht
Typ of module | Lehr-/Lernform / Teaching/Learning method
Vorkenntnisse / Previous knowledge | Fundamentals of Neurobiology, Behavioural Biology
Examination | Time of examination
Final exam of module | as agreed, usually in the break after the winter term
100% written exam (content of the lectures)
Course type | Comment | SWS | Frequency | Workload of compulsory attendance
Lecture | 3 | -- | 42
Exercises | 1 | -- | 14
Total time of attendance for the module | 56 h
Clinical Modules

gsw070 - Gene-based Therapies in Human diseases

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<td>Responsible persons</td>
<td>Neidhardt, John (Module responsibility)</td>
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<td></td>
<td>Neidhardt, John (Authorized examiners)</td>
</tr>
<tr>
<td></td>
<td>Jüschke, Christoph (Authorized examiners)</td>
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<td></td>
<td>Song, Fei (Authorized examiners)</td>
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<td>Prerequisites</td>
<td>Enrolment in Master’s programme Molecular Biomedicine</td>
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</table>
| Skills to be acquired in this module| Competencies:
++ deepened biological expertise 
++ deepened clinical expertise 
++ deepened knowledge of biological working methods 
+ deepened knowledge of clinical diagnostics 
+ data analysis skills 
+ interdisciplinary thinking 
++ critical and analytical thinking 
+ independent searching and knowledge of scientific literature 
++ ability to perform independent biological research 
+ data presentation and discussion (written and spoken) 
+ team work 
+ project and time management |

Adressing students with emphasis on translational/therapeutical interest in molecular biology, molecular genetics, cell biology and neurobiology.

Module contents

The module focuses on translational research in human genetics, molecular biology, molecular genetics, translational medicine, cell- and neurobiology.

Subjects of the lecture: Therapeutic strategies and research applications, molecular bases of neurodegenerative diseases, structure and function of DNA/RNA/proteins/membranes.

Lecture: To improve knowledge in molecular genetics, molecular biology and cell biology in correlation with human diseases; gain knowledge in Antisense-Oligonucleotide-, U1- and CRISPR-based genetic therapies, viruses in gene therapy, cell sorting and diagnosis by FACS.

Exercises: Learning current methods of therapy development; molecular biology and human genetics; high throughput technologies; introduction to cell cultivation techniques.

Learn to transfer the theoretical knowledge to experiments. Gaining methodological knowledge in molecular genetics, cell biology and therapeutic approaches. Initial training on how to perform research projects.

Reader's advisory
Molecular Biology of the Cell (Alberts et al., 6th edition)

Links
https://uol.de/humangenetik/research-and-clinical-collaborations/

Language of instruction
English

Duration (semesters)
1 Semester

Module frequency
summer semester
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<td>Total time of attendance for the module</td>
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gsw080 - Genetic Diagnostics: from chromosomal aberrations to gene mutations

Module label: Genetic Diagnostics: from chromosomal aberrations to gene mutations
Module code: gsw080
Credit points: 6.0 KP
Workload: 180 h
Applicability of the module: Master's Programme Molecular Biomedicine (Master) > Clinical Modules
Responsible persons: Owczarek-Lipska, Marta (Module responsibility); Owczarek-Lipska, Marta (Authorized examiners)
Prerequisites: Enrolment in Master’s programme Molecular Biomedicine

Skills to be acquired in this module

Goals of the Module:
- to expand the knowledge about classical cytogenetics and molecular genetics as well as modern cyto- and molecular genetics technics applied in clinical diagnostics and research.
- deepened biological and clinical expertise (cytogenetics and molecular genetics)

Competencies:
- deepened knowledge of biological working methods and clinical diagnostics (classical cyto- and molecular genetics laboratory methods)
- data analysis skills
- interdisciplinary thinking
- critical and analytical thinking
- independent searching and knowledge of scientific literature
- ability to perform independent biological research
- data presentation and discussion (written and spoken)
- team work
- project and time management

Module contents

The module focuses on genome- and gene mutations, cyto- and molecular genetics, human syndromes and diseases caused by different chromosomal aberrations.

Lecture:
- essentials of classical cytogenetics and molecular genetics, classification of mutations, genetics syndromes/diseases, introduction to the genetic diagnostic laboratory techniques

Exercises:
- chromosomal stainings, microscopy, karyotyping, identification of chromosomal aberrations, identification of gene mutations

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-gehirnfehlbildungen/forschungsschwerpunkte/
Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: Second half of the winter semester
Module capacity: 10
The number of participants for the practical part of this module is limited to 10. If there are more students registered than places available, lots will be drawn. Students which are enrolled in Master’s programme Molecular Biomedicine will be preferred.

<table>
<thead>
<tr>
<th>Reference text</th>
<th>The number of participants for the practical part of this module is limited to 10. If there are more students registered than places available, lots will be drawn. Students which are enrolled in Master’s programme Molecular Biomedicine will be preferred.</th>
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<td>Wahlpflicht / Elective</td>
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<td>Lecture, Seminar and Exercise</td>
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<td>Examination</td>
<td>Time of examination</td>
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<td>Type of examination</td>
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### gsw090 - Current Topics in Clinical Research

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<td>Applicability of the module</td>
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#### Responsible persons

- Dömer, Patrick (Module responsibility)
- Dömer, Patrick (Authorized examiners)
- Heep, Axel (Authorized examiners)
- Plösch, Torsten (Authorized examiners)
- Loser, Karin (Authorized examiners)
- Hinz, Cornelia (Authorized examiners)
- Dübbel, Lena (Authorized examiners)
- Hamprecht, Axel (Authorized examiners)
- Noster, Janina (Authorized examiners)
- Rauch, Bernhard (Authorized examiners)
- Meyer, Helge (Authorized examiners)

#### Prerequisites

Enrolment in Master’s programme Molecular Biomedicine

#### Skills to be acquired in this module

**Competencies:**
- ++ deepened clinical expertise
- ++ deepened knowledge of biological working methods and clinical diagnostics
- ++ interdisciplinary thinking
- + data analysis skills
- ++ critical and analytical thinking
- + independent searching and knowledge of scientific literature
- + ethics and professional behavior

#### Module contents

The module focuses on molecular aspects as part of current clinical research in different fields.

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
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<th>Time of examination</th>
<th>Type of examination</th>
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</table>
gsw100 - Immunology and Inflammation

Module label: Immunology and Inflammation

Module code: gsw100

Credit points: 6.0 KP

Workload: 180 h

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)
- Gibbs, Bernhard (Module counselling)

Prerequisites:
Enrolment in Master’s programme Molecular Biomedicine

Skills to be acquired in this module:

Competencies:
++ comprehensive understanding of the fundamentals of immunology and inflammation
++ deepened knowledge of clinical aspects of diseases
++ systematic understanding in the therapy diseases
+ interdisciplinary thinking
+ critical and analytical thinking
++ independent searching and knowledge of scientific literature
++ data presentation and discussion (written and spoken)
++ teamwork
+ time management

Module contents:

The module focuses on dermatology, immunology and inflammation.

Lectures:
Fundamentals of immunology and inflammation

Seminars:
Worked examples of major inflammatory diseases (e.g. allergies, infections, autoimmune diseases) and advanced therapeutic concepts.

Exercises:
Students will be expected to demonstrate the ability to prepare presentations in small working groups where they critically evaluate current research regarding specific examples of inflammatory diseases and their therapy (problem-orientated learning)

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/

Language of instruction: English

Duration (semesters): 1 Semester

Module frequency: First half of the winter semester

Module capacity: 25

Modullevel / module level: MM (Mastermodul / Master module)

Modulart / typ of module: Wahlpflicht / Elective
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<th>Lecture, Seminar, Exercise</th>
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**Examination**

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<tr>
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<td>written examination (60 min, 60%), coursework (short review in English in the style &quot;News and Views&quot; article, 40%) additionally (ungraded): formative feedback given for presentations</td>
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**Course type**

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<td>WiSe</td>
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**Total time of attendance for the module**

56 h
Module label: Clinical Aspects of Degenerative Diseases
Module code: gsw110
Credit points: 6.0 KP
Workload: 180 h

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

Responsible persons:
- Zieschang, Tania (Module responsibility)
- Dewald, Oliver (Module responsibility)
- Zieschang, Tania (Authorized examiners)
- Dewald, Oliver (Authorized examiners)
- Koschate, Jessica (Authorized examiners)
- Eichstaedt, Harald (Authorized examiners)
- Meier, Fritz (Authorized examiners)
- Ort, Katharina (Authorized examiners)
- Sahlmann, Bianca (Authorized examiners)
- Sander-Sandersfeld, Carina (Authorized examiners)
- Lau, Sandra (Authorized examiners)
- Hackbarth, Michel (Authorized examiners)
- Brümleve, Nils (Authorized examiners)

Prerequisites:
Enrolment in Master’s programme Molecular Biomedicine

Skills to be acquired in this module:

**Competencies:**
- ++ comprehensive understanding of clinical manifestation, epidemiology, risk factors, treatment strategies of degenerative diseases
- ++ understanding of geriatric phenomena
- ++ understanding and application of the comprehensive geriatric assessment (CGA)
- ++ interdisciplinary thinking
- ++ ethics and professional behaviour
- ++ critical and analytical thinking
- ++ independent searching and knowledge of scientific literature
- ++ data presentation and discussion (written and spoken)
- ++ teamwork

Module contents:
The module focuses on geriatric medicine.

**Lecture:**
Fundamentals of degenerative diseases (Alzheimer's disease, Parkinson's disease, Rheumatoid Arthritis, Osteoarthritis, heart valve disease, aortic dilatation) and geriatric phenomena as frailty, multimorbidity and polypharmacy and their impact on diagnostic and treatment options, basics of geriatric medicine, evidence of the impact of the CGA on patient outcomes, dimensions of the CGA, surgical and interventional heart procedures in geriatric patients

**Seminar:**
Instant ageing, the geriatric team, cognitive assessment with actors, work in heart team

**Excursion:**
Small groups (2 students) can accompany clinical rounds on the geriatric ward (either acute geriatric care or geriatric rehabilitation). Conduction of parts of the CGA with patients
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. Ziemer, Haverich: Herzchirurgie

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

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<thead>
<tr>
<th>Links</th>
<th><a href="https://www.aortenklappenregister.de/publikationen-des-registers.html">https://www.aortenklappenregister.de/publikationen-des-registers.html</a></th>
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<td>Modulart / typ of module</td>
<td>Wahlpflicht / Elective</td>
</tr>
<tr>
<td>Lehr-/Lernform / Teaching/Learning method</td>
<td>Lecture, Seminar, Excursion</td>
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<tr>
<td>Vorkenntnisse / Previous knowledge</td>
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<td>Examination</td>
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<td>Final exam of module</td>
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<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<td>WiSe</td>
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Total time of attendance for the module | 56 h
**gsw120 - Tumor Biology**

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<td>Module code</td>
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<tr>
<td>Credit points</td>
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<tr>
<td>Workload</td>
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**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)
- Dübbel, Lena (Authorized examiners)
- Loser, Karin (Authorized examiners)
- Dübbel, Lena (Module counselling)
- Roeper, Julia (Module counselling)

**Prerequisites**
- Enrolment in Master’s programme Molecular Biomedicine

**Skills to be acquired in this module**

**Goals of the Module:**
upon successful completion of this module, students
- can define and identify oncogenes and tumor suppressor genes
- know about the hallmarks of cancer and can explain them based on example pathways and traits
- know about the complexity of the tumor tissue and the different cells that are involved
- know about the principles of metastasis.

**Competencies:**
++ deepened biological & clinical expertise
++ interdisciplinary thinking
+ deepened knowledge of biological working methods & clinical diagnostics
++ data analysis skills
+ usage of databases and computational tools
++ critical & analytical thinking
+ independent searching & knowledge of scientific literature
++ data presentation & discussion (written and spoken)
+ teamwork

**Module contents**

**Part 1 - Lecture:**
We will give a brief overview of several aspects of tumor biology: Types of mutation, hallmarks of cancer, tumor as a tissue, metastasis, oncogenes and tumor suppressor genes, signal transduction and many example pathways that are important for cancer progression. In addition, you will learn about tumor-infiltrating immune cells and new therapy options like tumor-immune therapy.

**Part 2 - Seminar:**
Students will be expected to demonstrate the ability to prepare presentations in small working groups where they critically evaluate current research regarding specific examples of tumor diseases and their therapy (problem-orientated learning)

**Optional:** Lectures from the study programme Human Medicine (will be held in German)
Lecture topics from the Human Medicine programme focusses on large tumor entities, therapy strategies, and basics of carcinogenesis and therapeutic implementation. Please note, that these lectures are not part of the curriculum and are therefore not relevant for the examinations.

**Reader’s advisory**

Current literature will be uploaded on Stud.IP. Previous literature research is not necessary.
If you are looking for more information/background: Weinberg; “The Biology of Cancer”; Garland Science.
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Language of instruction</td>
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</tr>
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<td>Duration (semesters)</td>
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<tr>
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<td>Modulart / typ of module</td>
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<tr>
<td>Lehr-/Lernform / Teaching/Learning method</td>
<td></td>
</tr>
<tr>
<td>Vorkenntnisse / Previous knowledge</td>
<td>Basic knowledge of genetics, cell biology and biochemistry</td>
</tr>
<tr>
<td>Examination</td>
<td>Time of examination</td>
</tr>
<tr>
<td>Final exam of module</td>
<td></td>
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<td>Course type</td>
<td>Comment</td>
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<td>Seminar</td>
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<td>Lecture</td>
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<td>Total time of attendance for the module</td>
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### gsw130 - Regenerative Medicine in Ophthalmology

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<td>Credit points</td>
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<td>Workload</td>
<td>180 h</td>
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<tr>
<td>Responsible persons</td>
<td>Mertsch, Sonja (Module responsibility)</td>
</tr>
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<td></td>
<td>Mertsch, Sonja (Authorized examiners)</td>
</tr>
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<td>Enrolment in Master’s programme Molecular Biomedicine</td>
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<tr>
<td>Skills to be acquired in this module</td>
<td></td>
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<tr>
<td>Competencies:</td>
<td>++ comprehensive understanding of the fundamentals of regenerative ophthalmology research</td>
</tr>
<tr>
<td></td>
<td>++ deepened knowledge of clinical aspects of eye diseases</td>
</tr>
<tr>
<td></td>
<td>++ deepened knowledge of biological working methods and clinical diagnostics (classical tissue engineering, cell culture and molecular laboratory methods)</td>
</tr>
<tr>
<td></td>
<td>++ systematic understanding in translational research</td>
</tr>
<tr>
<td></td>
<td>+ interdisciplinary thinking</td>
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<td></td>
<td>+ critical and analytical thinking</td>
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<tr>
<td></td>
<td>++ data analysis and interpretation skills</td>
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<td></td>
<td>++ data presentation and discussion (written and spoken)</td>
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<td></td>
<td>++ teamwork</td>
</tr>
<tr>
<td></td>
<td>+ time management</td>
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</table>

### Module contents

The module focuses 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

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<th>Language of instruction</th>
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### Reference text

The number of participants is limited to 5. Students which are enrolled in Master’s programme Molecular Biomedicine will be preferred.

### Modullevel / module level

<table>
<thead>
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### Modulart / typ of module

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### Vorkenntnisse / Previous knowledge

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<tr>
<td>basic knowledge of cell culture methods, protein and mRNA isolation methods</td>
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### Examination

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<th>Type of examination</th>
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**Total time of attendance for the module**

56 h
gsw060 - Epigenetics and Gene Regulation

Module label: Epigenetics and Gene Regulation
Module code: gsw060
Credit points: 6.0 KP
Workload: 180 h

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

Responsible persons:
- Plösch, Torsten (Module responsibility)
- Heep, Axel (Module responsibility)
- Plösch, Torsten (Authorized examiners)
- Heep, Axel (Authorized examiners)
- Hinz, Cornelia (Authorized examiners)

Prerequisites:
Enrolment in Master’s programme Molecular Biomedicine

Skills to be acquired in this module:

Goals of the Module:
upon completion of this course, students
- know about epigenetic regulation of gene transcription
- can determine different epigenetic features
- have a basic understanding of the role of epigenetics in human disease

Competencies:
++ deepened biological expertise
+ deepened clinical expertise
++ deepened knowledge of biological working methods
++ deepened knowledge of clinical diagnostics
+ data analysis skills
+ critical and analytical thinking
+ ability to perform independent biological research
+ data presentation and discussion (written and spoken)
+ teamwork

Module contents:

Lecture:
- introduction to epigenetics
- regulation of gene expression
- developmental epigenetics
- cancer epigenetics
- current methods
- ethics

Seminar:
- presentation of important historical and current primary literature
- presentation and discussion of lab methods used in the practical part

Exercise:
- Designing bisulfite PCR strategies for methylated DNA
- analyses of datasets
- DNA isolation from cells
- in vitro methylation of DNA
- methylation-specific restriction analysis (and PCR)
- methylation-specific bisulfite PCR
- histone characterization

Reader's advisory

Links
Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: summer term
Module capacity: 12

Reference text:
The number of participants for this module is limited to 12. If there are more students registered than places available, lots will be drawn. Students which are enrolled in Master’s programme Molecular Biomedicine will be
preferred.

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<td>Examination</td>
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<td>Type of examination</td>
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Research Modules

gsw150 - Research Project Molecular Biomedicine

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<td>• Master's Programme Molecular Biomedicine (Master) &gt; Research Modules</td>
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Responsible persons

Koch, Karl-Wilhelm (Module responsibility)
Koch, Karl-Wilhelm (Authorized examiners)

Further responsible persons

all teachers of the curriculum (module counselling, authorized examiners)

Prerequisites

as defined in the admission and examination regulations

Skills to be acquired in this module

Competencies:
- ++ deepened biological and / or clinical expertise
- ++ deepened knowledge of biological working methods and / or clinical diagnostics
- ++ data analysis skills
- ++ interdisciplinary thinking
- ++ critical and analytical thinking
- ++ independent searching and knowledge of scientific literature
- ++ ability to perform independent biological research
- ++ data presentation and discussion (written and spoken)
- ++ team work
- ++ ethics and professional behaviour
- ++ project and time management

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/immologie/aktuelle-forschungsprojekte
- https://uol.de/humangenetik/research-and-clinical-collaborations/
- 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

Links

Language of instruction English
Duration (semesters) 1 Semester
Module frequency every semester, time is flexible and subject to individual arrangement
Module capacity unlimited
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<td>Lehr-/Lernform / Teaching/Learning method</td>
<td>Seminar and Project</td>
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<tr>
<td>Vorkenntnisse / Previous knowledge</td>
<td>basic knowledge of cell biology, genetics, biochemistry or clinical biomedicine</td>
</tr>
<tr>
<td>Examination</td>
<td>Time of examination</td>
</tr>
<tr>
<td>Final exam of module</td>
<td>signed project report 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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<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<td>Project (Individuelles Forschungsprojekt)</td>
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<td>SoSe oder WiSe</td>
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| Total time of attendance for the module | 140 h |
### gsw160 - External Research Project Molecular Biomedicine

<table>
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<tr>
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<td>Workload</td>
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#### Applicability of the module
- Master's Programme Molecular Biomedicine (Master) > Research Modules

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

#### Further responsible persons
- All teachers of the curriculum (module counselling, authorized examiners)

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

#### Skills to be acquired in this module

**Competencies:**
- Deepened biological and/or clinical expertise
- Deepened knowledge of biological working methods and/or clinical diagnostics
- Data analysis skills
- Interdisciplinary thinking
- Critical and analytical thinking
- Independent searching and knowledge of scientific literature
- Ability to perform independent biological research
- Data presentation and discussion (written and spoken)
- Critical and analytical thinking
- 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

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<th>Language of instruction</th>
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<tbody>
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<tr>
<td>Module frequency</td>
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<td>Module capacity</td>
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<td>Seminar and Project</td>
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<tr>
<td>Vorkenntnisse / Previous knowledge</td>
<td>Basic knowledge of cell biology, genetics, biochemistry or clinical biomedicine</td>
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#### Examination

- Time of examination
- Type of examination
- Final exam of module
  - Signed project report
  - Signed project report additionally (ungraded): (participation in seminar and) 30 min. presentation during the semester on a topic depending on the chosen option

#### Course type

<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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<tbody>
<tr>
<td>Seminar</td>
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<td>SoSe oder WiSe</td>
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<td>Project (Individuelles Forschungsprojekt)</td>
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<td>SoSe oder WiSe</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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Workload of compulsory attendance 40 / 55

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

Responsible persons:
- Hartmann, Anna-Maria (Module responsibility)
- Hartmann, Anna-Maria (Authorized examiners)

Prerequisites:
Enrolment in Master’s programme Molecular Biomedicine

Skills to be acquired in this module

Competencies:
++ deepened knowledge of biological working methods
+ deepened knowledge of clinical diagnostics
++ data analysis skills
+ interdisciplinary thinking
++ critical and analytical thinking
++ ability to perform independent biological research
++ data presentation and discussion (written and spoken)

Basic knowledge of techniques used in neuroscience

Module contents
The module focuses on competence in research methods.

Seminar:
Hybridization and detection of nucleic acid, polymerase chain reaction, nucleic acid sequencing, analyses of epigenetic modifications, protein-nucleic acid interaction, immunological techniques, light microscopy techniques, mass spectrometry analyses, protein-protein interactions, fluorescence in situ hybridization

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

Reader's advisory

Links

Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: Second half of the winter semester; annually
Module capacity: 25
Modulart / typ of module: Wahlpflicht / Elective

Lehr-/Lernform / Teaching/Learning method:
Seminar and Exercise

Vorkenntnisse / Previous knowledge

Examination
Time of examination: 20 min. presentation (talk about one seminar topic)
Type of examination: Seminar and Exercise

Course type: Comment: SWS: Frequency: Workload of compulsory attendance
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<tr>
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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
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**Module label**
Ethics in Medicine

**Module code**
gsw180

**Credit points**
3.0 KP

**Workload**
90 h

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

**Responsible persons**
- Schweda, Mark (Module responsibility)
- Schweda, Mark (Authorized examiners)
- Weßel, Merle (Authorized examiners)

**Prerequisites**
Enrolment in Master’s programme Molecular Biomedicine

**Skills to be acquired in this module**

**Competencies:**
- deepened medical / ethical expertise with a focus on research ethics
- interdisciplinary thinking
- critical and analytical thinking
- independent searching and knowledge of scientific literature
- ability to perform independent biological research
- data presentation and discussion (written and spoken)
- team work
- ethics and professional behaviour
- project and time management

**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**

**Links**
https://uol.de/medizinethik/

**Language of instruction**
English

**Duration (semesters)**
1 Semester

**Module frequency**
winter semester

**Module capacity**
25

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

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

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

**Vorkenntnisse / Previous knowledge**

**Examination**
Time of examination
Type of examination

**Final exam of module**
written examination (60 min.)

**Course type**
Lecture

**SWS**
2

**Frequency**
WiSe

**Workload attendance**
28 h
gsw190 - Journal Club

<table>
<thead>
<tr>
<th>Module label</th>
<th>Journal Club</th>
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<tr>
<td>Module code</td>
<td>gsw190</td>
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<tr>
<td>Credit points</td>
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<tr>
<td>Workload</td>
<td>90 h</td>
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<tr>
<td>Applicability of the module</td>
<td>Master's Programme Molecular Biomedicine (Master) &gt; Skills Modules</td>
</tr>
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**Responsible persons**
- Mertsch, Sonja (Module responsibility)
- Mertsch, Sonja (Authorized examiners)
- Maer, Esther Christine (Authorized examiners)
- Gialeli, Andriana (Authorized examiners)

**Further responsible persons**
- all teachers of the curriculum

**Prerequisites**
- Enrolment in Master’s programme Molecular Biomedicine. Neuroscience and Biology students can participate on request.

**Skills to be acquired in this module**

- **Competencies:**
  - ++ reading and understanding of original scientific literature
  - ++ deepened biological expertise
  - ++ deepened knowledge of biological working methods
  - ++ data analysis skills
  - + interdisciplinary thinking
  - ++ critical and analytical thinking
  - ++ independent searching and knowledge of scientific literature
  - + ability to perform independent biological research
  - ++ data presentation and discussion (written and spoken)

**Module contents**
The module focuses on current topics in molecular cell biology and biomedicine.

Seminar topics: original literature of molecular life science related to health and disease

**Reader's advisory**
- publications related to the current research question

**Links**
- Language of instruction: English
- Duration (semesters): 1 Semester
- Module frequency: winter and summer semester
- Module capacity: unlimited
- Modullevel / module level: MM (Mastermodul / Master module)
- Modulart / typ of module: Wahlpflicht / Elective
- Lehr-/Lernform / Teaching/Learning method: Seminar

**Vorkenntnisse / Previous knowledge**
- basic knowledge of cell biology, genetics, biochemistry

**Examination**

<table>
<thead>
<tr>
<th>Final exam of module</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portfolio: Presentation of journal articles, 2 presentations à 20 min.</td>
<td></td>
<td></td>
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</tbody>
</table>

**Course type**
- Seminar

**SWS**
- 2

**Frequency**
- SoSe und WiSe

**Workload attendance**
- 28 h
gs200 - Microscopic Imaging in Biomedical Sciences

Module label: Microscopic Imaging in Biomedical Sciences  
Module code: gs200  
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)  
- Solovyeva, Vita (Authorized examiners)

Prerequisites:  
Enrolment in Master’s programmes Molecular Biomedicine and Neuroscience.

Skills to be acquired in this module:

- Competencies:  
  + deepened biological expertise  
  ++ deepened knowledge of biological working methods  
  + data analysis skills  
  ++ interdisciplinary thinking  
  ++ critical and analytical thinking  
  ++ data presentation and discussion (written and spoken)  
  + team work

Module contents:

The module focuses on microscopy, imaging and methods of microscopy.

Lecture:  
Basics in optics, microscopy methods, image processing, biomedical applications

Seminar:  
Examples for selected microscopy methods and their application

Different microscopical methods and their applications are discussed and compared. Students will understand the basics and limitations of microscopy methods and learn to evaluate them. Selected methods are demonstrated.

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)

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

Modulart / typ of module: Wahlpflicht / Elective

Lehr-/Lernform / Teaching/Learning method: Lecture and Seminar

Vorkenntnisse / Previous knowledge: basic physics, basic cell biology

Examination:  
Time of examination  
Type of examination

Final exam of module
<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>
<td></td>
<td>2</td>
<td>WiSe</td>
<td>0</td>
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<tr>
<td>Seminar</td>
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<td>2</td>
<td>WiSe</td>
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**Total time of attendance for the module**

28 h
neu751 - Laboratory Animal Science

<table>
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<tr>
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<th>Laboratory Animal Science</th>
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<tr>
<td>Module code</td>
<td>neu751</td>
</tr>
<tr>
<td>Credit points</td>
<td>3.0 KP</td>
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</table>

**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

**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)
- Nolte, Arne (Authorized examiners)
- Heyers, Dominik (Authorized examiners)
- Ebbers, Lena (Authorized examiners)
- Dedek, Karin (Authorized examiners)
- Schmaljohann, Heiko (Authorized examiners)
- Winklhofer, Michael (Authorized examiners)

**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

### 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)

### Module level / module level

je nach Studiengang Pflicht oder Wahlpflicht

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

### Vorkenntnisse / Previous knowledge

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final exam of module</td>
<td>immediately before the practical part</td>
<td>written exam of 90 minutes</td>
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<table>
<thead>
<tr>
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<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>1</td>
<td>SoSe und WiSe</td>
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<tr>
<td>Exercises</td>
<td></td>
<td>1</td>
<td>SoSe und WiSe</td>
<td>14</td>
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**Total time of attendance for the module**: 28 h
neu760 - Scientific English

Module label: Scientific English
Module code: neu760
Credit points: 6.0 KP
Workload: 180 h
- 0.5 SWS Lecture (VO)
  Total workload 23h: 8h contact / 15h research for term paper
- 3.5 SWS Supervised exercise (UE)
  Total workload 158h: 46h contact / 46h preparation of texts and presentations / 66h term paper

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.
- Modullevel / 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>
<tbody>
<tr>
<td><strong>Final exam of module</strong></td>
<td>within 2 months of completing the course</td>
<td>Portfolio: 70% several quick tests, texts, presentations, 30% term paper Bonus system for active participation</td>
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<table>
<thead>
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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>Exercises</td>
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<td>WiSe</td>
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**Total time of attendance for the module** 56 h
gsw210 - Scientific Communication

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<tr>
<th>Module label</th>
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<tbody>
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<td>Credit points</td>
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<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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<td>Responsible persons</td>
<td></td>
</tr>
<tr>
<td>Plösch, Torsten (Module responsibility)</td>
<td></td>
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<tr>
<td>Plösch, Torsten (Authorized examiners)</td>
<td></td>
</tr>
<tr>
<td>Gibbs, Bernhard (Authorized examiners)</td>
<td></td>
</tr>
<tr>
<td>Dömer, Patrick (Authorized examiners)</td>
<td></td>
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<tr>
<td>Dittmann, Tim (Authorized examiners)</td>
<td></td>
</tr>
<tr>
<td>Prerequisites</td>
<td></td>
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<tr>
<td>Enrolment in Master’s programme Molecular Biomedicine</td>
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</tr>
<tr>
<td>Skills to be acquired in this module</td>
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<tr>
<td>Goals of the module:</td>
<td></td>
</tr>
<tr>
<td>upon completion of this module, students</td>
<td></td>
</tr>
<tr>
<td>• have improved their competencies in scientific writing</td>
<td></td>
</tr>
<tr>
<td>• demonstrate effective communication and presentation skills (oral and written)</td>
<td></td>
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<tr>
<td>• can defend their findings in scientific discussions or rebuttal letters</td>
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<tr>
<td>• know about major communication pitfalls</td>
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<tr>
<td>Competencies:</td>
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<tr>
<td>++ scientific writing</td>
<td></td>
</tr>
<tr>
<td>++ data presentation and discussion</td>
<td></td>
</tr>
<tr>
<td>+ independent searching and knowledge of scientific literature</td>
<td></td>
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<tr>
<td>+ teamwork</td>
<td></td>
</tr>
<tr>
<td>+ critical and analytical thinking</td>
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<tr>
<td>Module contents</td>
<td></td>
</tr>
<tr>
<td>Seminar:</td>
<td></td>
</tr>
<tr>
<td>• Introduction to scientific writing (analysis of scientific publications, structure of publications, common mistakes, logical story plots)</td>
<td></td>
</tr>
<tr>
<td>• types of scientific communications: posters, oral presentations, journal papers, grant applications, CV/job application</td>
<td></td>
</tr>
<tr>
<td>• Literature management (information search/literature management tools/plagiarism)</td>
<td></td>
</tr>
<tr>
<td>• presentation techniques (how to structure your poster/presentation, how to reach your audience)</td>
<td></td>
</tr>
<tr>
<td>• how to write your Master’s thesis</td>
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</tr>
<tr>
<td>• job application (CV, application letter)</td>
<td></td>
</tr>
<tr>
<td>• how do others perceive your message?</td>
<td></td>
</tr>
<tr>
<td>• “don’ts” of scientific communication</td>
<td></td>
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<tr>
<td>• social media for scientists</td>
<td></td>
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<tr>
<td>• the perfect abstract</td>
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<tr>
<td>Exercise:</td>
<td></td>
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<tr>
<td>• analysis of scientific publications</td>
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<tr>
<td>• writing an abstract</td>
<td></td>
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<tr>
<td>• presentation (poster, short talk)</td>
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<tr>
<td>Reader's advisory</td>
<td></td>
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<tr>
<td>A list will be distributed on forehand</td>
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<td>Links</td>
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<tr>
<td>Language of instruction</td>
<td>English</td>
</tr>
<tr>
<td>Duration (semesters)</td>
<td>1 Semester</td>
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<tr>
<td>Module frequency</td>
<td>winter term</td>
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<tr>
<td>Module capacity</td>
<td>12</td>
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<tr>
<td>Reference text</td>
<td></td>
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<tr>
<td>The number of participants for this module is limited to 12. If there are more students registered than places available, lots will be drawn. Students which are enrolled in Master’s programme Molecular Biomedicine will be</td>
<td></td>
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</tbody>
</table>

51 / 55
preferred.

<table>
<thead>
<tr>
<th>Module level / module level</th>
<th>MM (Mastermodul / Master module)</th>
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<tbody>
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<td>Modulart / typ of module</td>
<td>Wahlpflicht / Elective</td>
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<td>Lehr-/Lernform / Teaching/Learning method</td>
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<tr>
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<td>English level B2 according to Common European Framework of Reference for Languages (CEFR)</td>
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<th>Type of examination</th>
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<tbody>
<tr>
<td>Final exam of module</td>
<td>during seminar</td>
<td>portfolio (presentation, several exercises, active participation during discussions)</td>
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<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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<tr>
<td>Seminar</td>
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<td>2</td>
<td>WiSe</td>
<td>28</td>
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<tr>
<td>Exercises</td>
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<td>2</td>
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<td>28</td>
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Total time of attendance for the module 56 h
Masterabschlussmodul

mam - Master Thesis Module

<table>
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<th>Module label</th>
<th>Master Thesis Module</th>
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<td>Module code</td>
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<tr>
<td>Credit points</td>
<td>30.0 KP</td>
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<td>Workload</td>
<td>900 h</td>
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<td></td>
<td>{ attendance in the lab meetings: 14 hours (1 SWS); theses work: 886 hours }</td>
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<td>Applicability of the module</td>
<td>• Master's Programme Molecular Biomedicine (Master) &gt; Masterabschlussmodul</td>
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<tr>
<td>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>
</tr>
<tr>
<td>Skills to be acquired in this module</td>
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</table>

++ 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
<table>
<thead>
<tr>
<th>Links</th>
<th>Language of instruction</th>
<th>English</th>
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<tbody>
<tr>
<td>Duration (semesters)</td>
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<td>1 Semester</td>
</tr>
<tr>
<td>Module frequency</td>
<td></td>
<td>recommended in semester 4, time is flexible and subject to individual arrangement</td>
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<tr>
<td>Module capacity</td>
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<td>unlimited</td>
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<td>Modullevel / module level</td>
<td></td>
<td>Abschlussmodul / Conclude</td>
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<td>Modulart / typ of module</td>
<td></td>
<td>Pflicht / Mandatory</td>
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<tr>
<td>Vorkenntnisse / Previous knowledge</td>
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<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final exam of module</td>
<td></td>
<td>Master Thesis (90%), oral presentation (colloquium, 10%)</td>
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<td>Course type</td>
<td>Colloquium</td>
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<tr>
<td>SWS</td>
<td>1</td>
<td></td>
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<tr>
<td>Frequency</td>
<td>SoSe oder WiSe</td>
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