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Modules for Biology

Background Modules

bio605 - Molecular Genetics and Cell Biology

<table>
<thead>
<tr>
<th>Module label</th>
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<td>Workload</td>
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Applicability of the module

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

Responsible persons

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

Prerequisites

BSc (Biologie, Biochemie)

Skills to be acquired in this module

++ deepened biological expertise
++ deepened knowledge of biological working methods
+ data analysis skills
++ interdisciplinary thinking
+ critical and analytical thinking
+ independent searching and knowledge of scientific literature
+ data presentation and discussion in German and English (written and spoken)
+ teamwork
+ ethics and professional behaviour
+ project and time management

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/

Language of instruction

English

Duration (semesters)

1 Semester

Module frequency

Module capacity

15

Reference text

associated with bio900

Modullevel / module level

MM (Mastermodul / Master module)

Modulart / typ of module

Wahlpflicht / Elective

Lehr-/Lernform / Teaching/Learning method

Vorkenntnisse / Previous knowledge

Zellbiologische Grundkenntnisse, Genetik, Biochemie

Examination

Time of examination

Type of examination

Final exam of module

written examination (70 %), paper(s) presentation 30 %; not graded: signed lab protocols, regular active participation is required for the module to be passed.
<table>
<thead>
<tr>
<th>Course type</th>
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<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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**Total time of attendance for the module**

112 h
bio655 - Ornithology

Module label: Ornithology
Module code: bio655
Credit points: 12.0 KP
Workload: 360 h

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

Responsible persons:
- Liedvogel, Miriam (Module responsibility)
- Klump, Georg Martin (Module counselling)
- Bouwhuis, Sandra (Module counselling)
- Köppl, Christine (Module counselling)
- Langemann, Ulrike (Module counselling)
- Mouritsen, Henrik (Module counselling)
- Schmaljohann, Heiko (Module counselling)
- Feenders, Gesa (Module counselling)

Liedvogel, Miriam (Authorized examiners)
- Klump, Georg Martin (Authorized examiners)
- Bouwhuis, Sandra (Authorized examiners)
- Köppl, Christine (Authorized examiners)
- Langemann, Ulrike (Authorized examiners)
- Mouritsen, Henrik (Authorized examiners)
- Schmaljohann, Heiko (Authorized examiners)
- Feenders, Gesa (Authorized examiners)

Prerequisites:
The module imparts advanced knowledge on different aspects of ornithology. The students acquire:

- An extended knowledge of morphological and physiological fundamentals and the resulting ecological and behaviour-biological consequences in birds
- Knowledge, presentation and discussion of relevant English literature from various fields of ornithology
  += deepened biological expertise
  + deepened knowledge of biological working methods
  + critical and analytical thinking
  + independent searching and knowledge of scientific literature
  ++ data presentation and discussion in German and English (written and spoken)

Module contents:
The module is composed of the lecture “Ecology and Physiology of Birds”, a seminar accompanying the lecture “Current Questions of Ornithology”, a seminar “Behavioural Ecology of Birds”, and a seminar “Methods in Field Ornithology”.

Lecture “Ecology and Physiology of Birds”:
This lecture consolidates special aspects of systematics, morphology, physiology, migration, orientation, population biology, communication and behavioural ecology in birds.

Seminar “Current Questions of Ornithology”:
In this seminar, original English publications are presented and discussed which deal with current research results from various fields treated in the lecture. Every student reads a paper on one scientific article and discusses the results of that article with the other participants.

Seminar “Behavioural Ecology of Birds” (option 1):
In the seminar, current literature relating to the life history of birds will be reported. During the term, each participant is presenting an original paper in a short talk and the group of students will be guided to critically discuss the paper.
Seminar "Methods in Field Ornithology" (option 2):
The core methods of field ornithology, such as stable isotopes, bird census, ringing, radar, radio tracking, etc.,
will be introduced with the help of English scientific papers by the students. In the presentations the corresponding methods will be explained in detail with an emphasis on the pros and cons of the method. The aim of this seminar is to learn how to deal with scientific methods in a critical way.

Reader's advisory

Links
Participating Institution: Institut für Vogelforschung
http://www.ifv-vogelwarte.de

Languages of instruction
German, English

Duration (semesters)
1 Semester

Module frequency

Module capacity
30

Reference text
associated with bio900

Modullevel / module level
MM (Mastermodul / Master module)

Modulart / typ of module
Wahlpflicht / Elective

Vorkenntnisse / Previous knowledge

Examination
Time of examination
Type of examination

Final exam of module
Klausur in der letzten Vorlesungswoche
Presentations 40% (the main seminar is mandatory, one of the two options one need to be taken)
Written examination 60%
Regular active participation is required for the module to be passed successfully.

Course type
Comment
SWS
Frequency
Workload of compulsory attendance

Lecture
4
WiSe
56

Seminar
4
WiSe
56

Total time of attendance for the module
112 h
bio675 - Molecular Ecology

Module label: Molecular Ecology

Module code: bio675

Credit points: 12.0 KP

Workload: 360 h

Applicability of the module
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Landscape Ecology (Master) > Basismodule

Responsible persons
- Nolte, Arne (Module responsibility)
- Gerlach, Gabriele (Module counselling)
- Nolte, Arne (Authorized examiners)
- Gerlach, Gabriele (Authorized examiners)

Prerequisites
- B.Sc. (Biologie, Umweltwissenschaften)
- M.Sc. (Biologie, Marine Umweltwissenschaften, Landschaftsökologie)

Skills to be acquired in this module
- The field of molecular ecology strives to identify relationships between species genotypes, phenotypes and ecological factors. It addresses questions about how organisms adapt and explains patterns of distribution and biodiversity. During the course, participants will get to know the biological background to design an experiment in the field of molecular ecology. We will discuss the state of the art according to literature. Participants will perform sampling and conduct steps of the analysis. The course will cover field methods (sampling) and lab methods (behavior experiments, genetic analyses, phenotypic analyses) as well as computer based analyses.
- ++ 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 in German and English (written and spoken)
- + statistics & scientific programming

Module contents
- Lecture: AN/GG - Molecular ecology background of specific study systems. The lectures will introduce a study system that will be analyzed during the course (study systems may vary from year to year). It is the goal of the lecture to provide students with background information to develop an experimental design of a field study during the practical.
- Exercise: AN/GG - Mixed course with laboratory and field exercises. Samples will be collected in the field. One goal of the course is to apply modern analyses to understand how organisms are distributed. Another aspect is the application of molecular markers to analyze behavioral experiments.

Readers' advisory
- will be announced during the course

Links
- Languages of instruction: German, English
- Duration (semesters): 1 Semester

Module frequency

Module capacity: 15

Reference text
- associated with bio890 Current Topics of Biology (Seminar)

Modullevel / typ of module
- MM (Mastermodul / Master module)

Lehr-/Lernform / Teaching/Learning method

Examination
- Time of examination: during the module
- Type of examination: Präsentationen (50%), Portfolio (50%). Regular participation is a prerequisite to pass in the module.

Course type
- Comment: SWS
- Frequency: Workload of compulsory attendance
- Lecture: 2 SuSe 28
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<th>Frequency</th>
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**Total time of attendance for the module**

112 h
**bio695 - Biochemical concepts in signal transduction**

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<tr>
<td>Workload</td>
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| Applicability of the module | Master's Programme Biology (Master) > Background Modules  
|               | Master's Programme Molecular Biomedicine (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  
| 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 |  
| Module capacity | 20  
| Modullevel / module level | MM (Mastermodul / Master module)  
| Modulart / typ of module | Wahlpflicht / Elective  |
| Lehr-/Lernform / Teaching/Learning method |  
| Vorkenntnisse / Previous knowledge |  
| Examination | Time of examination  
| Final exam of module | written examination (50%)  
| Course type | Comment | SWS | Frequency | Workload of compulsory attendance |
| Lecture | 1 | WiSe | 14  
| Seminar | 1 | WiSe | 14  
| Exercises | 6 | WiSe | 84  
| Total time of attendance for the module | 112 h

---
bio703 - Basic Concepts in Plant Sciences

Module label | Basic Concepts in Plant Sciences
--- | ---
Module code | bio703
Credit points | 12.0 KP
Workload | 360 h

Applicability of the module
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Biology (Master) > Background Modules

Responsible persons
- Laubinger, Sascha (Module responsibility)
- Zotz, Gerhard (Module counselling)
- Albach, Dirk Carl (Module counselling)
- von Hagen, Klaus Bernhard (Module counselling)
- Laubinger, Sascha (Authorized examiners)
- Zotz, Gerhard (Authorized examiners)
- Albach, Dirk Carl (Authorized examiners)
- von Hagen, Klaus Bernhard (Authorized examiners)

Prerequisites
- Communicating deeper knowledge in ecology, phylogeny, evolution and genetics of plants
- Communicating scale- and method-overarching thinking
- Communicating deeper theoretic concepts of ecology, evolution and genetics of plants
- 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 in German and English (written and spoken)
- Teamwork
- Ethics and professional behaviour

Module contents
- V: Biodiversity of plants (2 SWS)
- V: Resource acquisition and use by plants (1 SWS)
- V: Gene expression in plants (1 SWS)
- S: Phylogeny of plants (2 SWS)
- S: Interactions of plants with environmental parameters (2SWS)

Reader's advisory

Links
- Languages of instruction: German, English
- Duration (semesters): 1 Semester
- Module frequency: 12
- Module capacity: 12
- Reference text: associated with bio765 (Current Methods in Plant Science) (recommended)
- Module level / module level: MM (Mastermodul / Master module)
- Moduleart / typ of module: Wahlpflicht / Elective
- Lehr-/Lernform / Teaching/Learning method
- Vorkenntnisse / Previous knowledge: Ökologie, Flora, Genetik

Examination
- Time of examination
- Type of examination
- Final exam of module: 1 Portfolio
- Course type | Comment | SWS | Frequency | Workload of compulsory attendance
--- | --- | --- | --- | ---
Lecture | 4 | WiSe | 56
Seminar | 4 | WiSe | 56

Total time of attendance for the module: 112 h
**bio720 - Marine Biodiversity**

<table>
<thead>
<tr>
<th>Module label</th>
<th>Marine Biodiversity</th>
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<tr>
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<tr>
<td>Credit points</td>
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<td>Responsible persons</td>
<td></td>
</tr>
<tr>
<td>Martinez Arbizu, Pedro Miguel (Module responsibility)</td>
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<td>Glatzel, Thomas (Module counselling)</td>
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<tr>
<td>Martinez Arbizu, Pedro Miguel (Authorized examiners)</td>
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<td>Glatzel, Thomas (Authorized examiners)</td>
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<tr>
<td>Wehrmann, Achim (Authorized examiners)</td>
<td></td>
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<tr>
<td>Rossel, Sven (Authorized examiners)</td>
<td></td>
</tr>
<tr>
<td>Gutt, Julian (Authorized examiners)</td>
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<tr>
<td>Kröncke, Ingrid (Authorized examiners)</td>
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<td>Skills to be acquired in this module</td>
<td>++ 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 in German and English (written and spoken) ++ teamwork ++ ethics and professional behaviour + project and time management ++ statistics &amp; scientific programming</td>
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<tr>
<td>Module contents</td>
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<td>L: (AW) General Marine Geology E: Biogenic sedimentation, Interaction benthos-sediment; (SS) Plankton of the oceans; (MH) unicellular plankton; (IK) benthos of the North-Sea; (PM) biodiversity in the deep sea and on seamounts; (JG) conceptions and hypotheses of marine biodiversity, biodiversity of marine vertebrates; (GG) animal migrations and dispersal behaviour. Methods and scientific work on research vessels. A lecture comprises the above-mentioned subjects and imparts marine biological theories, research results and methods. In the seminar, research is presented and discussed. In the laboratory course/exercises, subjects are treated in coordination with the contents of the lecture. With the aid of a computer, data are analysed and interpreted statistically.</td>
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<tr>
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<td>as announced in the lecture</td>
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<td>Vorkenntnisse / Previous knowledge</td>
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<td>Examination</td>
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<td>Time of examination</td>
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<td>Type of examination</td>
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<td>Final exam of module</td>
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<td>Written examination (60 %), portfolio (20 %), short presentation (20 %)</td>
<td>Regular active participation is required for the module to be passed.</td>
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<td>Total time of attendance for the module</td>
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bio733 - Evolutionary Biology Population Genetics

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<tr>
<td>Credit points</td>
<td>6.0 KP</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 Biology (Master) &gt; Background Modules</td>
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<td>Responsible persons</td>
<td>Gerlach, Gabriele (Module responsibility)</td>
</tr>
<tr>
<td></td>
<td>Albach, Dirk Carl (Module counselling)</td>
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<td></td>
<td>Gerlach, Gabriele (Authorized examiners)</td>
</tr>
<tr>
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<td>Albach, Dirk Carl (Authorized examiners)</td>
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<tr>
<td>Prerequisites</td>
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<td>Skills to be acquired in this module</td>
<td>+ vertiefte biologische Fachkenntnisse</td>
</tr>
<tr>
<td></td>
<td>++ vertiefte Kenntnisse biologischer Arbeitstechniken</td>
</tr>
<tr>
<td></td>
<td>++ Fähigkeit zur Datenanalyse; ++ kritisches und analytisches Denken</td>
</tr>
<tr>
<td></td>
<td>++ eigenständige Recherche und Kenntnisse wissenschaftlicher Primärliteratur</td>
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<tr>
<td></td>
<td>++ Datenpräsentation und Diskussion in Wort und Schrift (D/E)</td>
</tr>
<tr>
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<td>+ Teamfähigkeit</td>
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<td>++ Statistik und wissenschaftliches Programmieren</td>
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<tr>
<td>Reader's advisory</td>
<td>aktuelle wissenschaftliche Artikel zur Evolutionsbiologie</td>
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<tr>
<td></td>
<td>Futuyama D. Evolutionary Biology, Elsevier, Hartl &amp; Clark Principles of Population Genetics, Sinauer</td>
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<td>German, English</td>
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<td>Module frequency</td>
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<td>12</td>
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**Vorkenntnisse / Previous knowledge**

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<td>portfolio (60%) presentation (40%)</td>
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**Comment**

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Total time of attendance for the module 56 h
### bio736 - Evolutionary Transcriptomics

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<tr>
<th><strong>Module label</strong></th>
<th>Evolutionary Transcriptomics</th>
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<td><strong>Module code</strong></td>
<td>bio736</td>
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<tr>
<td><strong>Credit points</strong></td>
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<tr>
<td><strong>Workload</strong></td>
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</table>

#### Applicability of the module
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Biology (Master) > Background Modules

#### Responsible persons
- Nolte, Arne (Module responsibility)
- Laubinger, Sascha (Module counselling)
- Gowik, Udo (Module counselling)
- Nolte, Arne (Authorized examiners)
- Laubinger, Sascha (Authorized examiners)
- Gowik, Udo (Authorized examiners)

#### Prerequisites
none

#### Skills to be acquired in this module
+ deepened biological expertise
++ deepened knowledge of biological working methods
++ data analysis skills; ++ critical and analytical thinking
+ independent searching and knowledge of scientific literature
++ data presentation and discussion in English (written and spoken)
++ statistics & scientific programming

#### Module contents
Lecture: Gene expression represents the first step of the translation of genomic information into a phenotype. This phenotype is of broad interest in all disciplines of biology. Gene expression data can reveal how genetic changes at single genes manifest phenotypically and how gene expression is regulated. The same data can also explain differences in life history and adaptation to different environments. Different perspectives can be understood by studying mechanisms of gene regulation as well as broad scale transcriptomics analyses.

Exercise: We will generate and analyze gene expression data during the course including wet lab and computational methods. Practicals include the analysis of single-gene expression data as well as RNAseq data representing complete transcriptomes.

#### Reader's advisory

#### Links
Languages of instruction
- German, English

Duration (semesters)
- 1 Semester

Module frequency
- 12

Reference text
- associated with bio733: Evolutionary Biology Population Genetics (recommended)

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

Modulart / typ of module
- Wahlpflicht / Elective

#### Lehr-/Lernform / Teaching/Learning method
Vorkenntnisse / Previous knowledge
- Grundkenntnisse Evolutionsbiologie

#### Examination

<table>
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<tr>
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<td></td>
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<td>portfolio (60%) presentation (40%)</td>
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<th>Workload of compulsory attendance</th>
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| Total time of attendance for the module | 56 h |

15 / 77
### bio765 - Current Methods in Plant Sciences - Ecology, Phylogeny and Molecular Biology

<table>
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<th>Module label</th>
<th>Current Methods in Plant Sciences - Ecology, Phylogeny and Molecular Biology</th>
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<tr>
<td>Module code</td>
<td>bio765</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 Biology (Master) > Background Modules |
| Responsible persons |  
- Albach, Dirk Carl (Module responsibility)  
- Laubinger, Sascha (Module counselling)  
- Zotz, Gerhard (Module counselling)  
- Albach, Dirk Carl (Authorized examiners)  
- Laubinger, Sascha (Authorized examiners)  
- Zotz, Gerhard (Authorized examiners) |
| Prerequisites | Acquaintance and practicing ecological, phylogenetic and molecular methods  
Communication of scale- and method-overarching thinking and project planning  
Knowledge of current methods and questions in plant science  
Capacity for teamwork, project- and time management  
++ 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 in German and English (written and spoken)  
+ teamwork  
+ statistics & scientific programming |
| Module contents | Ü: Current Methods in Plant Science (8 SWS) |
| Reader's advisory |  |
| Links |  |
| Languages of instruction | German, English |
| Duration (semesters) | 1 Semester |
| Module frequency |  |
| Module capacity | 12 |
| Reference text | associated with bio703 (Basic Concepts in Plant Sciences) (recommended) |
| Modullevel / module level | MM (Mastermodul / Master module) |
| Modulart / typ of module | Wahlpflicht / Elective |
| Lehr-/Lernform / Teaching/Learning method |  |
| Vorkenntnisse / Previous knowledge | Ökologie, Flora, Genetik |
| Examination | Time of examination | Type of examination | Portfolio |
| Final exam of module |  |
| Course type | Exercises |
| SWS | 8 |
| Frequency | WiSe |
| Workload attendance | 112 h |
bio770 - Field Methods in Organismal Biology

Module label | Field Methods in Organismal Biology
Module code | bio770
Credit points | 15.0 KP
Workload | 450 h

Applicability of the module
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Landscape Ecology (Master) > Basismodule

Responsible persons
- Zotz, Gerhard (Module responsibility)
- Gerlach, Gabriele (Module counselling)
- Albach, Dirk Carl (Module counselling)
- Glatzel, Thomas (Module counselling)
- von Hagen, Klaus Bernhard (Module counselling)
- Mouritsen, Henrik (Module counselling)
- Zotz, Gerhard (Authorized examiners)
- Gerlach, Gabriele (Authorized examiners)
- Albach, Dirk Carl (Authorized examiners)
- Glatzel, Thomas (Authorized examiners)
- von Hagen, Klaus Bernhard (Authorized examiners)
- Mouritsen, Henrik (Authorized examiners)

Prerequisites

Skills to be acquired in this module
- [nop] ++ 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 in German and English (written and spoken) ++ project and time management ++ statistics & scientific programming [/nop]

The molecule aims at enabling students to apply theoretical knowledge to practical, hypothesis-based field studies within the scope of a seminar. The data derived from the individual projects performed are then to be documented and discussed in the form of a written laboratory course report oriented by a scientific publication and to be written in English. Several teachers cooperate to enable interdisciplinary approaches (e.g. botanical-zoological approaches).

Module contents
- S: Biogeographic and ecological classification and characterization of a biome (e.g. Mediterranean region, moist tropics, boreal zone), independent identification and treatment of scientific questions, presentation of scientific results in a "mini symposium" subsequent to the field studies.
- E: Planning and performing a field study project, data analysis, written report in the form of a scientific publication.

Reader's advisory
Varies with topic and field locality

Links
www.uni-oldenburg.de/fun_eco/

Languages of instruction
German, English

Duration (semesters)
1 Semester

Module frequency
jährlich

Module capacity
21

Modullevel / module level
MM (Mastermodul / Master module)

Modulart / typ of module
Wahlpflicht / Elective

Lehr-/Lernform / Teaching/Learning method

Vorkenntnisse / Previous knowledge

<table>
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<td>2 Presentations (30 %) Laboratory course report on project work (70 %)</td>
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**Total time of attendance for the module** 168 h
**bio773 - Sequence based biomonitoring**

**Module label**
Sequence based biomonitoring

**Module code**
bio773

**Credit points**
12.0 KP

**Workload**
360 h

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

**Responsible persons**
- Nolte, Arne (Module responsibility)
- Laubinger, Sascha (Module counselling)
- Dennenmoser, Stefan (Module counselling)
- Nolte, Arne (Authorized examiners)
- Laubinger, Sascha (Authorized examiners)
- Dennenmoser, Stefan (Authorized examiners)

**Prerequisites**
none

**Skills to be acquired in this module**
- deepened biological expertise; 
- deepened knowledge of biological working methods; 
- data analysis skills; 
- critical and analytical thinking; 
- independent searching and knowledge of scientific literature; 
- data presentation and discussion in English (written and spoken); 
- statistics and scientific computing

**Module contents**

Content of the module:

Lecture: The identification of organisms based on DNA sequences is well established and databased dedicated for this purpose are growing through 'barcoding of life' initiatives. Such information can be used to assign sequences extracted from environmental samples to individual species. This can be used to obtain species inventories and to study communities. While these methods are already used in fundamental research, they are only slowly adopted by fields such as conservation and ecosystem monitoring. The lecture covers concepts, methods, promises and problems of sequence based biomonitoring.

Seminar: participants present topics relevant to the module.

Exercise: We will generate and analyse sequence data data from environmental samples to generate species inventories for terrestrial and aquatic ecosystems. For this purpose we will extract eDNA from samples and apply next generation sequencing. The read data will be jointly analysed on the university hpc cluster. The participants will study methods and concepts associated with the analyses and present them in short presentations. The key aspect in the practical cours is to assign sequences to species and to discuss the applicability of the methods in fundamental research and in applied, management oriented research.

**Reader's advisory**

**Links**

**Language of instruction**
English

**Duration (semesters)**
1 Semester

**Module frequency**
annual

**Module capacity**
16

**Reference text**

Associated with the module:

- Evolutionary Biology Gerlach/Albach.
- Molecular Ecology: Nolte/Gerlach

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

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

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

**Vorkenntnisse / Previous knowledge**
- Evolutionsbiologie
- Lesen von englischer Fachliteratur und die Präsentation von Seminarthemen auf Englisch.
- Grundkenntnisse zum Arbeiten in einem Genlab und mit dem Computer.
- Kartierung von Arten im Freiland

<table>
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<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
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<tbody>
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<td>2 parts: Präsentation (50%) und Portfolio (50%)</td>
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<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>Lecture</td>
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<td>1</td>
<td>WiSe</td>
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<tr>
<td>Seminar</td>
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<td>WiSe</td>
<td>14</td>
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<tr>
<td>Exercises</td>
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<td>WiSe</td>
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| Total time of attendance for the module | 112 h |
## bio780 - Biodiversity of Littoral Communities

<table>
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<td>Module code</td>
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<td>Credit points</td>
<td>15.0 KP</td>
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<tr>
<td>Workload</td>
<td>450 h</td>
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| Applicability of the module  | - Master's Programme Biology (Master) > Background Modules  
- Master's Programme Biology (Master) > Background Modules |
| Responsible persons          | Glatzel, Thomas (Module responsibility)  
Martinez Arbizu, Pedro Miguel (Module counselling)  
Glatzel, Thomas (Authorized examiners)  
Martinez Arbizu, Pedro Miguel (Authorized examiners) |
| Prerequisites                | Safe apnoediving with aptitude test and medical fitness certificate |
| Skills to be acquired in this module | [nop] + deepened knowledge of biological working methods + ability to perform independent biological research + teamwork + ethics and professional behaviour + project and time management |
| Skills to be acquired in this module | By actively participating in this module students acquire qualifications in the following fields:  
- Biological oceanography, marine biology and marine ecology - Geological formation history of the Mediterranean Sea and Atlantic Ocean, respectively, or the Red Sea and adjacent seas - Oceanography and hydrology - Development of the faunal and floras composition of the Atlantic Ocean, the Mediterranean Sea and the Mediterranean region or the Red Sea (biogeography) - Commercial utilization of the seas and its impacts - Biotopes and biotic communities - Evolution, systematics, morphology, modes of life, and ecology of selected animal groups - Applying theoretical knowledge to real-world organisms/systems - Improved and specialized knowledge of species - Adaptation of life cycles - Interaction between organisms and environment - Dynamics of reef-building and reef-degrading processes - Threat to coral reefs/protection of marine environments Methods: - Formulation and definition of scientific approaches and selection of methods - Observation and investigation of organisms and their habitats (snorkeling/diving) - Documentation of small research projects in groups in the style of a scientific publication - Editorial work to prepare a module report - Popular presentation of results to be published by the media and to be presented at the University Further skills: - Social engagement in groups/teamwork in projects - Independent scientific work in groups - Improvement of scientific discussion culture - Consciousness of the threat to coral reefs - Practising English - Dealing with the culture of the visited region Culture: - History, culture, politics, and religion Additionally: - Physiological aspects of apnoediving - Measures in case of accidents (also caused by "poisonous" organisms) |
<p>| Module contents              | Biodiversity of littoral biotic communities – topographical field research |
| Links                        |                                      |
| Language of instruction      | German                               |
| Duration (semesters)         | 1 Semester                           |
| Module frequency             | jährlich                             |
| Module capacity              | unlimited                            |
| Modulelevel/module level     | MM (Mastermodul / Master module)     |
| Modulart/typ of module       | Wahlpflicht / Elective               |
| Lehr-/Lernform/Teaching/Learning method |                                      |
| Vorkenntnisse/Previous knowledge |                                      |</p>
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<tr>
<th>Examination</th>
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<th>Type of examination</th>
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<tbody>
<tr>
<td>Final exam of module</td>
<td>during the lectures</td>
<td>2 short presentations (30 %), 1 internship report (70 %) (project report in the style of a scientific publication) PLEASE NOTE: Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.</td>
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<table>
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<tr>
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<th>Comment</th>
<th>SWS</th>
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**Total time of attendance for the module** 168 h
bio845 - Introduction to Development and Evolution

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<tr>
<td>Module code</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
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**Applicability of the module**
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Neuroscience (Master) > Background Modules

**Responsible persons**
- Sienknecht, Ulrike (Module responsibility)
- Sienknecht, Ulrike (Module counselling)
- Sienknecht, Ulrike (Authorized examiners)
- Claußen, Maike (Authorized examiners)

**Prerequisites**

**Skills to be acquired in this module**
Upon successful completion of this course, students

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

**skills:**

++ deepened biological expertise

+ deepened knowledge of biological working methods

++ interdisciplinary thinking

++ critical and analytical thinking

+ independent searching and knowledge of scientific literature

+ ability to perform independent biological research

+ teamwork

**Module contents**

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

- Introduction to Developmental Biology
- Cell-Cell Communication
- Differential Gene Expression (I and II)
- Early Development of Vertebrates, Gastrulation
- Neurulation
- Brain Development
- Axonal Growth, Target Selection, Synaptogenesis and Refinement
- Neural Crest
- Mesoderm Development
- Morphogenesis
- Developmental Mechanisms of Evolutionary Change
- Model Organisms in Developmental Biology
- Transgenic Mice
- Medical Implications of Developmental Biology

Reader's advisory

Literature:

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

Links

Language of instruction: English
Duration (semesters): 1 Semester

Module frequency

Module capacity: 20
(selection criteria: sequence of registration)

Reference text
associated with bio846 (previously neu120) (Lab Exercises in Development and Evolution)

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

Modulart / typ of module: Wahlpflicht / Elective

Lehr-/Lernform / Teaching/Learning method

Vorkenntnisse / Previous knowledge: organismic biology, developmental biology, evolutionary biology, neurobiology, genetics, molecular biology

Examination

Time of examination: same winter term
Type of examination: oral exam of 30 minutes (or written exam) *Pending approval PO

Final exam of module

Course type: Lecture, Seminar
Comment: 3
SWS: 3
Frequency: WiSe
Workload of compulsory attendance: 45

Total time of attendance for the module: 90 h
### bio846 - Lab Exercises in Development and Evolution

<table>
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<tr>
<th>Module label</th>
<th>Lab Exercises in Development and Evolution</th>
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<tbody>
<tr>
<td>Module code</td>
<td>bio846</td>
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<td>Credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
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</table>
| Applicability of the module | • Master's Programme Biology (Master) > Background Modules  
• Master's Programme Biology (Master) > Background Modules  
• Master's Programme Neuroscience (Master) > Background Modules |
| Responsible persons| Sienknecht, Ulrike (Module responsibility)  
Sienknecht, Ulrike (Module counselling)  
Sienknecht, Ulrike (Authorized examiners)  
Claußen, Maike (Authorized examiners)  
Ebbers, Lena (Authorized examiners) |
| Prerequisites      | mandatory prerequisite is the module bio845 (neu110) (Introduction to Development and Evolution) |
| Skills to be acquired in this module | Upon successful completion of this course, students have skills in methods of developmental biology:  
• are capable of performing live embryo husbandry  
• are able to carry out in-ovo stainings  
• are familiar with the use of embryonic stage discrimination standards for model organisms  
• document the observed embryonic stages by drawings with anatomical labelling  
• are familiar with tissue preparation (including cryosectioning), the use of different molecular markers, and immunohistological staining methods  
• microscopy, data analysis, and photographic data documentation  
• know the standards of proper documentation of research data and the universal format of a lab notebook  
• know how to carry out formal laboratory reports (and the structure of a scientific paper)  
• have basic knowledge in the field of auditory system development  
• have basic knowledge of the organisation of the auditory system across vertebrate groups  
• have basic knowledge of the development of the middle and inner ear, as well as selected auditory brain centres  
• are able to summarize current hypotheses about the evolution of the auditory system in vertebrates skills:  
++ deepened biological expertise  
++ deepened knowledge of biological working methods  
++ data analysis skills  
++ critical and analytical thinking  
+ independent searching and knowledge of scientific literature  
++ ability to perform independent biological research  
+ data presentation and discussion (written and spoken)  
+ teamwork  
+ ethics and professional behaviour  
+ project and time management |
| Module contents    | Lab exercises in developmental biology of auditory research model organisms, such as chicken and mouse |
embryos. Practical introduction to methods, such as in-ovo live observation; developmental stage discrimination and description, tissue preparation for histology, sectioning, staining, and microscopy, including data analyses. Seminars in the field of auditory system development and methods based on current literature

### Reader's advisory


### Links

<table>
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<tr>
<th>Language of instruction</th>
<th>English</th>
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<td>Duration (semesters)</td>
<td>1 Semester</td>
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<tr>
<td>Module capacity</td>
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<td>Reference text</td>
<td>Associated with bio845 (previously neu110) (Introduction to Development and Evolution)</td>
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<tr>
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<td>MM (Mastermodul / Master module)</td>
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<tr>
<td>Modulart / typ of module</td>
<td>Wahlpflicht / Elective</td>
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<tr>
<td>Previous knowledge</td>
<td>organismic biology, experience with lab work</td>
</tr>
<tr>
<td>Examination Time of examination</td>
<td>Type of examination</td>
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<td>Final exam of module</td>
<td>same winter term</td>
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### Course type

| SWS | 6 |
| Frequency | WiSe |
| Workload attendance | 84 h |
**bio860 - Comparative Developmental Biology**

<table>
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<td>Applicability of the module</td>
<td>Master's Programme Biology (Master) &gt; Background Modules</td>
</tr>
<tr>
<td>Responsible persons</td>
<td>Sienknecht, Ulrike (Module responsibility)</td>
</tr>
<tr>
<td></td>
<td>Sienknecht, Ulrike (Authorized examiners)</td>
</tr>
<tr>
<td></td>
<td>N., N. (Module counselling)</td>
</tr>
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</table>

**Prerequisites**

Skills to be acquired in this module:

- ++ deepened biological knowledge
- ++ deepened knowledge of techniques in biology
- ++ knowledge in data analysis and presentation
- ++ cross-disciplinary knowledge and thinking
- ++ critical and analytical thinking
- ++ independent searching and knowledge of scientific literature
- ++ ability to perform independent biological research
- ++ data presentation and discussion in German and English (written and spoken)
- ++ team work
- ++ ethics and professional behaviour
- ++ project and time management

**Module contents**

Lectures and Lab exercises in topics of evolutionary developmental biology, i.e. comparative developmental biology, such as the development of sensory systems in different species.

**Reader's advisory**


**Links**

- Language of instruction: English
- Duration (semesters): 1 Semester

**Module capacity**

6 (Reihenfolge der Anmeldungen)

**Reference text**

associated with bio845 Introduction to Development and Evolution

**Modullevel / module level**

MM (Mastermodul / Master module)

**Modulart / typ of module**

Wahlpflicht / Elective

**Vorkenntnisse / Previous knowledge**

organismic biology, experience with lab work

**Examination**

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<tr>
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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
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<td>1</td>
<td>SuSe</td>
<td>14</td>
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<td>Exercises</td>
<td></td>
<td>3</td>
<td>SuSe</td>
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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 background literature reading and preparation for sh
- 1 SWS Seminar (SE)
- Total workload 30h: 10h contact / 20h literature reading and preparation of result presentation
- 8 SWS Supervised exercise (UE)
- Total workload 240h: 200h contact / 40h results analysis, writing of short reports for portfolio

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

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

Prerequisites:
- Basic knowledge of neurobiology

Skills to be acquired in this module:
- ++ Neurosci. knowlg.
- ++ Expt. Methods
- + Independent research
- ++ Scient. Literature
- + Social skills
- + Maths/Stats/Progr.
- ++ Data present./disc.
- + Scientific English
- + Ethics

Upon successful completion of this course, students
- have basic knowledge of electrophysiological techniques used in neuroscience research
- have acquired first practical skills in some electrophysiological techniques
- have acquired basic skills in data analysis
- have knowledge on retinal physiology and anatomy of the visual system
- have basic knowledge of brain structures and their function
- have profound knowledge of the architecture and circuits of the vertebrate retina
- have acquired basic skills in histological techniques (tissue fixation, embedding, sectioning, staining procedures, immunohistochemistry)
- have acquired fundamental skills in microscopy (differential interference contrast microscopy, phase-contrast microscopy, confocal microscopy)

Module contents:
The background module Neurophysiology consists of two weeks of theoretical introduction and two weeks of hands-on lab exercises in patch or extracellular recordings and two weeks of hands-on lab exercises in anatomy.

The seminars cover the following topics:
- Visual system
- Introduction to electrophysiological methods
- Introduction into methods used in neuranatomy and neurochemistry
- Introduction into microscopy and image analysis
- Presentation and discussion of results relating to the literature

Reader's advisory:
Course scripts and mandatory scientific literature discussed in the seminar will be available in Stud.IP. Background and seminar literature will be available in Stud.IP.

Language of instruction:
English
### Duration (semesters)
1 Semester

### Module frequency
annually, summer term, first half (full time)

### Module capacity
12 - with Visual Neuroscience: Anatomy (Shared course components with (cannot be credited twice): neu151 BM Visual Neuroscience: Anatomy)

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

### Modulart / typ of module
Wahlpflicht / Elective

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

### Vorkenntnisse / Previous knowledge
Basic knowledge in neurobiology

### 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>during the course (summer semester, first half) In addition, mandatory but ungraded: seminar presentation</td>
<td></td>
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### Course type

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
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</tr>
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<tbody>
<tr>
<td>Lecture</td>
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<td>SuSe or WiSe</td>
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</tr>
<tr>
<td>Seminar</td>
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<td>2</td>
<td>SuSe or WiSe</td>
<td>28</td>
</tr>
<tr>
<td>Exercises</td>
<td></td>
<td>2</td>
<td>SuSe or WiSe</td>
<td>28</td>
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### Total time of attendance for the module
84 h
**neu150 - Visual Neuroscience - Anatomy**

<table>
<thead>
<tr>
<th>Module label</th>
<th>Visual Neuroscience - Anatomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>neu150</td>
</tr>
<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
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<tr>
<td>Applicability of the module</td>
<td></td>
</tr>
<tr>
<td>• Master's Programme Biology (Master) &gt; Background Modules</td>
<td></td>
</tr>
<tr>
<td>• Master's Programme Molecular Biomedicine (Master) &gt; Background Modules</td>
<td></td>
</tr>
<tr>
<td>• Master's Programme Neuroscience (Master) &gt; Background Modules</td>
<td></td>
</tr>
<tr>
<td>Responsible persons</td>
<td></td>
</tr>
<tr>
<td>Janssen-Bienhold, Ulrike (Module responsibility)</td>
<td></td>
</tr>
<tr>
<td>Dedek, Karin (Module counselling)</td>
<td></td>
</tr>
<tr>
<td>Janssen-Bienhold, Ulrike (Authorized examiners)</td>
<td></td>
</tr>
<tr>
<td>Dedek, Karin (Authorized examiners)</td>
<td></td>
</tr>
<tr>
<td>Prerequisites</td>
<td>attendance in pre-meeting</td>
</tr>
<tr>
<td>Module contents</td>
<td></td>
</tr>
<tr>
<td>Lecture: 14 h Introduction to current neurobiological approaches and results.</td>
<td></td>
</tr>
<tr>
<td>Seminar: 14 h Discussion of background literature and results of own experiments.</td>
<td></td>
</tr>
<tr>
<td>Lab course: 3 weeks, each 24 h neuroanatomical experiments in small groups on vertebrate retina and brain.</td>
<td></td>
</tr>
<tr>
<td>Reader's advisory</td>
<td>Background and seminar literature will be available in Stud.IP</td>
</tr>
<tr>
<td>Links</td>
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</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>jährlich</td>
</tr>
<tr>
<td>Module capacity</td>
<td>unlimited</td>
</tr>
<tr>
<td>Reference text</td>
<td>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.</td>
</tr>
<tr>
<td>Modullevel / module level</td>
<td>BC (Basiscurriculum / Base curriculum)</td>
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<tr>
<td>Modulart / typ of module</td>
<td>je nach Studiengang Pflicht oder Wahlpflicht</td>
</tr>
<tr>
<td>Vorkenntnisse / Previous knowledge</td>
<td></td>
</tr>
<tr>
<td>Examination</td>
<td></td>
</tr>
<tr>
<td>Final exam of module</td>
<td>summer semester, first half</td>
</tr>
<tr>
<td>Type of examination</td>
<td>Portfolio (75 %), report (25%)</td>
</tr>
<tr>
<td>Course type</td>
<td>Comment</td>
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<tr>
<td>Lecture</td>
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<td>Seminar</td>
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<tr>
<td>Practical training</td>
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<td>Total time of attendance for the module</td>
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# neu210 - Neurosensory Science and Behaviour

<table>
<thead>
<tr>
<th>Module label</th>
<th>Neurosensory Science and Behaviour</th>
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</thead>
<tbody>
<tr>
<td>Module code</td>
<td>neu210</td>
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<tr>
<td>Credit points</td>
<td>9.0 KP</td>
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<tr>
<td>Workload</td>
<td>270 h</td>
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<tr>
<td></td>
<td>4 SWS Lecture (VO) “Neuroethology” and “Behavioural ecology”</td>
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<tr>
<td></td>
<td>Total workload 180h: 56h contact/ 60h background reading/ 64h exam preparation</td>
</tr>
<tr>
<td></td>
<td>2 SWS Seminar (SE) “Current issues of ethology”</td>
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<tr>
<td></td>
<td>Total workload 90h: 28h contact/ 30h literature reading/ 32h preparation</td>
</tr>
<tr>
<td>Applicability of the module</td>
<td>• Master's Programme Biology (Master) &gt; Background Modules</td>
</tr>
<tr>
<td></td>
<td>• Master's Programme Biology (Master) &gt; Background Modules</td>
</tr>
<tr>
<td></td>
<td>• Master's Programme Neuroscience (Master) &gt; Background Modules</td>
</tr>
<tr>
<td>Responsible persons</td>
<td>Klump, Georg Martin (Module responsibility)</td>
</tr>
<tr>
<td></td>
<td>Langemann, Ulrike (Module counselling)</td>
</tr>
<tr>
<td></td>
<td>Mouritsen, Henrik (Module counselling)</td>
</tr>
<tr>
<td></td>
<td>Feenders, Gesa (Module counselling)</td>
</tr>
<tr>
<td></td>
<td>Klump, Georg Martin (Authorized examiners)</td>
</tr>
<tr>
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<td>Mouritsen, Henrik (Authorized examiners)</td>
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<td></td>
<td>Langemann, Ulrike (Authorized examiners)</td>
</tr>
<tr>
<td></td>
<td>Feenders, Gesa (Authorized examiners)</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>Fundamentals of Neurobiology, Behavioural Biology, Evolution, Ecology</td>
</tr>
<tr>
<td>Skills to be acquired in this module</td>
<td>++ Neurosci. knowlg. + Expt. methods + Independent research + Scient. literature + Social skills</td>
</tr>
<tr>
<td></td>
<td>++ Interdiscipl. knowlg. Maths/Stats/Progr. + Data present./disc. + Scientific English Ethics</td>
</tr>
<tr>
<td>Upon successful completion of this course, students</td>
<td>• know the fundamentals of behavioural ecology and neuroethology</td>
</tr>
<tr>
<td></td>
<td>• are able to present and critically assess scientific data and approaches</td>
</tr>
<tr>
<td>Module contents</td>
<td>The lecture “Neuroethology” provides an introduction to the mechanisms underlying the behaviour of animals. Subjects are, e.g., the mechanisms of perception, control of movement patterns, mechanisms of learning, orientation and navigation. The lecture “Behavioural ecology” provides an introduction to topics such as predator-prey interactions, optimal food utilization, spatial and temporal distribution of animals, social relations and group formation, mating systems and reproductive strategies, sexual selection, investment of parents in offspring, and communication. In the seminar “Current issues of Ethology”, current original literature relating to behavioural biology is reported and discussed.</td>
</tr>
<tr>
<td>Links</td>
<td>Language of instruction English</td>
</tr>
<tr>
<td>Duration (semesters)</td>
<td>1 Semester</td>
</tr>
<tr>
<td>Module frequency</td>
<td>jährlich</td>
</tr>
<tr>
<td>Module capacity</td>
<td>30 (Recommended in combination with: neu220 BM “Neurocognition and Psychopharmacology” Shared course components with (cannot be credited twice): bio610 (5.02.611 “Neuroethologie”, 5.02.612 “Verhaltensökologie”, 5.02.613 “Aktuelle Themen der Ethologie”)</td>
</tr>
<tr>
<td>Reference text</td>
<td>Course in the second half of the semester Regular active participation is required to pass the module.</td>
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<td>Modulenevel / module level</td>
<td>je nach Studiengang Pflicht oder Wahlpflicht</td>
</tr>
<tr>
<td>Lehr-/Lernform / Teaching/Learning method</td>
<td>Vorkenntnisse / Previous knowledge</td>
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<td>----------------------------------------</td>
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</tr>
<tr>
<td>Examination</td>
<td>Time of examination</td>
</tr>
<tr>
<td>Final exam of module</td>
<td>as agreed, usually in the break after the winter term</td>
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<table>
<thead>
<tr>
<th>Course type</th>
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**Total time of attendance for the module** 84 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 excursion (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:
- ++ Neurosci. knowlg. + Expt. methods Independent research + Scient. literature + Social skills
- ++ Interdiscipl. knowlg. Maths/Stats/Progr. + Data present./disc. + Scientific English Ethics

Skills to be acquired in this module:
- 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 excersise either deepens that knowledge by excersises or discussions of recent papers/ talks on the respective topic covered during that week.
The lecture "Psychopharmacology" illustrates the connection between neurotransmitters and behaviour and its links to psychiatric disease. The lecture contains several interactive parts to consolidate and critically evaluate the acquired knowledge.
Lecture topics:
- Introduction to Terms and Definitions in Drug Research
- Dopaminergic and Noradrenergic System
- Cholinergic and Serotonergic System
- GABAergic and Glutamatergic System
- Addiction
- Depression
- Schizophrenia
- Anxiety
- Alzheimer's Disease

Reader's advisory:

Links:

Language of instruction: English
**Module:**

- **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.
- **Modullevel / module level:** je nach Studiengang Pflicht oder Wahlpflicht
- **Modulart / typ of module:** Lehr-/Lernform / Teaching/Learning method
- **Vorkenntnisse / Previous knowledge:** Fundamentals of Neurobiology, Bahavioural Biology
- **Examination:** Final exam of module
  as agreed, usually in the break after the winter term
  100% written exam (content of the lectures)
- **Course type:**
  - Lecture
    - SWS: 3
    - Frequency: --
    - Workload of compulsory attendance: 42
  - Exercises
    - SWS: 1
    - Frequency: --
    - Workload of compulsory attendance: 14
- **Total time of attendance for the module:** 56 h
# neu290 - Biophysics of Sensory Reception

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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>
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<tr>
<td></td>
<td>2 SWS Lecture (VO) Total workload 90h: 30h contact / 60 h individual reading 2 SWS Seminar (SE) Total workload 90h: 30 h contact / 60h individual reading</td>
</tr>
<tr>
<td>Applicability of the module</td>
<td>Master's Programme Biology (Master) &gt; Background Modules</td>
</tr>
<tr>
<td></td>
<td>Master's Programme Biology (Master) &gt; Background Modules</td>
</tr>
<tr>
<td></td>
<td>Master's Programme Neuroscience (Master) &gt; Background Modules</td>
</tr>
<tr>
<td>Responsible persons</td>
<td>Winklhofer, Michael (Module responsibility)</td>
</tr>
<tr>
<td></td>
<td>Winklhofer, Michael (Authorized examiners)</td>
</tr>
<tr>
<td></td>
<td>Winklhofer, Michael (Module counselling)</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>Recommended previous knowledge/skills: cell biology of neurons</td>
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<tr>
<td>Skills to be acquired in this module</td>
<td>++ Neurosci. knowlg.</td>
</tr>
<tr>
<td></td>
<td>+ Independent research</td>
</tr>
<tr>
<td></td>
<td>+ Scient. Literature</td>
</tr>
<tr>
<td></td>
<td>++ Interdiscipl. knowlg.</td>
</tr>
<tr>
<td></td>
<td>+ Data present./disc.</td>
</tr>
<tr>
<td></td>
<td>to gain a general understanding of sensory reception</td>
</tr>
<tr>
<td></td>
<td>to acquire specific knowledge of sensory reception at the molecular and cellular level, with focus on the relationship between structure and function of sensory molecules</td>
</tr>
<tr>
<td></td>
<td>to be able to perform simple quantitative assessments of detection sensitivity to physical stimuli</td>
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<tr>
<td></td>
<td>to understand common features in transduction pathways among various senses</td>
</tr>
<tr>
<td>Module contents</td>
<td>General aspects of sensory reception and signal transduction: adequate stimulus, threshold sensitivity and signal-to-noise limitations, activation of receptor proteins Evolutionary and ecological aspects of sensory reception The senses: Chemoreception in the gustatory cells and olfactory sensory neurons Thermoreception in the skin Infrared reception in the pit organ Mechanoreception - auditory hair cells, somatosensory neurons in the skin, lateral line, proprioceptors, baroreceptors Photoreception - ciliary and rhabdomeric photoreceptor cells; Electoreception in Lorenzini ampullae of elasmobranch fish and in tuberous receptors of mormyrid fish; derived electoreceptors in aquatic mammals Magnetoreception - candidate structural correlates of magnetoreceptors</td>
</tr>
<tr>
<td>Reader's advisory</td>
<td>Required reading: The reading list will be updated on an annual basis to include new developments. The current reading list can be found on StudIP.</td>
</tr>
<tr>
<td>Links</td>
<td></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>annually, summer term, second half</td>
</tr>
<tr>
<td>Module capacity</td>
<td>20</td>
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<tr>
<td>Modullevel / module level</td>
<td>MM (Mastermodul / Master module)</td>
</tr>
<tr>
<td>Modulart / typ of module</td>
<td>Wahlpflicht / Elective</td>
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### Lehr-/Lernform / Teaching/Learning method

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<thead>
<tr>
<th>Vorkenntnisse / Previous knowledge</th>
<th>cell biology of neurons</th>
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</table>

<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>appr. one week after the last lecture</td>
<td>Type of examination: written exam (75%), presentation in the seminar (25%) In addition, mandatory but ungraded: presentation on seminar</td>
</tr>
</tbody>
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<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>
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<td>2</td>
<td>SuSe</td>
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<tr>
<td>Seminar</td>
<td></td>
<td>2</td>
<td>SuSe</td>
<td>28</td>
</tr>
</tbody>
</table>

**Total time of attendance for the module**: 56 h
neu300 - Functional MRI data analysis

Module label: Functional MRI data analysis
Module code: neu300
Credit points: 12.0 KP
Workload: 360 h
- 3 SWS Practical (PR) Total workload 225h: 70h contact / 100h experimental work / 55h exam preparation 2
SWS Lecture (VO) Total workload 90h: 28h contact / 30h background reading / 32h exam preparation 1 SWS
Seminar (SE) Total workload 45h: 15h contact / 30h preparation of presentation

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

Responsible persons:
- Gießing, Carsten (Module responsibility)
- Gießing, Carsten (Authorized examiners)
- Thiel, Christiane Margarete (Authorized examiners)

Prerequisites:
- Skills to be acquired in this module:
  - + Neurosci. knowlg.
  - ++ Expt. Methods
  - + Social skills
  - ++ Interdiscipl. knowlg.
  - ++ Maths/Stats/Progr.
  - + Data present./disc.
  - + Scientific English

Students will learn the basics about planning and performing a neuroimaging study. They will focus on the statistical and methodological background of functional neuroimaging data analysis and analyse a sample functional MRI data set.

Module contents:
The module comprises (i) a lecture “Functional MRI data analysis” [2 SWS], and (ii) a practical course [5 SWS] and (iii) a seminar “Experiments on Neurocognition” [1 SWS] including aspects of planning, performance and analysis of functional neuroimaging studies using MATLAB based software.

Reader's advisory:

Links:
Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: annually, summer term, second half
Module capacity: 12 (in total with bio640) (shared course components with (cannot be credited twice): bio640)
Module level / module level: MM (Mastermodul / Master module)
Modulart / typ of module: Wahlpflicht / Elective

Vorkenntnisse / Previous knowledge:

Examining Time of examination Type of examination
Final exam of module end of summer term 70% oral exam or written exam, 30% presentations. In addition, mandatory but ungraded: Regular active participation

Course type Comment SWS Frequency Workload of compulsory attendance
Practical training: 5 SuSe 70
Seminar: 1 SuSe 14
<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>SuSe</td>
<td>28</td>
</tr>
</tbody>
</table>

**Total time of attendance for the module**

112 h
neu310 - Psychophysics of Hearing

Module label: Psychophysics of Hearing
Module code: neu310
Credit points: 12.0 KP
Workload: 360 h
- 5 SWS Practical (PR) "Experiments in Hearing" Total workload 225h: 70h contact / 110h experimental work / 45h exam preparation
- 1 SWS Supervised exercise (UE) "Fundamentals in psychoacoustic data analysis" Total workload 45h: 15h contact / 30h practising data analysis (incl. SPSS)
- 2 SWS Seminar (SE) "Hearing" Total workload 90h: 30h contact / 60h background reading

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

Responsible persons:
Klump, Georg Martin (Module responsibility)
Klump, Georg Martin (Authorized examiners)
Langemann, Ulrike (Authorized examiners)

Prerequisites:
- Neurosci. knowlg.
- Expt. Methods
- Social skills
- Maths/Stats/Progr.
- Data present./disc.
- Scientific English

Skills to be acquired in this module:
- Students will learn the basics about performing a psychoacoustic experiment. Based on an experiment in which they study their own hearing, they will learn how to conduct a behavioural study in hearing and analyze the data. In addition, they will be provided with an overview of the mechanisms of auditory perception.

Module contents:
The modul comprises (i) a seminar "Hearing" [2 SWS] (ii) an exercise "Fundamentals in psychoacoustic data analysis" [1 SWS], and a (iii) practical course [7 SWS] including aspects of planning and conducting psychoacoustic experiments.

Reader's advisory:
Plack, Christopher J. (2005) The sense of hearing. Mahwah, NJ [u.a.] : Erlbaum (sufficient number of copies available in the university library)

Links:
Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: annually, summer term, second half
Module capacity: 6 (in total with bio640)
Modulelevel / module level: MM (Mastermodul / Master module)
Lehr-/Lernform / Teaching/Learning method:
Vorkenntnisse / Previous knowledge:

Examination:
- Time of examination: end of summer term
- Type of examination: 70% report or oral exam, 30% presentation In addition, mandatory but ungraded: regular active participation

Course type:
- Exercises:
  - Comment: 1
  - SWS: 1
  - Frequency: SuSe
  - Workload of compulsory attendance: 14
- Seminar:
  - Comment: 2
  - SWS: 2
  - Frequency: SuSe
  - Workload of compulsory attendance: 28
- Practical training:
  - Comment: 5
  - SWS: 5
  - Frequency: SuSe
  - Workload of compulsory attendance: 70
- Lecture:
  - Comment: SuSe
  - SWS: SuSe
  - Frequency: 0

Total time of attendance for the module: 112 h
neu340 - Invertebrate Neuroscience

<table>
<thead>
<tr>
<th>Module label</th>
<th>Invertebrate Neuroscience</th>
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</thead>
<tbody>
<tr>
<td>Module code</td>
<td>neu340</td>
</tr>
<tr>
<td>Credit points</td>
<td>6.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>180 h</td>
</tr>
</tbody>
</table>
|                       | (2 SWS Seminar (SE)
|                       | Total workload 72h: 28h contact / 44h background literature reading, preparation for short tests, portfolio assignments and results presentation |
|                       | 3 SWS Supervised exercise (UE)
|                       | Total workload 108h: 42h contact / 66h data analysis and preparation of portfolio assignments) |

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

Responsible persons
- Kretzberg, Jutta (Module responsibility)
- Kretzberg, Jutta (Authorized examiners)

Prerequisites
- attendance in pre-meeting

Skills to be acquired in this module
- ++ Neurosci. knowlg.
- ++ Expt. Methods
- Scient. Literature
- Social skills
- Maths/Stats/Progr.
- Independent Research
- Data present./disc.
- Scientific English
- Ethics

Upon successful completion of this course, students
- have knowledge on invertebrate neuronal systems in comparison to vertebrate systems
- have discussed an overview of experimental and theoretical methods of invertebrate neurosciec
- have acquired first practical skills in intracellular recordings from invertebrate neurons
- have acquired basic skills in data analysis
- have acquired an intuitive understanding of membrane potential and action potential generation based on computer simulations

Module contents
The module consists of three weeks of seminar and hands-on lab exercises on intracellular recordings from leech neurons, as well as computer simulations to study the basis of membrane potential and action potential generation.

The seminar covers the following topics:
- Invertebrate neuronal systems in comparison to vertebrate systems
- Ion channels, membrane potential and action potential generation
- Introduction to electrophysiological methods
- Introduction to data analysis methods

In the practical exercises, portfolio assignments will be performed on:
- Qualitative electrophysiological classification of different cell types in the leech nervous system
- Quantitative analysis (stimulus - response relationship) of at least one cell type
- Action potential generation: Comparison of model simulations and experiments
- Planning a small individual team-work project based on the techniques taught in this module, that can be used as basis for the module neu345

Reader's advisory
Course scripts and mandatory scientific literature (3 review articles) discussed in the seminar will be available in Stud.IP Background and seminar literature will be available in Stud.IP
<table>
<thead>
<tr>
<th>Links</th>
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</thead>
<tbody>
<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>annually, summer term, second half</td>
</tr>
<tr>
<td>Module capacity</td>
<td>12 (this module provides the background for neu345 “Neural Computation in invertebrate systems”)</td>
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<tr>
<td>Modullevel / module level</td>
<td>MM (Mastermodul / Master module)</td>
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<td>Modulart / typ of module</td>
<td>Wahlpflicht / Elective</td>
</tr>
<tr>
<td><strong>Vorkenntnisse / Previous knowledge</strong></td>
<td>basic knowledge of neurobiology, basic MATLAB programming skills</td>
</tr>
<tr>
<td>Examination</td>
<td>Time of examination</td>
</tr>
<tr>
<td>Final exam of module</td>
<td>during the course (summer term, second half)</td>
</tr>
<tr>
<td></td>
<td>Portfolio consisting of short tests, short reports (according to portfolio assignments) and seminar presentation</td>
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</table>

<table>
<thead>
<tr>
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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<tr>
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<td>SuSe</td>
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<td>3</td>
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<td></td>
<td></td>
<td></td>
<td><strong>70 h</strong></td>
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</table>
neu360 - Auditory Neuroscience

Module label: Auditory Neuroscience
Module code: neu360
Credit points: 6.0 KP
Workload: 180 h
- 1 SWS Lecture (VO)
- Total workload 45h: 14 h contact / 31 h background reading
- 1 SWS Seminar (SE)
- Total workload 45h: 14 h contact / 15 h background reading / 16 h preparation and presentation
- 2 SWS Supervised exercise (UE)
- Total workload 90h: 10 h contact / 20 h literature search / 60 h work on essay paper

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

Responsible persons:
- Köppl, Christine (Module responsibility)
- Klump, Georg Martin (Authorized examiners)
- Köppl, Christine (Authorized examiners)

Prerequisites:
Recommended previous knowledge/skills: Basics of Neurosensory Science and Behavioural Biology

Skills to be acquired in this module:
++ Neurosci. knowlg
+ Expt. methods
++ Scient. Literature
+ Social skills
++ Interdiscipl. knowlg
++ Data present./disc.
++ Scientific English
+ Ethics

Introduction to Auditory Physiology. May serve as preparation for a Research Module in this area.

Upon successful completion of this course, students
- have profound knowledge on auditory sensory processing at several levels (including cochlear transduction mechanisms, central auditory processing)
- have basic knowledge of the large range of techniques used in auditory research
- are able to read and critically report to others on an original research paper in auditory neuroscience
- are able to research and review a specific topic in auditory neuroscience

Module contents:
One week introductory block course, comprised of a lecture series and matching seminar that emphasizes discussion.
Topics:
- Hair cells: structure, transduction mechanism, receptor potential, synaptic transmission
- Basilar papilla / cochlea: structure, micromechanics, amplification; otoacoustic emissions
- Auditory nerve: phase locking, rate coding. Excitation patterns
- Ascending auditory pathways: wiring, principles of excitation/inhibition, examples of cellular/molecular specialisations
- Sound localisation in birds and mammals
- Central auditory processing: imaging techniques, auditory streams, cortex, primates
- Relation between psychophysics and neurophysiology

The introductory block is followed by a supervised literature search and individually written term paper on a specific topic in auditory neuroscience.

Reader's advisory:
About 20 selected original papers (selection varies)
Pickles JO (2012) An Introduction to the Physiology of Hearing. Brill, Netherlands

Links:
Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: annually, summer term, second half
Module capacity: 15
- BM neu211 "Neurosensory Science and Behaviour"
- or BM neu270 "Neurocognition and Psychophysics"
or skills module box "Current Topics in Hearing Science"

**Reference text**
Registration procedure / selection criteria: StudIP, final acceptance after assignment of seminar presentation

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

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

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

**Vorkenntnisse / Previous knowledge**
Basics of Neurosensory Science and Behavioural Biology

**Examination**
Time of examination
Type of examination
Final exam of module
within a few weeks of the end of summer term lecture period
HA

<table>
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<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<td>SuSe</td>
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<tr>
<td>Seminar</td>
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<td>1</td>
<td>SuSe</td>
<td>14</td>
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<tr>
<td>Exercises</td>
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<td>2</td>
<td>SuSe</td>
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**Total time of attendance for the module**
56 h
psy270 - Functional MRI Data Analysis

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<td>psy270</td>
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<td>Credit points</td>
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<td>Workload</td>
<td>270 h</td>
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<td>Applicability of the module</td>
<td>Master's Programme Biology (Master) &gt; Background Modules</td>
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<tr>
<td></td>
<td>Master's Programme Neurocognitive Psychology (Master) &gt; Mastermodule</td>
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<td></td>
<td>Master's Programme Neuroscience (Master) &gt; Background Modules</td>
</tr>
<tr>
<td>Responsible persons</td>
<td>Gießing, Carsten (Module responsibility)</td>
</tr>
<tr>
<td></td>
<td>Gießing, Carsten (Authorized examiners)</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>Enrolment in Master's programme Neurocognitive Psychology.</td>
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<tr>
<td>Skills to be acquired in this module</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Goals of module:</strong> Students will learn the basics about planning and performing a neuroimaging study. They will focus on the statistical and methodological background of functional neuroimaging data analysis and analyse a sample functional MRI data set.</td>
</tr>
<tr>
<td></td>
<td><strong>Competencies:</strong> ++ experimental methods</td>
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<td></td>
<td>++ statistics &amp; scientific programming</td>
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<tr>
<td></td>
<td>+ data presentation &amp; discussion</td>
</tr>
<tr>
<td></td>
<td>++ group work</td>
</tr>
<tr>
<td>Module contents</td>
<td>Theoretical knowledge on functional MRI data analysis, Planning, performance and analysis of functional neuroimaging studies using MATLAB-based software, Hands-on fMRI data analysis with SPM</td>
</tr>
<tr>
<td>Links</td>
<td>Language of instruction: English</td>
</tr>
<tr>
<td></td>
<td>Duration (semesters): 1 Semester</td>
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<tr>
<td></td>
<td>Module frequency: The module will be offered every summer term.</td>
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<tr>
<td></td>
<td>Module capacity: 15 (The remaining places are reserved for Biology and Neuroscience students. )</td>
</tr>
<tr>
<td></td>
<td>Reference text: Since the module is primarily offered for the Master’s programme Biology it has to be offered as a blocked course. Please contact us if you are interested in the module but have problems with interfering other courses.</td>
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<tr>
<td></td>
<td>PLEASE NOTE: We strongly recommend to take either psy170, psy270, psy280, or psy220 to gain methodological competencies (EEG, fMRI, TBS, HCI) that are needed for most practical projects and Master’s theses!</td>
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<tr>
<td></td>
<td>Modullevel / module level: MM (Mastermodul / Master module)</td>
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<td></td>
<td>Modulart / typ of module: Wahlpflicht / Elective</td>
</tr>
<tr>
<td></td>
<td>Lehr-/Lernform / Teaching/Learning method: blocked course with lecture, interactive seminar and exercise parts</td>
</tr>
<tr>
<td></td>
<td>Vorkenntnisse / Previous knowledge: Students need to have solid statistical knowledge as taught in the Introductory Course Statistics and in</td>
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</table>
Research Methods.

<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>end of summer term</td>
<td>Oral or written examination</td>
</tr>
</tbody>
</table>

Required active participation for gaining credits:
- 1-2 presentations
- Participation in discussions on other presentations
- Attendance of at least 70% in the seminars and exercises (use attendance sheet that will be handed out in the beginning of the term).

<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>2</td>
<td>SuSe</td>
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<td>28</td>
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<tr>
<td>Exercises</td>
<td>2</td>
<td>SuSe</td>
<td></td>
<td>28</td>
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<tr>
<td>Seminar</td>
<td>1</td>
<td>SuSe</td>
<td></td>
<td>14</td>
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</table>

**Total time of attendance for the module**

70 h
Research Modules

bio810 - Independent Research

<table>
<thead>
<tr>
<th>Module label</th>
<th>Independent Research</th>
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<tr>
<td>Module code</td>
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<tr>
<td>Credit points</td>
<td>15.0 KP</td>
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<tr>
<td>Workload</td>
<td>450 h</td>
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</table>

Applicability of the module

- Master's Programme Biology (Master) > Research Modules
- Master's Programme Biology (Master) > Research Modules

Responsible persons

- Zotz, Gerhard (Module responsibility)
- Zotz, Gerhard (Authorized examiners)
- der Biologie, Lehrende (Authorized examiners)

Prerequisites

External research projects are done on an individual basis. They are supervised by one person from Oldenburg and a local supervisor at any university or research institution in Germany and abroad. Please contact Gerhard Zotz (Gerhard.zotz@uol.de) for details. See https://uol.de/ibu/studium-und-lehre/fach-master-biology/downloads-und-links/ (Learning Agreement for External Research Module)

Skills to be acquired in this module

++ deepened biological expertise
++ deepened knowledge of biological working methods
++ data analysis skills
++ critical and analytical thinking
++ independent searching and knowledge of scientific literature
++ ability to perform independent biological research
++ data presentation and discussion in German and English (written and spoken)
+ teamwork
++ project and time management
++ statistics & scientific programming

Students perform individual research projects to learn:

- planning and organization of a research project in a group outside of University of Oldenburg
- formulate a scientific hypothesis
- planning, performing and analyzing experiments and/or simulations
- working with scientific background literature on the specific context of the project
- oral presentation and discussion of backgrounds and results in the lab seminar
- write a scientific report in publication format
- prepare and present a scientific poster

Module contents

Students are introduced to independent research in a specific area of biology by a scientific working group outside of the regular IBU Biology faculty at the University of Oldenburg (usually a university research institute in Germany or abroad)

The content and venue of this module is chosen in close coordination with the Prüfungsausschuss Master Biologie, possibly with consultations of other professors. Course work should cover all parts of a scientific project, i.e. data collection, data analysis and the presentation of the results. Irrespective of the particular venue (universities, research institutes) the student has to report to a professor in Oldenburg in form of a written report and an oral presentation, both in English.

Note:
- all members of the regular IBU Biology faculty at the University of Oldenburg can act as local supervisor, students should contact appropriate supervisors individually
- prior to project start, external and local supervisors must fill the learning agreement form
- the supervisor at the host institution is invited to submit a short written statement of assessment, final grading is done by the local supervisor
- participation in a joint poster presentation of concurrent research modules is highly recommended.

Reader's advisory

varies with chosen topic

Links

Languages of instruction

English, German

Duration (semesters)

1 Semester

Module frequency

halbjährlich

Module capacity

unlimited

Module level / module level

MM (Mastermodul / Master module)
<table>
<thead>
<tr>
<th>Modulart / typ of module</th>
<th>Wahlpflicht / Elective</th>
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</thead>
<tbody>
<tr>
<td>Lehr-/Lernform / Teaching/Learning method</td>
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<tr>
<td>Vorkenntnisse / Previous knowledge</td>
<td></td>
</tr>
<tr>
<td>Examination</td>
<td>Time of examination</td>
</tr>
<tr>
<td>Final exam of module</td>
<td>internship report</td>
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<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>Seminar</td>
<td>1</td>
<td>SuSe and WiSe</td>
<td>14</td>
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<tr>
<td>Project-oriented module</td>
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<td>SuSe and WiSe</td>
<td>140</td>
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</table>

Total time of attendance for the module 154 h
bio820 - Research Module Fast Track

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<tr>
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<th>Research Module Fast Track</th>
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<tr>
<td>Module code</td>
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<td>Credit points</td>
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<td>Workload</td>
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Applicability of the module
- Master's Programme Biology (Master) > Research Modules
- Master's Programme Biology (Master) > Research Modules

Responsible persons
- Klump, Georg Martin (Module responsibility)
- Klump, Georg Martin (Authorized examiners)

Prerequisites

Skills to be acquired in this module
++ deepened biological expertise
++ deepened knowledge of biological working methods
++ data analysis skills
++ critical and analytical thinking
++ independent searching and knowledge of scientific literature
++ ability to perform independent biological research
++ data presentation and discussion in German and English (written and spoken)
++ teamwork
++ project and time management
++ statistics & scientific programming

Module contents

Reader’s advisory

Links

Languages of instruction
- German, English

Duration (semesters)
- 1 Semester

Module frequency
- unregelmäßig

Module capacity
- unlimited

Modulart / module level
- je nach Studiengang Pflicht oder Wahlpflicht

Lehr-/Lernform / Teaching/Learning method
- internship report

Vorkenntnisse / Previous knowledge

Examination
- Time of examination
- Type of examination

Final exam of module
- written report

Course type
- Seminar

SWS

Frequency
- --

Workload attendance
- 0 h
**bio900 - Biology Research Module**

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<th>Biology Research Module</th>
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<tbody>
<tr>
<td>Module code</td>
<td>bio900</td>
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<td>15.0 KP</td>
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<tr>
<td>Workload</td>
<td>450 h</td>
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</table>

**Applicability of the module**
- Master's Programme Biology (Master) > Research Modules
- Master's Programme Biology (Master) > Research Modules

**Responsible persons**
- Zotz, Gerhard (Module responsibility)
- der Biologie, Lehrende (Module counselling)
- Zotz, Gerhard (Authorized examiners)
- der Biologie, Lehrende (Authorized examiners)

**Prerequisites**
project and supervisor(s) need to be approved by the exam board prior to the start of lab work

**Hinweise:**
- all members of the regular IBU Biology faculty at the University of Oldenburg can act as local supervisor, students should contact appropriate supervisors individually
- prior to project start, external and local supervisors must fill the learning agreement form
- the supervisor at the host institution is invited to submit a short written statement of assessment, final grading is done by the local supervisor
- participation in a joint poster presentation of concurrent research modules is highly recommended.

**Skills to be acquired in this module**
Students will learn to plan, perform and analyse a study in a biological field. Topics will be chosen in close coordination with teaching staff. Depending on the particular project, knowledge in statistics, molecular biology, physiology, modelling, or ethology will be necessary. Results will be related to the current biological literature in a written report and be presented in the seminar of the hosting working group.

- * deepened knowledge of biological working methods
- ++ data analysis skills
- ++ critical and analytical thinking
- ++ independent searching and knowledge of scientific literature
- ++ ability to perform independent biological research
- ++ data presentation and discussion in German and English (written and spoken)
- + teamwork
- ++ project and time management
- + statistics & scientific programming

**Module contents**
The students develop an empirical investigation, carry it out and analyse the results. The students present and discuss their project both orally and in writing

**Reader's advisory**

**Links**

**Languages of instruction**
German, English

**Duration (semesters)**
1 Semester

**Module frequency**
unlimited

**Reference text**
Within the Modul bio900 is it possible to take several courses as long as their contents differ substantially. When taking the course group 5.02.960 it is mandatory to choose two courses out of the group A – D.

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

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

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

**Vorkenntnisse / Previous knowledge**

<table>
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<th>Type of examination</th>
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<tr>
<td>Final exam of module</td>
<td>internship report</td>
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<tr>
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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<tbody>
<tr>
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<td>Comment</td>
<td>SWS</td>
<td>Frequency</td>
<td>Workload of compulsory attendance</td>
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<td>SuSe or WiSe</td>
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<td>Seminar</td>
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<td>SuSe or WiSe</td>
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<td>SuSe and WiSe</td>
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**Total time of attendance for the module** 140 h
## Skills Modules

**bio870 - Communicating Plant Sciences**

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<tbody>
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<td>6.0 KP</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
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</table>

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

**Responsible persons**
- Zotz, Gerhard (Module responsibility)
- Laubinger, Sascha (Module counselling)
- Albach, Dirk Carl (Module counselling)
- Zotz, Gerhard (Authorized examiners)
- Laubinger, Sascha (Authorized examiners)
- Albach, Dirk Carl (Authorized examiners)

**Prerequisites**
Communicating and practicing scientific presentation techniques (talk, publication, poster) Presentation of data and discussion in spoken and written (english) Communicating of techniques in problem treatment in free speech and scientific writing Independent investigation and knowledge of scientific primary literature [nop] + interdisciplinary thinking ++ critical and analytical thinking ++ independent searching and knowledge of scientific literature ++ data presentation and discussion in German and English (written and spoken) [nop]

**Module contents**
- S: Working group seminar (2 SWS; Choice 1: Functional Ecology; Choice 2: Evolutionary genetics of plants; Choice 3: Plant biodiversity and evolution) S: Scientific Writing in Plant Science (2SWS)

**Reader's advisory**

**Links**

**Languages of instruction**
- German, English

**Duration (semesters)**
- 1 Semester

**Module frequency**
- 12

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

**Modulart / typ of module**
- Wahlmodul / Opportunity

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

**Vorkenntnisse / Previous knowledge**
- Ökologie, Flora, Genetik

**Examination**

<table>
<thead>
<tr>
<th>Final exam of module</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
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<td>1 term paper</td>
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**Course type**
- Seminar

**SWS**
- 4

**Frequency**
- WiSe

**Workload attendance**
- 56 h
bio880 - Skills in Plant Systematics

**Module label**
Skills in Plant Systematics

**Module code**
bio880

**Credit points**
6.0 KP

**Workload**
180 h

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

**Responsible persons**
- Albach, Dirk Carl (Module responsibility)
- von Hagen, Klaus Bernhard (Module counselling)
- Albach, Dirk Carl (Authorized examiners)
- von Hagen, Klaus Bernhard (Authorized examiners)
- Janzen, Thijs (Authorized examiners)

**Prerequisites**

**Skills to be acquired in this module**
In this module, we provide the skills necessary to describe and distinguish species for floras and monographs/first publication of species. For that, an overview of the plant kingdom is provided. Further, various non-molecular methods of systematics are practiced, such as morphometry, SEM, identification key generation, nomenclature, species delimitation methods, and interpretation of phylogenetic analyses.

- deepened biological expertise
- **deepened knowledge of biological working methods**
- **deepened knowledge of biological working methods**
- **critical and analytical thinking**
- independent searching and knowledge of scientific literature
- ability to perform independent biological research
- **data presentation and discussion in German and English (written and spoken)**
- teamwork
- **statistical & scientific programming**

**Module contents**
In the seminar we provide an overview of the larger groups of plants and characters for their grouping. We analyse methods for phylogeny generation, angiosperm classification and description of new taxa.

In the exercises morphological characters are investigated in various ways and internet resources for further morphological characters presented. Species delimitation methods for molecular and morphological characters are used. Identification keys are generated and nomenclatural rules discussed.

**Reader’s advisory**

**Links**

**Languages of instruction**
German, English

**Duration (semesters)**
1 Semester

**Module frequency**

**Module capacity**
8

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

**Modulart / typ of module**
Wahlmodul / Opportunity

**Vorkenntnisse / Previous knowledge**
gute Kenntnisse der heimischen Flora

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<th>Comment</th>
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<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<tr>
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<td>Exercises</td>
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**Total time of attendance for the module**
56 h
bio890 - Current Topics in Biology

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<td>Workload</td>
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<td>Master's Programme Biology (Master) &gt; Skills Modules</td>
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**Responsible persons**
- Gerlach, Gabriele (Module responsibility)
- der Biologie, Lehrende (Module counselling)
- Gerlach, Gabriele (Authorized examiners)
- Laakmann, Silke (Authorized examiners)

**Prerequisites**
- + biological knowledge
- + biologically relevant, natural / mathematical scientific basic knowledge
- ++ interdisciplinary knowledge and thinking
- ++ abstract, logical, and analytical thinking
- ++ expanded knowledge in a specific biological field
- ++ presentation of results and factual discussion, both written and spoken
- ++ (scientific) communication skills

**To develop skills in the critical analysis and interpretation of results and themes in diverse areas of modern biology, including (but not limited to) evolutionary biology, population genetics, biodiversity, ecology, genomics, ornithology, and neurobiology.**

**Module contents**
Discussion and interpretations of one or more themes in modern biology. The themes and exact content will be provided by the instructor(s) at the beginning of the course.

**Reader's advisory**
Varies with chosen topic (will be provided by the instructor(s) at the beginning of the course)

**Links**
- Languages of instruction: English, German
- Duration (semesters): 1 Semester
- Module frequency: unlimited
- Modullevel / module level: MM (Mastermodul / Master module)
- Moduleart / typ of module: Wahlmodul / Opportunity

**Lehr-/Lernform / Teaching/Learning method**
- Vorkenntnisse / Previous knowledge: Teilnahme in einem oder mehreren Grundmodulen des Master Biologie

**Examination**
- Time of examination: open
- Type of examination: Portfolio

**Course type**
- Seminar

**SWS**
- 2

**Frequency**
- SuSe and WiSe

**Workload attendance**
- 28 h
neu730 - Biosciences in the Public Eye and in our Laws

<table>
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<tr>
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<td>neu730</td>
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<tr>
<td>Credit points</td>
<td>6.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>180 h</td>
</tr>
<tr>
<td></td>
<td>{ 56h contact / 84h research for presentations / 40h term paper }</td>
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</table>
| Applicability of the module | • Master's Programme Biology (Master) > Skills Modules  
• Master's Programme Biology (Master) > Skills Modules  
• Master's Programme Neuroscience (Master) > Skills Modules |
| Responsible persons | Köppl, Christine (Module responsibility)  
Sienknecht, Ulrike (Module counselling)  
Köppl, Christine (Authorized examiners)  
Sienknecht, Ulrike (Authorized examiners) |
| Prerequisites |  
- Expt. methods  
- Scient. Literature  
- Social skills  
- Interdiscipl. knowlg  
- Data present./disc.  
- Scientific English  
- Ethics |

Skills to be acquired in this module

Upon completion of this course, students

- know basic rules of good scientific practise  
- are aware of the legal framework that is relevant to biological research, e.g. on animal welfare or genetically modified organisms  
- have practised to research and summarize different viewpoints on biological research, using both scientific (peer-reviewed) and non-scientific sources  
- are able to identify and critically discuss ethical conflicts in biological research, e.g., in the context of stem cell research or data manipulation  
- are able to prepare and give a coherent presentation in a team  
- have practised to lead a group discussion

Module contents

In supervised exercises, students research the ethical aspects and controversial issues on several specific topics in the biosciences. Everyone participates in researching all topics. Students then take turns in summarizing and presenting each topic in small teams, and leading a critical discussion of each topic. Problem-based, independent research of the scientific background by the students is an integral part of this module.

Example topics:
- Good scientific practise and fraud  
- Neuroenhancement  
- Artificial intelligence  
- Animal welfare, Animal experiments  
- Overfishing, Nature conservation  
- State-of-the-art genetic tools and their implications  
- Genetically modified organisms, e.g., in food production, chimeras  
- Stem cells  
- Humans as experimental subjects

A bonus can be obtained through active participation during the semester. Active participation requires regular oral contributions to the group discussions, that go beyond giving your own talks.

A bonus improves the exam mark by one step (0.3 or 0.4). The bonus is optional, an exam mark of 1.0 is achievable without a bonus. A bonus cannot be applied to pass a failed exam.

Reader’s advisory

Links

Language of instruction | English |
Duration (semesters) | 1 Semester |
Module frequency | annually, summer term |
Module capacity | 18 |
<table>
<thead>
<tr>
<th>Modullevel / module level</th>
<th>MM (Mastermodul / Master module)</th>
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<tr>
<td>Modulart / typ of module</td>
<td>Wahlpflicht / Elective</td>
</tr>
<tr>
<td>Lehr-/Lernform / Teaching/Learning method</td>
<td></td>
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<tr>
<td>Vorkenntnisse / Previous knowledge</td>
<td>Fundamentals of genetics, physiology, ecology and biological systematics</td>
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<tr>
<td>Examination</td>
<td>Time of examination</td>
</tr>
<tr>
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<td>within a few weeks of summer term lecture period</td>
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<tr>
<td>Regular participation during the semester is required (max 3 days of absence)</td>
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<tr>
<td>Course type</td>
<td>Comment</td>
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<tr>
<td>Lecture</td>
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<td>Seminar and exercise</td>
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<td>Total time of attendance for the module</td>
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### neu740 - Molecular Mechanisms of Ageing

<table>
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<td>Workload</td>
<td>180 h</td>
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<td></td>
<td>4 SWS Supervised exercise (UE)</td>
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<tr>
<td></td>
<td>Total workload 180h: 26h contact / 50h group work / 50h prep. of thesis, presentations / 54h recap. literature</td>
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**Applicability of the module**

- Bachelor's Programme Biology (Bachelor) > Fachnahe Angebote Biologie
- Bachelor's Programme Business Administration and Law (Bachelor) > Fachnahe Angebote Biologie
- Bachelor's Programme Business Informatics (Bachelor) > Fachnahe Angebote Biologie
- Bachelor's Programme Chemistry (Bachelor) > Fachnahe Angebote Biologie
- Bachelor's Programme Comparative and European Law (Bachelor) > Fachnahe Angebote Biologie
- Bachelor's Programme Computing Science (Bachelor) > Fachnahe Angebote Biologie
- Bachelor's Programme Economics and Business Administration (Bachelor) > Fachnahe Angebote Biologie
- Bachelor's Programme Education (Bachelor) > Fachnahe Angebote Biologie
- Bachelor's Programme Engineering Physics (Bachelor) > Fachnahe Angebote Biologie
- Bachelor's Programme Environmental Science (Bachelor) > Fachnahe Angebote Biologie
- Bachelor's Programme Intercultural Education and Counselling (Bachelor) > Fachnahe Angebote Biologie
- Bachelor's Programme Mathematics (Bachelor) > Fachnahe Angebote Biologie
- Bachelor's Programme Physics (Bachelor) > Fachnahe Angebote Biologie
- Bachelor's Programme Physics, Engineering and Medicine (Bachelor) > Fachnahe Angebote Biologie
- Bachelor's Programme Social Studies (Bachelor) > Fachnahe Angebote Biologie
- Bachelor's Programme Sustainability Economics (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Art and Media (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Biology (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Chemistry (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Computing Science (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Dutch Linguistics and Literary Studies (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Economic Education (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Economics and Business Administration (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme English Studies (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Gender Studies (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme General Education (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme German Studies (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme History (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Material Culture: Textiles (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Mathematics (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Music (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Philosophy / Values and Norms (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Physics (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Politics-Economics (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Protestant Theology and Religious Education (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Slavic Studies (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Social Studies (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Special Needs Education (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Sport Science (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Technology (Bachelor) > Fachnahe Angebote Biologie
- Fach-Bachelor Pädagogisches Handeln in der Migrationsgesellschaft (Bachelor) > Fachnahe Angebote Biologie
- Master's Programme Biology (Master) > Skills Modules
- Master's Programme Business Administration and Law (Master) > Fachnahe Angebote Biologie
- Master's Programme Neuroscience (Master) > Skills Modules
- Master's Programme Neuroscience (Master) > Skills Modules

**Responsible persons**

- Thedieck, Kathrin (Module responsibility)
- Ebbers, Lena (Module responsibility)
Prerequisites

Skills to be acquired in this module

<table>
<thead>
<tr>
<th>Code</th>
<th>Neurosci. knowlg.</th>
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<tbody>
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<td>Scient. literature</td>
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<tr>
<td>+</td>
<td>Social skills</td>
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<tr>
<td>++</td>
<td>Interdiscipl. knowlg.</td>
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<td>++</td>
<td>Data present./disc.</td>
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<tr>
<td>+</td>
<td>Scientific English</td>
</tr>
<tr>
<td>++</td>
<td>Ethics</td>
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</table>

In this module the participants gain an overview of arguments and experimental strategies in ageing research. We will focus on the fields of medicine/epidemiology, biochemistry/cell biology, physiology, and genetics. In addition, the main ageing theories will be covered. The participants work throughout the semester in project groups and present their results at a conference at the end of the course. Ethicists and philosophers from Germany and The Netherlands accompany the course, and chair at the conference a session on ethical aspects of ageing research. Under their moderation, the participants derive joint standpoints and policy recommendations.

At the end of this course the participants can

- understand, analyse, and present scientific articles from ageing research
- present the results of their studies and analyses using different presentation techniques
- apply the learned contents in novel contexts (ethics in ageing research)

Topics

Major ageing theories

arguments and experimental strategies in the fields of medicine/epidemiology, biochemistry/cell biology, physiology, genetics in ageing research
application of the learned contents in novel contexts (ethics in ageing research)
understanding, analysing, and presentation of scientific articles
presentation of results with different presentation techniques

Module contents

Lecture: major ageing theories and methods in ageing research are presented and discussed
Exercise: project work
1) Students: Choice of research focus
2) Independent work on the chosen research paper
3) Writing a 1 page thesis paper
4) Presentation in own expert group
5) Expert groups: research strategies, approaches, methods in chosen focus area
6) Development of a group presentation and group poster
7) Presentation at a 1 day conference
8) Dutch and German ethics experts present bioethics and lobby work in German and Dutch political gremia
9) The students develop a comparative view on medical ethics in different countries and derive own standpoints and policy recommendations for the ethical assessment of metabolic and ageing research.

The project works runs independently in the different expert groups throughout the semester and is organised via StudIP. The students and groups receive regular feedback and guidance in presence meetings.

The days for presence meetings and final conference are determined with the participants during the first meeting. The students organize their own work in groups according to the jigsaw concept. Their work is structured by a weekly schedule, tasks to be handed in at fixed deadlines across the semester, lectures and presence meetings.

Reader's advisory

Primary and secondary literature will be provided and introduced at the first meeting

Recommended textbook(s) or other literature:
Roger B. McDonald, Biologyof aging, Garland Science
Ludger Rensing ; Volkhard Rippe

Links

Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: annually, summer term
Module capacity: 16
Modullevel / module level

| Modulart / typ of module | Wahlpflicht / Elective |

Lehr-/Lernform / Teaching/Learning method

<table>
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<th>Vorkenntnisse / Previous knowledge</th>
<th>Time of examination</th>
<th>Type of examination</th>
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<tbody>
<tr>
<td>Final exam of module</td>
<td>end of semester</td>
<td>portfolio: thesis paper, oral presentation, poster presentation In addition, mandatory but ungraded: questionnaire on ageing theories, meeting protocols</td>
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Course type

<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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<td>Exercises</td>
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Total time of attendance for the module 84 h
neu751 - Laboratory Animal Science

Module label | Laboratory Animal Science
Module code | neu751
Credit points | 3.0 KP

Workload | 90 h
- one week full-time in semester break + flexible time for studying and exam preparation
- 1 SWS Lecture
  - total workload 45h: 2h contact / 20h background reading / 23h exam preparation
- 1 SWS Supervised exercise
  - total workload 45h: 35h contact / 10h background reading

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

Modullevel / module level
je nach Studiengang Pflicht oder Wahlpflicht

Lehr-/Lernform / Teaching/Learning method

Vorkenntnisse / Previous knowledge

Examination
Time of examination
Type of examination
Final exam of module
immediately before the practical part
written exam of 90 minutes

Course type

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Total time of attendance for the module
28 h
### neu760 - Scientific English

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<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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</table>

**Workload**

- 0.5 SWS Lecture (VO)
  - Total workload 23h: 8h contact / 15h research for term paper
- 3.5 SWS Supervised exercise (UE)
  - Total workload 158h: 46h contact / 46h preparation of texts and presentations / 66h term paper

**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)

**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>Final exam of module</td>
<td>within 2 months of completing the course</td>
<td>Portfolio: 70% several quick tests, texts, presentations, 30% term paper</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bonus system for active participation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
</tr>
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<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>0.5</td>
<td>WiSe</td>
<td>7</td>
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<tr>
<td>Exercises</td>
<td></td>
<td>3.5</td>
<td>WiSe</td>
<td>49</td>
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<tr>
<td><strong>Total time of attendance for the module</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>56 h</strong></td>
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</tbody>
</table>
neu780 - Introduction to Data Analysis with Python

Module label: Introduction to Data Analysis with Python
Module code: neu780
Credit points: 6.0 KP
Workload: 180 h
- 2 SWS Lecture total workload 90h: 30h contact / 60h individual reading
- 2 SWS Supervised exercise total workload 90h: 45h contact / 45h solving programming exercises

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

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

Prerequisites:
- Neurosci. knowlg.
- Maths/Stats/Progr.
- Data present./disc.

Skills to be acquired in this module:
- Neurosci. knowlg.
- Maths/Stats/Progr.
- Data present./disc.

The objective of the module is the acquisition of programming skills with focus on analysis of neurobiological datasets, using the programming language python. Python is available for any computer platform (PC, Mac, Linux) and is open source (for free), see https://www.python.org/.

Students will learn how to write effective scripts for data processing and visualisation, making use of pre-existing program libraries for various generic purposes (maths, statistics, plotting, image analysis).

Typical applications will be analysis of time series (e.g., electrophysiological recordings, movement data), images (e.g. immunohistochemical images, MRI slices), and spatio-temporal correlations in volume data. Students will also learn how to produce synthetica data from various noise models to assess signal-to-noise ratio in instrumental datasets.

Module contents:
- Data types and data structures, control structures, functions, modules, file input/output
- Standard libraries and SciPy libraries (Matplotlib, NumPy,...), scikit-image, VPython, ...

Reader's advisory:
- open access
- http://www.swaroopch.com/notes/python/

Links:

Language of instruction: English
Duration (semesters): 1 Semester
Module frequency: semester break, annually
Module capacity: 20

Reference text:
Shared course components with (cannot be credited twice): pb328 "Einführung in Datenanalyse mit Python" (Professionalisierungsmodul im Bachelorstudiengang Biologie)

Module type:
- Wahlpflicht / Elective

Vorkenntnisse / Previous knowledge:
- No prior knowledge in programming required, but useful.

Examination:
- Time of examination: term break, immediately after the course (2 weeks in February)
- Type of examination: assignment of programming exercises, 4 out of 5 exercises to be assessed

Course type:
- Lecture: 2 SWS, WiSe 28
- Exercises: 2 SWS, WiSe 28

Total time of attendance for the module: 56 h
**neu790 - Communicating Neuroscience**

<table>
<thead>
<tr>
<th>Module label</th>
<th>Communicating Neuroscience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>neu790</td>
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<tr>
<td>Credit points</td>
<td>3.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>90 h</td>
</tr>
<tr>
<td></td>
<td>(28 h contact / 62 h individual reading and preparing discussion questions)</td>
</tr>
</tbody>
</table>

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

**Responsible persons**
- Kretzberg, Jutta (Module responsibility)
- Kretzberg, Jutta (Authorized examiners)
- Köppl, Christine (Authorized examiners)

**Prerequisites**
- Neurosci. knowlg.
- Scientific Literature
- Social skills
- Interdiscipl. knowlg.
- Data present./disc.
- Scientific English
- Ethics

Skills to be acquired in this module

Upon successful completion of this course, students will have thought about and discussed in depth scientific, social and ethical aspects of communication in and about neuroscience. In particular, participants practice critical reading of neuroscience literature, learn about the scientific publication process and discuss science communication to the general public.

**Module contents**

The overall goal of critical discussion of neuroscientific results in a scientific, social and ethical context requires preparation and active participation both before (Stud.IP wiki) and during the weekly sessions. Each participant is responsible for the preparation and moderation of at least one session in a group of 2-3 students. For passing the module, additional active participation is required in at least 10 of the seminar sessions. The specific papers and topics that are discussed vary, but typically cover:

- How to find literature?
- How to read different types of scientific papers: Classic papers, review papers, perspective papers, recent original papers?
- Publication process, Authorship and impact metrics
- Alternative publication paths and data sharing in neuroscience
- Science communication for the general public and on social media
- Face-to-face scientific communication

**Reader's advisory**

List of published papers, as well as online resources for preparation will be selected by the teachers and participants via Stud.IP.

Background neuroscience textbooks, e.g.:
- Galizia, Lledo ‘Neuroscience – From Molecule to Behavior’, 2013, Springer
- Nicholls et al. ‘From Neuron to Brain’, 5th edition 2012, Sinauer
## Language of instruction
- English

## Duration (semesters)
- 1 Semester

## Module frequency
- Winter semester

## Module capacity
- 20

- Registration procedure / selection criteria: StudIP

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

## Module art / typ of module
- Wahlpflicht / Elective

## Vorkenntnisse / Previous knowledge

### Examination
- **Time of examination**: 
- **Type of examination**:

### Final exam of module
- Presentation (ungraded, pass / fail)

## Course type
- Seminar

## SWS
- 2

## Frequency
- WiSe

## Workload attendance
- 28 h
neu800 - Introduction to Matlab

<table>
<thead>
<tr>
<th>Module label</th>
<th>Introduction to Matlab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>neu800</td>
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<tr>
<td>Credit points</td>
<td>3.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>90 h</td>
</tr>
<tr>
<td></td>
<td>{</td>
</tr>
<tr>
<td></td>
<td>2 SWS Supervised exercise (UE) &quot;Introduction to MATLAB&quot;</td>
</tr>
<tr>
<td></td>
<td>Total workload 90h: 28h contact / 62h practising learned programming skills</td>
</tr>
<tr>
<td>Applicability of the module</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Master's Programme Biology (Master) &gt; Skills Modules</td>
</tr>
<tr>
<td></td>
<td>• Master's Programme Biology (Master) &gt; Skills Modules</td>
</tr>
<tr>
<td></td>
<td>• Master's Programme Neuroscience (Master) &gt; Skills Modules</td>
</tr>
<tr>
<td>Responsible persons</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gießing, Carsten (Module responsibility)</td>
</tr>
<tr>
<td></td>
<td>Gießing, Carsten (Authorized examiners)</td>
</tr>
<tr>
<td>Prerequisites</td>
<td></td>
</tr>
<tr>
<td>Skills to be acquired in this module</td>
<td>++ Expt. Methods</td>
</tr>
<tr>
<td></td>
<td>+ Social skills</td>
</tr>
<tr>
<td></td>
<td>+ Interdiscipl. knowlg.</td>
</tr>
<tr>
<td></td>
<td>++ Maths/Stats/Progr.</td>
</tr>
<tr>
<td></td>
<td>+ Data present./disc.</td>
</tr>
<tr>
<td></td>
<td>+ Scientific English</td>
</tr>
</tbody>
</table>

Within this introductory course students will learn the basics of MATLAB programming. Participants will be introduced in fundamental programming concepts.

| Module contents              | The modul comprises an introduction to data structures, flow control, loops, graphics, basic data analyses with MATLAB, scripts and functions. |

| Links                        |                        |
| Language of instruction      | English                |
| Duration (semesters)         | 1 Semester             |
| Module frequency             | annually, summer term, second half |
| Module capacity              | 12 (in total with bio640) |
|                              | { shared course components with (cannot be credited twice): bio640 } |
| Modullevel / module level    | MM (Mastermodul / Master module) |
| Modulart / typ of module     | Wahlpflicht / Elective |

| Lehr-/Lernform / Teaching/Learning method |                        |
| Vorkenntnisse / Previous knowledge |                        |
| Examination                    | Time of examination    | Type of examination |
| Final exam of module           | end of summer term     | Working on exercises Regular active participation |

<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></td>
<td>SuSe</td>
<td>0</td>
</tr>
<tr>
<td>Seminar</td>
<td></td>
<td></td>
<td>SuSe</td>
<td>0</td>
</tr>
<tr>
<td>Exercises</td>
<td></td>
<td>2</td>
<td>SuSe</td>
<td>28</td>
</tr>
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</table>

Total time of attendance for the module: 28 h
# neu810 - International Meeting Contribution

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>Module code</td>
<td>neu810</td>
</tr>
<tr>
<td>Credit points</td>
<td>3.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>90 h</td>
</tr>
</tbody>
</table>
| Applicability of the module   | • Master's Programme Biology (Master) > Skills Modules  
• Master's Programme Biology (Master) > Skills Modules  
• Master's Programme Neuroscience (Master) > Skills Modules |
<p>| Responsible persons           | Kretzberg, Jutta (Module responsibility)            |
|                              | Kretzberg, Jutta (Authorized examiners)             |
|                              | Köppl, Christine (Authorized examiners)             |
| Prerequisites                 |                                                     |
| Skills to be acquired in this module |                                                     |
|                               | • Neurosci. knowlg.                                 |
|                               | ++ Independent research                             |
|                               | • Scient. Literature                                |
|                               | ++ Social skills                                    |
|                               | • Interdiscipl. knowlg.                             |
|                               | ++ Data present./disc.                              |
|                               | • Scientific English                               |
|                               | • Ethics                                             |
|                               | Preparation, presentation and critical discussion of own studies for an international audience: |
|                               | • participate in an international meeting           |
|                               | • prepare a poster or talk for an international meeting |
|                               | • present own results in a way that is appropriate for the target audience |
|                               | • put own studies into the context of scientific literature |
|                               | • acquire additional knowledge about a broader field of research |
| Module contents               |                                                     |
|                               | Active participation in a scientific conference, workshop, summer school etc, lasting a minimum of 3 full days. Student must be the presenter (poster or talk) and an author of the presented work, typically carried out in the context of a research module or the Master thesis. |
|                               | It is mandatory to present the poster or talk to Christine Köppl or Jutta Kretzberg prior to the meeting and incorporate the feedback on the presentation. |
| Reader's advisory             | dependent on the scientific topic                   |
| Links                         |                                                     |
| Language of instruction       | English                                             |
| Duration (semesters)          | 1 Semester                                           |
| Module frequency              | every semester, flexible                             |
| Module capacity               | unlimited (please contact module organizer individually) |
| Modullevel / module level     | MM (Mastermodul / Master module)                     |
| Modulart / typ of module      | Wahlpflicht / Elective                               |
| Lehr-/Lernform / Teaching/Learning method |                                                     |
| Vorkenntnisse / Previous knowledge |                                                     |
| Examination                   | Time of examination                                 |
| Final exam of module          | presentation (ungraded, pass/fail)                  |
| Course type                   | Seminar                                              |
| SWS                           | 2                                                    |</p>
<table>
<thead>
<tr>
<th>Frequency</th>
<th>SuSe and WiSe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workload attendance</td>
<td>28 h</td>
</tr>
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</table>
neu725 - Multivariate Statistics and Applications in R

<table>
<thead>
<tr>
<th>Module label</th>
<th>Multivariate Statistics and Applications in R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>neu725</td>
</tr>
<tr>
<td>Credit points</td>
<td>6.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>180 h</td>
</tr>
<tr>
<td></td>
<td>2 SWS Lecture (30h contact / 60h self-studies and exam preparation)</td>
</tr>
<tr>
<td></td>
<td>2 SWS Seminar (30h contact / 60h statistical data analysis in R)</td>
</tr>
<tr>
<td>Applicability of the module</td>
<td>Master’s Programme Biology (Master) &gt; Skills Modules</td>
</tr>
<tr>
<td></td>
<td>Master’s Programme Neuroscience (Master) &gt; Skills Modules</td>
</tr>
<tr>
<td>Responsible persons</td>
<td>Hildebrandt, Andrea (Module responsibility)</td>
</tr>
<tr>
<td></td>
<td>Hildebrandt, Andrea (Authorized examiners)</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>recommended in semester 1/3 weeks 11-13 of summer semester</td>
</tr>
<tr>
<td>Skills to be acquired in this module</td>
<td>Students will acquire basic knowledge in planning empirical investigations, managing and understanding quantitative data and conducting a wide variety of multivariate statistical analyses. They will learn how to use the statistical methodology in terms of good scientific practice and how to interpret, evaluate and synthesize empirical results from the perspective of statistical modeling in basic and applied research context. The courses in this module will additionally point out statistical misconceptions and help students to overcome them.</td>
</tr>
<tr>
<td></td>
<td>+ Independent research</td>
</tr>
<tr>
<td></td>
<td>+ Scient. Literature</td>
</tr>
<tr>
<td></td>
<td>+ Social skills</td>
</tr>
<tr>
<td></td>
<td>++ Interdiscipl. knowledge</td>
</tr>
<tr>
<td></td>
<td>++ Maths/Stats/Progr.</td>
</tr>
<tr>
<td></td>
<td>++ Data preset./disc.</td>
</tr>
<tr>
<td></td>
<td>+ Scient. English</td>
</tr>
<tr>
<td></td>
<td>++ Ethics</td>
</tr>
<tr>
<td></td>
<td>Graphical representation of multivariate data</td>
</tr>
<tr>
<td></td>
<td>The Generalized Linear Modeling (GLM) framework</td>
</tr>
<tr>
<td></td>
<td>Multiple and moderated linear regression with quantitative and qualitative predictors</td>
</tr>
<tr>
<td></td>
<td>Logistic regression</td>
</tr>
<tr>
<td></td>
<td>Multilevel regression (Generalized Linear Mixed Effects Modeling – GLMM)</td>
</tr>
<tr>
<td></td>
<td>Non-linear regression models</td>
</tr>
<tr>
<td></td>
<td>Path modeling</td>
</tr>
<tr>
<td></td>
<td>Factor analysis (exploratory &amp; confirmatory)</td>
</tr>
<tr>
<td></td>
<td>(Multilevel) Structural equation modeling (SEM linear and non-linear)</td>
</tr>
<tr>
<td></td>
<td>Part 2: Analysis Methods with R (seminar)</td>
</tr>
<tr>
<td></td>
<td>Data examples and applications of GLM, GLMM, polynomial, spline and local regression, path modeling, factor analyses and SEM</td>
</tr>
<tr>
<td>Reader's advisory</td>
<td>Course material will be available in Stud.IP</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Links</th>
<th>Language of instruction</th>
<th>English</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Duration (semesters)</td>
<td>1 Semester</td>
</tr>
<tr>
<td></td>
<td>Module frequency</td>
<td>winter term, annually</td>
</tr>
<tr>
<td></td>
<td>Module capacity</td>
<td>unlimited (recommended in semester 1/3 weeks 11-13 of summer semester)</td>
</tr>
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<td></td>
<td>Modullevel / module level</td>
<td>MM (Mastermodul / Master module)</td>
</tr>
<tr>
<td></td>
<td>Modulart / typ of module</td>
<td>Wahlpflicht / Elective</td>
</tr>
<tr>
<td></td>
<td>Lehr-/Lernform / Teaching/Learning method</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vorkenntnisse / Previous knowledge</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Examination Time of examination</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Final exam of module End of winter semester</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Final exam of module</th>
<th>End of winter semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of examination</td>
<td>Type of examination</td>
</tr>
<tr>
<td></td>
<td>written exam</td>
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</table>
|                      | attendance of at least 70% in the seminars (in
<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>addition, mandatory but ungraded</td>
</tr>
<tr>
<td>Course type</td>
<td>Comment</td>
<td>SWS</td>
</tr>
<tr>
<td>Lecture</td>
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<td>2</td>
</tr>
<tr>
<td>Exercises</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

**Total time of attendance for the module** 56 h
neu820 - Neuroscience Journal Club

**Module label**  Neuroscience Journal Club

**Module code**  neu820

**Credit points**  3.0 KP

**Workload**  90 h

{  
30h contact / 60h reading and preparation of oral and poster presentation
}

**Applicability of the module**

- Master's Programme Biology (Master) > Skills Modules
- Master's Programme Biology (Master) > Skills Modules
- Master's Programme Neuroscience (Master) > Skills Modules

**Responsible persons**

Mertsch, Sonja (Module responsibility)

Mertsch, Sonja (Authorized examiners)

**Prerequisites**

**Skills to be acquired in this module**

Students will learn to read, interpret, present and discuss neuroscientific literature.

++ Neurosci. knowledge
+ Exp. Methods
++ Scient. Literature
++ Social skills
+ Interdiscipl. knowledge
++ Data present./disc.
+ Scientific English
+ Ethics

**Module contents**

Week 1: How to read and present a scientific paper and how to generate a scientific poster? Distribution of papers to participants

Week 2: Example presentation of a scientific paper by the teacher with discussion

Week 3-13: Oral presentation / moderation of discussion of one scientific paper per week by one or two student(s)

Week 14: Short poster presentations of all students

The focus topic of the scientific literature will change between semesters.

In winter semester 2021/22, the topic will be regenerative ophthalmology with the focus on tissue engineering.

**Reader's advisory**

Scientific literature will be available in Stud.IP

**Links**

**Language of instruction**  English

**Duration (semesters)**  1 Semester

**Module frequency**  winter term, annually

**Module capacity**  20

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

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

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

**Vorkenntnisse / Previous knowledge**

**Examination**  Time of examination

Type of examination

during the semester  presentation and attendace of at least 70% in the seminars

**Course type**  Seminar

**SWS**  2

**Frequency**  WiSe

**Workload attendance**  28 h
bio777 - Objekte in wissenschaftlichen Sammlungen: Konservierung, Management und Forschungsfragen

<table>
<thead>
<tr>
<th>Module label</th>
<th>Objekte in wissenschaftlichen Sammlungen: Konservierung, Management und Forschungsfragen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio777</td>
</tr>
<tr>
<td>Credit points</td>
<td>6.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>180 h</td>
</tr>
</tbody>
</table>
| Applicability of the module | • Master's Programme Biology (Master) > Skills Modules  
• Master's Programme Biology (Master) > Skills Modules |
| Responsible persons | Will, Maria (Module responsibility)  
Ellwanger, Karen (Authorized examiners)  
Will, Maria (Authorized examiners)  
Krämer, Carolin (Authorized examiners)  
Ellwanger, Karen (Module counselling)  
Albach, Dirk Carl (Module counselling)  
Krämer, Carolin (Module counselling) |
| Prerequisites |                                                                                       |
| Skills to be acquired in this module | • deepened biological expertise  
• deepened knowledge of biological working methods  
• interdisciplinary thinking  
• critical and analytical thinking  
• independent searching and knowledge of scientific literature  
• ability to perform independent biological research  
• data presentation and discussion in German and English (written and spoken)  
• teamwork  
• ethics and professional behaviour  
• project and time management |
| Module contents | • history of collections at universities and their importance for developing scientific theories;  
• origin/formation of collections (objects in time and space)  
• the collections of the CvO (overview) and their importance as infrastructure for teaching, learning and research  
• collection work in biological collections such as botanical garden, natural history museums, didactical collections or the herbarium (concepts, object handling, conservation, documentation & digitalization)  
• developing research questions and projects based on objects/collections, e.g., provenance research  
• communicating object-based topics (e.g., speed talk presenting current scientific articles)  
• … |
| Reader's advisory | articles and book chapters referring to (1) the history/presence/future of collections, (2) collection management and (3) research projects based on objects/collections |
| Links | https://uol.de/kustodien/zeugnissprogramm |
| Languages of instruction | German, English |
| Duration (semesters) | 1 Semester |
| Module frequency | 72 / 77 |
### Module capacity
10 (Vorlesung & Seminar als transdisziplinäre LV in Kooperation mit Fak. III)

### Reference text
verknüpft mit dem Modul bio783 "Object-based Research Projects in Biological Collections" (unabhängig Belegung möglich).

Wegen inhaltlicher Überschneidungen kann das Modul nicht zusätzlich zu pb335 belegt werden.

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

### Modulart / typ of module
Wahlmodul / Opportunity

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

### Vorkenntnisse / Previous knowledge

### Examination
<table>
<thead>
<tr>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Prüfungsleistungen:</td>
<td>2 Prüfungsleistungen:</td>
</tr>
<tr>
<td>- 1 Klausur oder 1 mündliche Prüfung (100%)</td>
<td>- 1 Klausur oder 1 mündliche Prüfung (100%)</td>
</tr>
<tr>
<td>und</td>
<td>und</td>
</tr>
<tr>
<td>1 Fachpraktische Übung (unbenotet)</td>
<td>1 Fachpraktische Übung (unbenotet)</td>
</tr>
</tbody>
</table>

### Final exam of module

### Comment

<table>
<thead>
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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>1</td>
<td>WiSe</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Seminar</td>
<td>2</td>
<td>WiSe</td>
<td>28</td>
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<tr>
<td>Exercises</td>
<td>1</td>
<td>WiSe</td>
<td>14</td>
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</table>

### Total time of attendance for the module
56 h
# bio783 - Object-based Research Projects in Biological Collections

<table>
<thead>
<tr>
<th>Module label</th>
<th>Object-based Research Projects in Biological Collections</th>
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<tbody>
<tr>
<td>Module code</td>
<td>bio783</td>
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<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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<td>Workload</td>
<td>180 h</td>
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## Applicability of the module
- Master's Programme Biology (Master) > Skills Modules
- Master's Programme Biology (Master) > Skills Modules

## Responsible persons
- Will, Maria (Module responsibility)
- Albach, Dirk Carl (Module counselling)
- Will, Maria (Authorized examiners)

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

## Skills to be acquired in this module
- documentation of a natural history collection (e.g., university or from an herbarium) including a description of the object(s), digitalization, check for traces of use and/or damage;
- if needed: restauration, i.e. fixing loose plants on herbarium vouchers;
- trace biographies of the collector and the collection/object (provenance);
- trace comparable collections using databases;
- as far as possible: identification/validation of scientific identification using databases and scientific literature
- generating and answer scientific questions based on the collection or develop an educational approach (e.g., teaching lecture)
- communicate the results, i.e. prepare a poster for a congress and defend your theses and summarize the results in a manuscripts;
- ...

## Reader's advisory
- scientific literature corresponding to the individual research project

## Links
- Languages of instruction: German, English
- Duration (semesters): 1 Semester
- Module frequency: irregular
- Module capacity: 4

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

## Modulart / typ of module
- Wahlmodul / Opportunity

## Lehr-/Lernform / Teaching/Learning
<table>
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<tr>
<th>Vorkenntnisse / Previous knowledge</th>
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<tbody>
<tr>
<td>Examination</td>
<td>Time of examination</td>
<td>Type of examination</td>
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<tr>
<td>Final exam of module</td>
<td>individual</td>
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<tr>
<td>Course type</td>
<td>Exercises</td>
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<td>SWS</td>
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<tr>
<td>Frequency</td>
<td>WiSe</td>
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<tr>
<td>Workload attendance</td>
<td>56 h</td>
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</table>
Abschlussmodul

mam - Master´s Thesis Module

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<th>Master´s Thesis Module</th>
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<td>30.0 KP</td>
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Applicability of the module
- Master's Programme Biology (Master) > Abschlussmodul

Responsible persons

Prerequisites

Skills to be acquired in this module

Module contents

Reader's advisory

Links

Languages of instruction
- German, English

Duration (semesters)
- 1 Semester

Module frequency

Module capacity
- unlimited

Modullevel / module level
- Abschlussmodul (Abschlussmodul / Conclude)

Modulart / typ of module
- Pflicht / Mandatory

Lehr-/Lernform / Teaching/Learning method

Vorkenntnisse / Previous knowledge

Examination
- Time of examination
- Type of examination
  - Final exam of module
    - G

Course type
- Colloquium

SWS
- 2

Frequency
- SuSe or WiSe

Workload attendance
- 28 h