# Background Modules

**bio605 - Molecular Genetics and Cell Biology**

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

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

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

**Prerequisites**
- BSc (Biologie, Biochemie)

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

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

**Module contents**
- Lecture: To improve knowledge in molecular genetics, molecular biology and cell biology in correlation with human diseases.
- Exercise: Learn to transfer the theoretical knowledge to experiments. Gaining methodological knowledge in molecular genetics, cell biology and therapeutic approaches. Initial training on how to perform research projects.
- Subjects of the lecture and seminar: Molecular bases of neurodegenerative diseases, structure and function of DNA/RNA/proteins/membranes, cytoskeleton, cell cycle, programmed cell death, cells in the social structure.
- Exercises: Learning current methods of molecular biology and human genetics; high throughput technologies, introduction to cell cultivation techniques.

**Literaturempfehlungen**
- Textbooks of Cell Biology

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

**Language of instruction**
- English

**Duration (semesters)**
- 1 Semester

**Module frequency**
- 15

**Reference text**
- associated with bio900

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

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

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

**Examination**
- Written examination (70 %), paper(s) presentation 30 %;
- not graded: signed lab protocols, regular active participation is required for the module to be passed.
<table>
<thead>
<tr>
<th>Form of teaching</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>2</td>
<td>WiSe</td>
<td>28</td>
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<tr>
<td>Seminar</td>
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<td>Exercises</td>
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<td><strong>Präsenzzeit Modul insgesamt</strong></td>
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<td></td>
<td></td>
<td><strong>112 h</strong></td>
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</table>
bio655 - Ornithology

Module label | Ornithology
Modulkürzel | bio655
Credit points | 12.0 KP
Workload | 360 h

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

Zuständige Personen
- Liedvogel, Miriam (Module responsibility)
- Klump, Georg Martin (Module counselling)
- Bouwhuis, Sandra (Module counselling)
- Köppl, Christine (Module counselling)
- Langemann, Ulrike (Module counselling)
- Bairlein, Franz (Module counselling)
- Mouritsen, Henrik (Module counselling)
- Schmaljohann, Heiko (Module counselling)
- Liedvogel, Miriam (Prüfungsberechtigt)
- Klump, Georg Martin (Prüfungsberechtigt)
- Bouwhuis, Sandra (Prüfungsberechtigt)
- Köppl, Christine (Prüfungsberechtigt)
- Langemann, Ulrike (Prüfungsberechtigt)
- Mouritsen, Henrik (Prüfungsberechtigt)
- Schmaljohann, Heiko (Prüfungsberechtigt)

Prerequisites

Skills to be acquired in this module

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.

Literaturempfehlungen


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

Lehr-/Lernform / Teaching/Learning method

Vorkenntnisse / Previous knowledge

Examination

Prüfungszeiten

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.

Form of teaching

Comment

SWS

Frequency

Workload of compulsory attendance

Lecture

4

WiSe

56

Seminar

4

WiSe

56

Präsenzzeit Modul insgesamt

112 h
### bio675 - Molecular Ecology

<table>
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<tr>
<th>Module label</th>
<th>Molecular Ecology</th>
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<tbody>
<tr>
<td>Modulkürzel</td>
<td>bio675</td>
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<td>Credit points</td>
<td>12.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>360 h</td>
</tr>
</tbody>
</table>

#### Verwendbarkeit des Moduls
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Landscape Ecology (Master) > Basismodule

#### Zuständige Personen
- Nolte, Arne (Module responsibility)
- Gerlach, Gabriele (Module counselling)
- Nolte, Arne (Prüfungsberechtigt)
- Gerlach, Gabriele (Prüfungsberechtigt)

#### 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.

#### Literatureempfehlungen
- will be announced during the course

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

#### ExamINATION
- Final exam of module: during the module
- Prüfungszeiten: Präsentationen (50%), Portfolio (50%). Regular participation is a prerequisite to pass in the module.

<table>
<thead>
<tr>
<th>Form of teaching</th>
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<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<tr>
<td>Form of teaching</td>
<td>Comment</td>
<td>SWS</td>
<td>Frequency</td>
<td>Workload of compulsory attendance</td>
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<tr>
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<td>SoSe</td>
<td>84</td>
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<td>Präsenzzelt Modul insgesamt</td>
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<td></td>
<td></td>
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</table>
bio695 - Biochemical concepts in signal transduction

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

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

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

Prerequisites:
- keine

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

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

Mechanisms of biochemical signal transduction are imparted theoretically and experimentally

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

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

Vorkenntnisse / Previous knowledge:

Examination:
- Final exam of module: 90 minutes written exam
  - written examination (50%)
  - protocols (50%)

Form of teaching:
- Lecture: 1 SWS
- Seminar: 1 SWS
- Exercises: 6 SWS

Präsenzzeit Modul insgesamt: 112 h
Bio703 - Basic Concepts in Plant Sciences

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

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

Zuständige Personen
- Albach, Dirk Carl (Module responsibility)
- Zotz, Gerhard Wolfgang (Module counselling)
- Laubinger, Sascha (Module counselling)
- von Hagen, Klaus Bernhard (Module counselling)
- Albach, Dirk Carl (Prüfungsberechtigt)
- Zotz, Gerhard Wolfgang (Prüfungsberechtigt)
- Laubinger, Sascha (Prüfungsberechtigt)
- von Hagen, Klaus Bernhard (Prüfungsberechtigt)

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 [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) + teamwork ++ ethics and professional behaviour [nop]

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)

Literaturempfehlungen

Links
- Languages of instruction: German, English
- Duration (semesters): 1 Semester
- Module capacity: 12
- Reference text: associated with bio765 (Current Methods in Plant Science) (recommended)
- Modullevel / module level: MM (Mastermodul / Master module)
- Modulart / typ of module: Wahlpflicht / Elective

Examination
- Prüfungszweige: Ökologie, Flora, Genetik
- Type of examination: Final exam of module
- Form of teaching: Lecture, Seminar
- Comment: 1 Portfolio
- SWS: 4, 4
- Frequency: WiSe, WiSe
- Workload of compulsory attendance: 56, 56
- Präsenzzeit Modul insgesamt: 112 h
## bio720 - Marine Biodiversity

<table>
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<tbody>
<tr>
<td>Modulkürzel</td>
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| Verwendbarkeit des Moduls | • Master's Programme Biology (Master) > Background Modules  
                          | • Master's Programme Biology (Master) > Background Modules                          |
| Zuständige Personen   | Martinez Arbizu, Pedro Miguel (Module responsibility)  
                          | Glatzel, Thomas (Module counselling)  
                          | Martinez Arbizu, Pedro Miguel (Prüfungsberechtigt)  
                          | Glatzel, Thomas (Prüfungsberechtigt)  
                          | Wehrmann, Achim (Prüfungsberechtigt)  
                          | Rossel, Sven (Prüfungsberechtigt)  
                          | Gutt, Julian (Prüfungsberechtigt)  
                          | Kröncke, Ingrid (Prüfungsberechtigt) |
| Prerequisites         | BSc (Biology)                                                                       |
| 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 ++ 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 & scientific programming |
| Prerequisites         | Knowledge of fundamentals, topical subjects and methods in Marine Biology and Marine Geology. Studies and critical assessment of the scientific literature. |
| Prerequisites         | Studies and critical assessment of the scientific literature.                        |
| Module contents       | 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. |
| Literatureempfehlungen| as announced in the lecture                                                          |
| 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 |                                                                                     |
| Examination           | Prüfungszeiten                                                                      |
| Final exam of module  | Written examination (60 %), portfolio (20 %), short presentation (20 %)  
                          | Regular active participation is required for the module to be passed.                |
| Form of teaching      | Comment | SWS | Frequency | Workload of compulsory attendance |
| Lecture               | 3 | WiSe | 42 |
| Exercises             | 9 | WiSe | 126 |
| Seminar               | 1 | WiSe | 14 |
| Präsenzzeit Modul insgesamt | 182 h                                                                                 |
**bio733 - Evolutionary Biology Population Genetics**

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<th>Evolutionary Biology Population Genetics</th>
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<tr>
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<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
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<td>Verwendbarkeit des Moduls</td>
<td>- Master's Programme Biology (Master) &gt; Background Modules</td>
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<tr>
<td>Zuständige Personen</td>
<td>Gerlach, Gabriele (Module responsibility)</td>
</tr>
<tr>
<td></td>
<td>Albach, Dirk Carl (Module counselling)</td>
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<td>Gerlach, Gabriele (Prüfungsberechtigt)</td>
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<td>Albach, Dirk Carl (Prüfungsberechtigt)</td>
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<tr>
<td>Prerequisites</td>
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<tr>
<td>Skills to be acquired in this module</td>
<td>+ vertiefte biologische Fachkenntnisse</td>
</tr>
<tr>
<td></td>
<td>++ vertiefte Kenntnisse biologischer Arbeitstechniken</td>
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<tr>
<td></td>
<td>++ Fähigkeit zur Datenanalyse; ++ kritisches und analytisches Denken</td>
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<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>
<td></td>
<td>+ Teamfähigkeit</td>
</tr>
<tr>
<td></td>
<td>++ Statistik und wissenschaftliches Programmieren</td>
</tr>
<tr>
<td></td>
<td>Übung: Es werden Datensätze und Methoden vorgestellt und angewendet, um die Verbreitung und genetischen Austausch zwischen Populationen zu bestimmen.</td>
</tr>
<tr>
<td>Literaturempfehlungen</td>
<td>aktuelle wissenschaftliche Artikel zur Evolutionsbiologie</td>
</tr>
<tr>
<td></td>
<td>Futuyama D. Evolutionary Biology, Elsevier, Hartl &amp; Clark Priciples of Population Genetics, Sinauer</td>
</tr>
<tr>
<td>Links</td>
<td>German, English</td>
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<tr>
<td>Languages of instruction</td>
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<td>Duration (semesters)</td>
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<td>Module capacity</td>
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<tr>
<td>Reference text</td>
<td>associated with bio736 (Evolutionary Transcriptomics) (recommended)</td>
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<td>Modullevel / module level</td>
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<td>Modulart / typ of module</td>
<td>Wahlpflicht / Elective</td>
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<td>Lehr-/Lernform / Teaching/Learning method</td>
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<td>Vorkenntnisse / Previous knowledge</td>
<td>Grundkenntnisse Evolutionsbiologie</td>
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<tr>
<td>Examination</td>
<td>Prüfungszeiten</td>
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<td>Final exam of module</td>
<td>portfolio (60%) presentation (40%)</td>
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<tr>
<td>Form of teaching</td>
<td>Comment</td>
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<td>Lecture</td>
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<td>Exercises</td>
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<tr>
<td>Präsenzzeit Modul insgesamt</td>
<td>56 h</td>
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bio736 - Evolutionary Transcriptomics

Module label: Evolutionary Transcriptomics
Modulkürzel: bio736
Credit points: 6.0 KP
Workload: 180 h

Verwendbarkeit des Moduls:
- Master's Programme Biology (Master) > Background Modules

Zuständige Personen:
- Nolte, Arne (Module responsibility)
- Laubinger, Sascha (Module counselling)
- Gowik, Udo (Module counselling)
- Nolte, Arne (Prüfungsberechtigt)
- Laubinger, Sascha (Prüfungsberechtigt)
- Gowik, Udo (Prüfungsberechtigt)

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.

Literaturempfehlungen

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

Module frequency:
Module capacity: 12
Reference text: associated with bio733: Evolutionary Biology Population Genetics (recommended)

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

Lehr-/Lernform / Teaching/Learning method

Vorkenntnisse / Previous knowledge: Grundkenntnisse Evolutionsbiologie

Examination:
- Prüfungszeiten
- Type of examination
- Final exam of module: portfolio (60%) presentation (40%)

Form of teaching:
- Lecture: 1 SWS, Prüfungszeiten, Frequency, Workload of compulsory attendance: W1Se, 14
- Exercises: 3 SWS, W1Se, 42

Präsenzzeit Modul insgesamt: 56 h
### bio765 - Current Methods in Plant Sciences - Ecology, Phylogeny and Molecular Biology

<table>
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<tr>
<th>Module label</th>
<th>Current Methods in Plant Sciences - Ecology, Phylogeny and Molecular Biology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modulkürzel</td>
<td>bio765</td>
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<tr>
<td>Credit points</td>
<td>12.0 KP</td>
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<td>Workload</td>
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**Verwendbarkeit des Moduls**
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Biology (Master) > Background Modules

**Zuständige Personen**
- Laubinger, Sascha (Module responsibility)
- Albach, Dirk Carl (Module counselling)
- Zotz, Gerhard Wolfgang (Module counselling)
- Laubinger, Sascha (Prüfungsberechtigt)
- Albach, Dirk Carl (Prüfungsberechtigt)
- Zotz, Gerhard Wolfgang (Prüfungsberechtigt)

**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)

**Literatureempfehlungen**

**Links**

**Languages of instruction**
- German, English

**Duration (semesters)**
- 1 Semester

**Module frequency**
- 12

**Reference text**
- associated with bio703 (Basic Concepts in Plant Sciences) (recommended)

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

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

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

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

**Examination**
- Prüfungszeiten

**Type of examination**
- Portfolio

**Final exam of module**
- Exercises

**Form of teaching**
- Exercises

**SWS**
- 8

**Frequency**
- WiSe

**Workload Präsenzzzeit**
- 112 h
bio770 - Field Methods in Organismal Biology

<table>
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<th>Field Methods in Organismal Biology</th>
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<td>Modulkürzel</td>
<td>bio770</td>
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<tr>
<td>Master's Programme Biology (Master) &gt; Background Modules</td>
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<tr>
<td>Master's Programme Landscape Ecology (Master) &gt; Basismodule</td>
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Zuständige Personen

Zotz, Gerhard Wolfgang (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 Wolfgang (Prüfungsberechtigt)
Gerlach, Gabriele (Prüfungsberechtigt)
Albach, Dirk Carl (Prüfungsberechtigt)
Glatzel, Thomas (Prüfungsberechtigt)
von Hagen, Klaus Bernhard (Prüfungsberechtigt)
Mouritsen, Henrik (Prüfungsberechtigt)

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 |

Literaturempfehlungen

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

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<td>2 Presentations (30 %) Laboratory course report on project work (70 %)</td>
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Form of teaching

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Module label: Biodiversity of Littoral Communities

Modulkürzel: bio780

Credit points: 15.0 KP

Workload: 450 h

Verwendbarkeit des Moduls:
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Biology (Master) > Background Modules

Zuständige Personen:
- Glatzel, Thomas (Module responsibility)
- Martinez Arbizu, Pedro Miguel (Module counselling)
- Glatzel, Thomas (Prüfungsberechtigt)
- Martinez Arbizu, Pedro Miguel (Prüfungsberechtigt)

Prerequisites:
- Safe apnoediving with aptitude test and medical fitness certificate

Skills to be acquired in this module:
- deepened knowledge of biological working methods
- ability to perform independent biological research
- teamwork
- ethics and professional behaviour
- project and time management

Skills acquired by participating 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 floral composition of the Atlantic Ocean, the Mediterranean Sea and the Mediterranean region or the Red Sea
  - 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

Methods:
- Formulation and definition of scientific approaches and selection of methods
- Observation and investigation of organisms and their habitats
- 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

Further skills:
- Social engagement in groups
- Independent scientific work in groups
- Improvement of scientific discussion culture
- Consciousness of the threat to coral reefs

Culture:
- History, culture, politics, and religion
- Physiological aspects of apnoediving
- Measures in case of accidents

Module contents:
- Biodiversity of littoral biotic communities – topographical field research

Literaturempfehlungen:
- GRÜTER, W., 2001: Leben im Meer - Vielfalt und Zusammenhänge. Dr. Friedrich Pfeil Verlag, München. Should be read prior to a marine biological excursion!
- Yosemite National Park website: http://www.nps.gov/yose/
- ZOOLOGICAL RECORD: The international journal covering all aspects of the study of the diversity of animal life. Published by the Zoological Society of London. Web of science: externhttp://www.bis.uni-oldenburg.de – Data banks(DBIS) – Biology – TOP data banks, e.g. ASFA, Science Citation Index, Zoological Record http://www.biodiversitylibrary.org/bibliography/14107

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

Vorkenntnisse / Previous knowledge
<table>
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<th>Examination</th>
<th>Prüfungszeiten</th>
<th>Type of examination</th>
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<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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**Präsenzzzeit Modul insgesamt** 168 h
**bio845 - Introduction to Development and Evolution**

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<td>Workload</td>
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<td></td>
<td>• Master's Programme Biology (Master) &gt; Background Modules</td>
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<td>• Master's Programme Neuroscience (Master) &gt; Background Modules</td>
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<td>Sienknecht, Ulrike (Module responsibility)</td>
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<td>Sienknecht, Ulrike (Module counselling)</td>
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<td></td>
<td>Sienknecht, Ulrike (Prüfungsberechtigt)</td>
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<td></td>
<td>Claußen, Maike (Prüfungsberechtigt)</td>
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**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

**Literature recommendations**

**Literature:**

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

**Links**

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<th>Language of instruction</th>
<th>English</th>
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<td>Modulart / typ of module</td>
<td>Wahlpflicht / Elective</td>
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**Vorkenntnisse / Previous knowledge**: organicism biology, developmental biology, evolutionary biology, neurobiology, genetics, molecular biology

**Examination**

**Final exam of module**

- same winter term
- oral exam of 30 minutes (or written exam)* Pending approval PO

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<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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**Präsenzzeit Modul insgesamt**

90 h
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

**Literatureempfehlungen**


**Links**

<table>
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<th>English</th>
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<td>Wahlpflicht / Elective</td>
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<td>Examination</td>
<td>Prüfungszeiten</td>
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<tr>
<td>Form of teaching</td>
<td>Exercises</td>
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<tr>
<td>SWS</td>
<td>6</td>
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<td>Workload Präsenzzzeit</td>
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bio860 - Comparative Developmental Biology

Module label: Comparative Developmental Biology
Modulkürzel: bio860
Credit points: 6.0 KP
Workload: 180 h

Verwendbarkeit des Moduls:
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Biology (Master) > Background Modules

Zuständige Personen:
- Sienknecht, Ulrike (Module responsibility)
- Sienknecht, Ulrike (Prüfungsberechtigt)
- N., N. (Module counselling)

Prerequisites:
- ++ 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.

Literaturempfehlungen:

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

Module capacity: 6
Module frequency: 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:
- Prüfungszeiten: same summer term
- Type of examination: 1 portfolio

Final exam of module:
- Form of teaching: Lecture, Exercises
- Comment: SWS
- Frequency: SoSe
- Workload of compulsory attendance: 14, 42

Präsenzzeit Modul insgesamt: 56 h
neu141 - Visual Neuroscience - Physiology and Anatomy

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<th>Visual Neuroscience - Physiology and Anatomy</th>
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Workload

- 360 h
  - 3 SWS Lecture (VO)
  - 1 SWS Seminar (SE)
  - 8 SWS Supervised exercise (UE)

Verwendbarkeit des Moduls

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

Zuständige Personen

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

Prerequisites

- Basic knowledge of neurobiology

Skills to be acquired in this module

- ++ Neurosci. knowlg.
- ++ Expt. Methods
- Independent research
- ++ Scient. Literature
- Social skills
- Maths/Stats/Progr.
- ++ Data present./disc.
- Scientific English
- Ethics

Upon successful completion of this course, students

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

Module contents

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

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

Literatureempfehlungen

Course scripts and mandatory scientific literature discussed in the seminar will be available in Stud.IP.

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

Links

Language of instruction

English
<table>
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<td>Wahlpflicht / Elective</td>
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neu150 - Visual Neuroscience - Anatomy

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

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

**Prerequisites**
- attendance in pre-meeting

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

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

**Literaturempfehlungen**
- Background and seminar literature will be available in Stud.IP

**Links**
- English

**Duration (semesters)**
- 1 Semester

**Module frequency**
- jährlich

**Module capacity**
- unlimited

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

**Modullevel / module level**
- BC (Basiscurriculum / Base curriculum)

**Modulart / typ of module**
- je nach Studiengang Pflicht oder Wahlpflicht

**Vorkenntnisse / Previous knowledge**

**Vorkenntnisse / Previous knowledge**

**Examination**

<table>
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<th>Final exam of module</th>
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**Form of teaching**

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**Präsenzzeit Modul insgesamt**
- 70 h
neu210 - Neurosensory Science and Behaviour

Module label | Neurosensory Science and Behaviour
---|---
Modulkürzel | neu210
Credit points | 9.0 KP

Workload | 270 h
---|---
4 SWS Lecture (VO) "Neuroethology" and "Behavioural ecology"
Total workload 180h: 56h contact/ 60h background reading/ 64h exam preparation
2 SWS Seminar (SE) "Current issues of ethology"
Total workload 90h: 28h contact/ 30h literature reading/ 32h preparation of presentation

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

Zuständige Personen
- Klump, Georg Martin (Module responsibility)
- Langemann, Ulrike (Module counselling)
- Mouritsen, Henrik (Module counselling)
- Klump, Georg Martin (Prüfungsberechtigt)
- Mouritsen, Henrik (Prüfungsberechtigt)
- Hildebrandt, Jannis (Prüfungsberechtigt)
- Langemann, Ulrike (Prüfungsberechtigt)

Prerequisites
Fundamentals of Neurobiology, Behavioural Biology, Evolution, Ecology

Skills to be acquired in this module
++ Neurosci. knowlg. + Expt. methods + Independent research + Scient. literature + Social skills
++ Interdiscipl. knowlg. Maths/Stats/Progr. + Data present./disc. + Scientific English Ethics

Upon successful completion of this course, students
- know the fundamentals of behavioural ecology and neuroethology
- are able to present and critically assess scientific data and approaches

Module contents
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.

Literatureempfehlungen

Links
Language of instruction | English
Duration (semesters) | 1 Semester
Module frequency | jährlich

Module capacity | 30

Recommendation 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")

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

Lehr-/Lenform / Teaching/Learning method
--- | ---
25 / 67
### Vorkenntnisse / Previous knowledge

Fundamentals of Neurobiology, Behavioural Biology, Evolution, Ecology

### Examination

<table>
<thead>
<tr>
<th>Prüfungszeiten</th>
<th>Type of examination</th>
</tr>
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<tbody>
<tr>
<td>as agreed, usually in the break after the winter term</td>
<td>80% written exam (content of the two lecture series), 20% presentation(s)</td>
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### Form of teaching

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<th>SWS</th>
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<tr>
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</table>

| Präsenzzeit Modul insgesamt | 84 h |
neu220 - Neurosensory Science and Behaviour - Part B

<table>
<thead>
<tr>
<th>Module label</th>
<th>Neurosensory Science and Behaviour - Part B</th>
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<tr>
<td>Modulkürzel</td>
<td>neu220</td>
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<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
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</tbody>
</table>

- 3 SWS Lecture (VO) "Intro. to Cognitive Neuroscience" and "Psychopharmacol." Total workload 135h: 45h contact/ 45 background reading/ 45h exam preparation
- 1 SWS Supervised excercise (UE) Total workload 45h: 14h contact/ 31h paper reading

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

Zuständige Personen
- Thiel, Christiane Margarete (Module responsibility)
- Thiel, Christiane Margarete (Module counselling)
- Thiel, Christiane Margarete (Prüfungsberechtigt)
- Gießing, Carsten (Prüfungsberechtigt)

Prerequisites
- ++ Neurosci. knowlg. + Expt. methods Independent research + Scient. literature + Social skills
- ++ Interdiscipl. knowlg. Maths/Stats/Progr. + Data present./disc. + Scientific English Ethics

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

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

Literatureempfehlungen

Links
- Language of instruction: English
- Duration (semesters): 1 Semester
<table>
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</table>
| Reference text   | Course in the second half of the semester  
Regular active participation is required to pass the module. |
| Modulart / module level | je nach Studiengang Pflicht oder Wahlpflicht |
| Lehr-/Lernform / Teaching/Learning method | |
| Vorkenntnisse / Previous knowledge | Fundamentals of Neurobiology, Behavioral Biology |
| Examination | Prüfungszeiten Type of examination |
| Final exam of module | as agreed, usually in the break after the winter term 100% written exam (content of the lectures) |
| Form of teaching | Comment SWS Frequency Workload of compulsory attendance |
| Lecture | 3 -- 42 |
| Exercises | 1 -- 14 |
| Präsenzzeit Modul insgesamt | 56 h |
**neu290 - Biophysics of Sensory Reception**

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

**Workload**

- 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

**Verwendbarkeit des Moduls**

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

**Zuständige Personen**

- Winklhofer, Michael (Module responsibility)
- Winklhofer, Michael (Prüfungsberechtigt)
- Winklhofer, Michael (Module counselling)

**Prerequisites**

Recommended previous knowledge/skills: cell biology of neurons

**Skills to be acquired in this module**

- ++ Neurosci. knowlg.
- + Independent research
- + Scient. Literature
- ++ Interdiscipl. knowlg.
- + Data present./disc.

- to gain a general understanding of sensory reception
- 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

- to be able to perform simple quantitative assessments of detection sensitivity to physical stimuli
- to understand common features in transduction pathways among various senses

**Module contents**

- 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, Electroreception in Lorenzini ampullae of elasmobranch fish and in tuberous receptors of mormyrid fish, derived electroreceptors in aquatic mammals, Magnetoreception - candidate structural correlates of magnetoreceptors

**Literaturempfehlungen**

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.

Recommended textbook(s) or other literature:

**Links**

**Language of instruction** English

**Duration (semesters)** 1 Semester

**Module frequency** annually, summer term, second half

**Module capacity** 20

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

**Modulart / typ of module** Wahlpflicht / Elective
Lehr-/Lernform / Teaching/Learning method

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

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<td>Final exam of module</td>
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Type of examination: written exam (75%), presentation in the seminar (25%) In addition, mandatory but ungraded: presentation on seminar

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Präsenzzeit Modul insgesamt 56 h

Workload of compulsory attendance
### neu300 - Functional MRI data analysis

<table>
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<tr>
<th>Module label</th>
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<td>Modulkürzel</td>
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<td>Credit points</td>
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<td>Workload</td>
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<td></td>
<td>(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 )</td>
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**Verwendbarkeit des Moduls**
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Biology (Master) > Background Modules
- Master's Programme Neuroscience (Master) > Background Modules

**Zuständige Personen**
- Gießing, Carsten (Module responsibility)
- Gießing, Carsten (Prüfungsberechtigt)
- Thiel, Christiane Margarete (Prüfungsberechtigt)

**Prerequisites**
- Skills to be acquired in this module
  - Neurosci. knowlg.
  - Expt. Methods
  - Social skills
  - Interdisclipl. 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 modul 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 neuro-imaging studies using MATLAB based software.

**Literaturempfehlungen**

**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

**Vorkenntnisse / Previous knowledge**

**Examination**
- Prüfungszeiten: end of summer term
- Type of examination: 70% oral exam or written exam, 30% presentations
- In addition, mandatory but ungraded: Regular active participation

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<th>Frequency</th>
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<td>Comment</td>
<td>SWS</td>
<td>Frequency</td>
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<td>Präsenzzzeit Modul insgesamt</td>
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neu310 - Psychophysics of Hearing

Module label: Psychophysics of Hearing
Modulkürzel: 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

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

Zuständige Personen:
Klump, Georg Martin (Module responsibility)
Klump, Georg Martin (Prüfungsberechtigt)
Langemann, Ulrike (Prüfungsberechtigt)

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

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.

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

Vorkenntnisse / Previous knowledge:

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

Form of teaching:
- Exercises: 1 SWS
- Seminar: 2 SWS
- Practical training: 5 SWS
- Lecture: 0 SWS

Waranzzeit Modul insgesamt: 112 h
neu340 - Invertebrate Neuroscience

Module label: Invertebrate Neuroscience
Modulkürzel: neu340
Credit points: 6.0 KP
Workload: 180 h

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

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

Zuständige Personen
Kretzberg, Jutta (Module responsibility)
Kretzberg, Jutta (Prüfungsberechtigt)

Prerequisites
attendance in pre-meeting

Skills to be acquired in this module

++ Neurosci. knowlg.
++ Exp. 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 neuroscience
- 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

Literatureempfehlungen
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
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<td>English</td>
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<td>Duration (semesters)</td>
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<tr>
<td>Module frequency</td>
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<td>Module capacity</td>
<td>12 (This module provides the background for neu345 &quot;Neural Computation in invertebrate systems&quot;)</td>
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<td>Modulart / typ of module</td>
<td>Wahlpflicht / Elective</td>
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<td>Vorkenntnisse / Previous knowledge</td>
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<td>Examination</td>
<td>Prüfungszeiten</td>
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<td>Präsenzzeit Modul insgesamt</td>
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**neu360 - Auditory Neuroscience**

**Module label**: Auditory Neuroscience

**Modulkürzel**: 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

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

**Zuständige Personen**
- Köppl, Christine (Module responsibility)
- Klump, Georg Martin (Prüfungsberechtigt)
- Köppl, Christine (Prüfungsberechtigt)

**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.

**Literaturempfehlungen**
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"
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
Prüfungszeiten
Type of examination

Final exam of module
within a few weeks of the end of summer term lecture period
HA

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Präsenzzeit Modul insgesamt

56 h
## Research Modules

**bio810 - Independent Research**

<table>
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<th>Independent Research</th>
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<td>Modulkürzel</td>
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<tr>
<td>Workload</td>
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**Verwendbarkeit des Moduls**
- Master's Programme Biology (Master) > Research Modules
- Master's Programme Biology (Master) > Research Modules

**Zuständige Personen**
- Zotz, Gerhard Wolfgang (Module responsibility)
- Zotz, Gerhard Wolfgang (Prüfungsberechtigt)
- der Biologie, Lehrende (Prüfungsberechtigt)

**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/](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.

**Literatureempfehlungen**
varies with chosen topic

**Languages of instruction**
English, German

**Duration (semesters)**
1 Semester

**Module frequency**
halbjährlich

**Module capacity**
unlimited

**Modullevel / module level**
MM (Mastermodul / Master module)
<table>
<thead>
<tr>
<th>Modulart / typ of module</th>
<th>Wahlpflicht / Elective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lehr-/Lernform / Teaching/Learning method</td>
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<td>Vorkenntnisse / Previous knowledge</td>
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<td>Examination</td>
<td>Prüfungszeiten</td>
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<tr>
<td>Final exam of module</td>
<td>internship report</td>
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<tr>
<td>Form of teaching</td>
<td>Comment</td>
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<td>Seminar</td>
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<td>10</td>
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<td>Präsenzzeit Modul insgesamt</td>
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### bio820 - Research Module Fast Track

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<tr>
<td>Modulkürzel</td>
<td>bio820</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>
</tr>
<tr>
<td>Verwendbarkeit des Moduls</td>
<td>• Master's Programme Biology (Master) &gt; Research Modules</td>
</tr>
<tr>
<td></td>
<td>• Master's Programme Biology (Master) &gt; Research Modules</td>
</tr>
<tr>
<td>Zuständige Personen</td>
<td>Klump, Georg Martin (Module responsibility)</td>
</tr>
<tr>
<td></td>
<td>Klump, Georg Martin (Prüfungsberechtigt)</td>
</tr>
<tr>
<td>Prerequisites</td>
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</tr>
<tr>
<td>Skills to be acquired in this module</td>
<td>++ deepened biological expertise</td>
</tr>
<tr>
<td></td>
<td>++ deepened knowledge of biological working methods</td>
</tr>
<tr>
<td></td>
<td>++ data analysis skills</td>
</tr>
<tr>
<td></td>
<td>++ critical and analytical thinking</td>
</tr>
<tr>
<td></td>
<td>++ independent searching and knowledge of scientific literature</td>
</tr>
<tr>
<td></td>
<td>++ ability to perform independent biological research</td>
</tr>
<tr>
<td></td>
<td>++ data presentation and discussion in German and English (written and spoken)</td>
</tr>
<tr>
<td></td>
<td>+ teamwork</td>
</tr>
<tr>
<td></td>
<td>++ project and time management</td>
</tr>
<tr>
<td></td>
<td>++ statistics &amp; scientific programming</td>
</tr>
<tr>
<td>Module contents</td>
<td></td>
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<td>Literatureempfehlungen</td>
<td></td>
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<td>Links</td>
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<td>Languages of instruction</td>
<td>German, English</td>
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<td>Duration (semesters)</td>
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<tr>
<td>Module frequency</td>
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<td>Modulart / typ of module</td>
<td>je nach Studiengang Pflicht oder Wahlpflicht</td>
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<td>Lehr-/Lernform / Teaching/Learning method</td>
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<td>Examination</td>
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<td>Prüfungszeiten</td>
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<td>Type of examination</td>
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<tr>
<td></td>
<td>written report</td>
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<tr>
<td>SWS</td>
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<tr>
<td>Frequency</td>
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<td>Workload Präsenzzeit</td>
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bio900 - Biology Research Module

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<tr>
<td>Modulkürzel</td>
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<td>Workload</td>
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<td>Verwendbarkeit des Moduls</td>
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<td>Master's Programme Biology (Master) &gt; Research Modules</td>
</tr>
<tr>
<td>Zuständige Personen</td>
<td>Zotz, Gerhard Wolfgang (Module responsibility)</td>
</tr>
<tr>
<td></td>
<td>der Biologie, Lehrende (Module counselling)</td>
</tr>
<tr>
<td></td>
<td>Zotz, Gerhard Wolfgang (Prüfungsberechtigt)</td>
</tr>
<tr>
<td>Prerequisites</td>
<td>project and supervisor(s) need to be approved by the exam board prior to the start of lab work</td>
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</tbody>
</table>

**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

**Literaturempfehlungen**
- 

**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**
- 

**Examination**
- Prüfungszeiten
- Type of examination
- final exam of module
- internship report
- 

**Form of teaching**
- Comment
- SWS
- Frequency
- Workload of compulsory attendance
- 

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<td>SWS</td>
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<tr>
<td>Lecture</td>
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<td>Seminar</td>
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## Skills Modules

### bio870 - Communicating Plant Sciences

<table>
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<tr>
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<th>Communicating Plant Sciences</th>
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<tbody>
<tr>
<td>Modulkürzel</td>
<td>bio870</td>
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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>

**Verwendbarkeit des Moduls**
- Master's Programme Biology (Master) > Skills Modules
- Master's Programme Biology (Master) > Skills Modules

### Zuständige Personen
- Zotz, Gerhard Wolfgang (Module responsibility)
- Laubinger, Sascha (Module counselling)
- Albach, Dirk Carl (Module counselling)
- Zotz, Gerhard Wolfgang (Prüfungsberechtigt)
- Laubinger, Sascha (Prüfungsberechtigt)
- Albach, Dirk Carl (Prüfungsberechtigt)

### Prerequisites
**Skills to be acquired in this module**
- 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
- Critical and analytical thinking
- Independent searching and knowledge of scientific literature
- Data presentation and discussion in German and English (written and spoken)

### 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)

### Literatureempfehlungen

### 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
- Final exam of module
- Type of examination: 1 term paper
- Form of teaching: Seminar
- SWS: 4
- Frequency: WiSe
- Workload Präsenzzeit: 56 h
### bio880 - Skills in Plant Systematics

<table>
<thead>
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<th>Skills in Plant Systematics</th>
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<tbody>
<tr>
<td>Modulkürzel</td>
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<td>Verwendbarkeit des Moduls</td>
<td>Master's Programme Biology (Master) &gt; Skills Modules</td>
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#### Zuständige Personen
- Albach, Dirk Carl (Module responsibility)
- von Hagen, Klaus Bernhard (Module counselling)
- Albach, Dirk Carl (Prüfungsberechtigt)
- von Hagen, Klaus Bernhard (Prüfungsberechtigt)
- Janzen, Thijs (Prüfungsberechtigt)

#### Prerequisites
- 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 over 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
  - ++ 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
  - + statistics & scientific programming

#### Module contents
- In the seminar we provide an overview over 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.

#### Literatureempfehlungen

#### 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

#### Examination
- Prüfungszeiten
- Type of examination: 1 presentation, 1 report

#### Final exam of module
<table>
<thead>
<tr>
<th>Form of teaching</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<tr>
<td>Seminar</td>
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<td>2</td>
<td>WiSe</td>
<td>28</td>
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<tr>
<td>Exercises</td>
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<td>2</td>
<td>WiSe</td>
<td>28</td>
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#### Präsenzzeit Modul insgesamt
- 56 h
bio890 - Current Topics in Biology

<table>
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Verwendbarkeit des Moduls
- Master's Programme Biology (Master) > Skills Modules
- Master's Programme Biology (Master) > Skills Modules

Zuständige Personen
- Gerlach, Gabriele (Module responsibility)
- der Biologie, Lehrende (Module counselling)
- Gerlach, Gabriele (Prüfungsberechtigt)
- Laakmann, Silke (Prüfungsberechtigt)

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.

Literaturempfehlungen
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 capacity
unlimited

Modulelevel / module level
MM (Mastermodul / Master module)

Modulart / typ of module
Wahlmodul / Opportunity

Lehr-/Lernform / Teaching/Learning method

Vorkenntnisse / Previous knowledge
Teilnahme in einem oder mehreren Grundmodulen des Master Biologie

Examination
Prüfungszeiten
Type of examination
open
Portfolio

Form of teaching
Seminar

SWS
2

Frequency
Sose und WiSe

Workload

- Präsenzzeit: 28 h
neu720 - Statistical programming in R

<table>
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<td>1.5 SWS Lecture (VO)</td>
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<td>Total workload 68h: 28h contact / 20h background reading / 20h exam preparation</td>
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<tr>
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<td>2.5 SWS Supervised exercise (UE): Total workload 113h: 28h contact / 20h background reading / 65h exercise solving</td>
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<td>Verwendbarkeit des Moduls</td>
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<tr>
<td></td>
<td>Master's Programme Neuroscience (Master) &gt; Skills Modules</td>
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<tr>
<td>Zuständige Personen</td>
<td>Otto-Sobotka, Fabian (Module responsibility)</td>
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<td></td>
<td>Otto-Sobotka, Fabian (Prüfungsberechtigt)</td>
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<tr>
<td>Prerequisites</td>
<td>+ Social skills</td>
</tr>
<tr>
<td></td>
<td>+ Interdiscipl. knowlg.</td>
</tr>
<tr>
<td></td>
<td>++ Maths/Stats/Progr.</td>
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<td>+ Scientific English</td>
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<tr>
<td>Skills to be acquired in this module</td>
<td>students learn the use of the software R in application scenarios</td>
</tr>
<tr>
<td></td>
<td>students learn to actively &quot;speak&quot; the programming language R</td>
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<tr>
<td></td>
<td>students practice statistical data analysis with R</td>
</tr>
<tr>
<td>Module contents</td>
<td>The lecture gives an intuitive introduction into the use of the statistics software R. We start by introducing the basic handling of R and the syntax of its programming language. We use those to obtain the first statistical analyses from R. The next important step is to create informative graphics to represent the statistical results. Finally, we look into programming concepts that allow for more complex statistical analyses.</td>
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<td>R Core Team - R: A language and environment for statistical computing (Reference Manual)</td>
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<td>Links</td>
<td>Language of instruction English</td>
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<td>Duration (semesters) 1 Semester</td>
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<td>Reference text Recommended previous knowledge / skills: basic statistical knowledge including regression analysis</td>
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<td>Form of teaching Comment SWS Frequency Workload of compulsory attendance</td>
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<td>Lecture 2 2 SoSe 28</td>
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<tr>
<td></td>
<td>Exercises 2 2 SoSe 28</td>
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<tr>
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<td>Präsenzzeit Modul insgesamt 56 h</td>
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neu730 - Biosciences in the Public Eye and in our Laws

Module label | Biosciences in the Public Eye and in our Laws
Modulkürzel | neu730
Credit points | 6.0 KP

Workload | 180 h
56h contact / 84h research for presentations / 40h term paper

Verwendbarkeit des Moduls

- 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 ProgrammeIntercultural Education and Counselling (Bachelor) > Fachnahe Angebote Biologie
- Bachelor's Programme Mathematics (Bachelor) > Fachnahe Angebote Biologie
- Bachelor's Programme Physics, Engineering and Medicine (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 Business Administration (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 Economics (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 German Studies (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme History (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Mathematics (Bachelor) > Fachnahe Angebote Biologie
- Dual-Subject Bachelor's Programme Media Culture: Textiles (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 Neuroscience (Master) > Skills Modules

Zuständige Personen

Köppl, Christine (Module responsibility)
Sienknecht, Ulrike (Module counselling)
Köppl, Christine (Prüfungsbeamtigtes)
Prerequisites

Skills to be acquired in this module

* Expt. methods
* Scient. Literature
* Social skills
* Interdiscipl. knowlg
* Data present./disc.
* Scientific English
* Ethics

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.

Literaturempfehlungen

Links

Language of instruction
English

Duration (semesters)
1 Semester

Module frequency
annually, summer term

Module capacity
18

Modullevel / module level
MM (Mastermodul / Master module)

Modulart / typ of module
Wahlpflicht / Elective

Lehr-/Lernform / Teaching/Learning method

Vorkenntnisse / Previous knowledge
Fundamentals of genetics, physiology, ecology and biological systematics

Examination
Prüfungszeiten
Type of examination

Final exam of module
within a few weeks of summer term lecture period
Term paper
Regular participation during the semester is required (max 3 days of absence)

Form of teaching
Comment
SWS
Frequency
Workload of compulsory attendance

Lecture
SoSe
0

Seminar und Übung
4
SoSe
56

Präsenzzeit Modul insgesamt
56 h
neu740 - Molecular Mechanisms of Ageing

<table>
<thead>
<tr>
<th>Module label</th>
<th>Molecular Mechanisms of Ageing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modulkürzel</td>
<td>neu740</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>{4 SWS Supervised exercise (UE) Total workload 180h: 26h contact / 50h group work / 50h prep. of thesis, presentations / 54h recap. literature}</td>
</tr>
</tbody>
</table>

Verwendbarkeit des Moduls

- 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

more...
- 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 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 Elementary Mathematics (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

Zuständige Personen

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

Skills to be acquired in this module

+ Neurosci. knowlg.
++ Expt. methods
++ Scient. literature
++ Social skills
++ Interdiscipl. knowlg.
++ Data present./disc.
++ Scientific English
++ Ethics

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 resenation and group poster
7) Presentation at 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 work 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.

Literatureempfehlungen

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

Recommended textbook(s) or other literature:
Roger B. McDonald, Biology of aging, Garland Science

Altern : Zelluläre und molekulare Grundlagen, körperliche Veränderungen und Erkrankungen, Therapieansätze

Ludger Rensing ; Volkhard Rippe

Links

Language of instruction
English

Duration (semesters)
1 Semester

Module frequency
annually, summer term

Module capacity
16
<table>
<thead>
<tr>
<th>Modullevel / module level</th>
<th>Wahlpflicht / Elective</th>
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<tbody>
<tr>
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<td>Lehr-/Lernform / Teaching/Learning method</td>
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<td>Vorkenntnisse / Previous knowledge</td>
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<td>Examination</td>
<td>Prüfungszeiten</td>
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<td>Final exam of module</td>
<td>end of semester</td>
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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
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<td>84 h</td>
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neu751 - Laboratory Animal Science

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<td>Modulkürzel</td>
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<tr>
<td>Credit points</td>
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<tr>
<td>Workload</td>
<td>90 h</td>
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<tr>
<td></td>
<td>{</td>
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<tr>
<td></td>
<td>one week full-time in semester break + flexible time for studying and exam preparation</td>
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<tr>
<td></td>
<td>1 SWS Lecture</td>
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<tr>
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<td>total workload 45h: 2h contact / 20h background reading / 23h exam preparation</td>
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<tr>
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<td>1 SWS Supervised exercise</td>
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<tr>
<td></td>
<td>total workload 45h: 35h contact / 10h background reading</td>
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Verwendbarkeit des Moduls

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

Zuständige Personen

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

Prerequisites

- none

Skills to be acquired in this module

- ++ Expt. Methods
- + Independent Research
- + Scient. Literature
- ++ Social skills
- ++ Interdiscipl. knowlg
- ++ Scientific English
- ++ Ethics

Upon successful completion of this course, students

- know the relevant EU legislation governing animal welfare and are able to explain its meaning in common language
- understand and are able to critically discuss salient ethical concepts in animal experimentation, such as the three Rs and humane endpoint
- have basic knowledge of the biology and husbandry of laboratory animal species held at the University of Oldenburg (rodents or birds or fish)
- are able to critically assess the needs and welfare of animals without compromising scientific integrity of the investigation
- have practical skills in handling small rodents or birds or fish
- have profound knowledge of anaesthesia, analgesia and basic principles of surgery.
- have practised invasive procedures and euthanasia.

NOTE: These objectives aim to satisfy the requirements for EU directive A „Persons carrying out animal experiments“ and EU directive D „Persons killing animals“.

Module contents

Background knowledge is taught using the third-party online platform "LAS Interactive" which concludes with a written exam that has to be passed before the practical part. Topics covered are:

- Legislation, ethics and the 3Rs
- Scientific integrity
- Data collection
- Basic biology of rodents, birds and fish
- Husbandry, and nutrition of rodents, birds and fish
- Animal Welfare
- Health monitoring
- Pain and distress
- Euthanasia

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

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

**Literaturempfehlungen**

“LAS interactive” internet-based learning platform

**Links**

**Language of instruction**

English

**Duration (semesters)**

1 Semester

**Module frequency**

semester break, every semester

**Module capacity**

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

**Modullevel / module level**

je nach Studiengang Pflicht oder Wahlpflicht

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

**Vorkenntnisse / Previous knowledge**

**Examination**

Prüfungszeiten

Type of examination

**Final exam of module**

immediately before the practical part

written exam of 90 minutes

**Form of teaching**

Comment

SWS

Frequency

Workload of compulsory attendance

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<tr>
<th>Lecture</th>
<th>1</th>
<th>Sose und WiSe</th>
<th>14</th>
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<tbody>
<tr>
<td>Exercises</td>
<td>1</td>
<td>Sose und WiSe</td>
<td>14</td>
</tr>
</tbody>
</table>

**Präsenzzeit Modul insgesamt**

28 h
neu760 - Scientific English

Module label: Scientific English
Modulkürzel: neu760
Credit points: 6.0 KP

Workload: 180 h
- 0.5 SWS Lecture (VO)
  Total workload 23h: 8h contact / 15h research for term paper
- 3.5 SWS Supervised exercise (UE)
  Total workload 158h: 46h contact / 46h preparation of texts and presentations / 66h term paper

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

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

Prerequisites
- non-native speakers

Skills to be acquired in this module
- Neurosci. knowlg.
- Social skills
- Data present./disc.
- Scientific English

Upon completion of this course, students
- have increased their proficiency in different forms of scientific presentation and communication in English, with special emphasis on neuroscience
- are able to express themselves with correct sentence structure and grammar, correct use of idioms and correct pronunciation
- are proficient in different contexts of scientific communication (e.g., paper, poster and informal exchange by email or phone)
- are able to recognize and avoid common errors of non-native speakers.

Module contents
Lectures cover
- characteristics of the different forms of scientific presentations
- sentence structure using the passive voice
- scientific vocabulary and terminology as contrasted to common speech
- appropriate language for communication with scientific editors and referees

Students read neuroscience texts of an advanced level and practice explaining and presenting these in both written and oral form. They also practice different contexts of scientific communication (e.g., paper, poster and informal exchange by email or phone). Emphasis is placed on individual problems in pronunciation and language use errors.

Literaturempfehlungen
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
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>Prüfungszeiten</th>
<th>Type of examination</th>
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</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 Bonus system for active participation</td>
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</table>

<table>
<thead>
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<th>Form of teaching</th>
<th>Comment</th>
<th>SWS</th>
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**Präsenzzeit Modul insgesamt** 56 h
**neu770 - Basics of Statistical Data Analysis**

<table>
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<th>Module label</th>
<th>Basics of Statistical Data Analysis</th>
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<tr>
<td>Modulkürzel</td>
<td>neu770</td>
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<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
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<tr>
<td></td>
<td>1.5 SWS Lecture (VO)</td>
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<tr>
<td></td>
<td>Total workload 68h: 28h contact / 20h background reading / 20h exam preparation</td>
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<tr>
<td></td>
<td>2.5 SWS Seminar (SE)</td>
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<td></td>
<td>Total workload 113h: 28h contact / 20h background reading / 65h exercise solving</td>
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<td>Verwendbarkeit des Moduls</td>
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<tr>
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<td>Bachelor's Programme Physics, Engineering and Medicine (Bachelor) &gt; Aufbaumodule</td>
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<td></td>
<td>Master's Programme Neuroscience (Master) &gt; Skills Modules</td>
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<tr>
<td>Zuständige Personen</td>
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<tr>
<td></td>
<td>Otto-Sobotka, Fabian (Module responsibility)</td>
</tr>
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<td>Otto-Sobotka, Fabian (Prüfungsberechtigt)</td>
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<tr>
<td>Prerequisites</td>
<td>Social skills</td>
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<tr>
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<td>Interdiscipl. knowl.</td>
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<td>Maths/Stats/Progr.</td>
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<td></td>
<td>Scientific English</td>
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<tr>
<td></td>
<td>Upon successful completion of this course, students</td>
</tr>
<tr>
<td></td>
<td>have basic statistical competencies for understanding data</td>
</tr>
<tr>
<td></td>
<td>understand the main statistical methods and their practical use through application</td>
</tr>
<tr>
<td></td>
<td>can evaluate statistical methods regarding the qualities and their limits</td>
</tr>
<tr>
<td>Module contents</td>
<td></td>
</tr>
<tr>
<td></td>
<td>populations and samples; exploratory data analysis through describing statistics</td>
</tr>
<tr>
<td></td>
<td>elementary probabilities and random variables</td>
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<tr>
<td></td>
<td>important discrete and continuous distributions</td>
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<tr>
<td></td>
<td>estimating parameters through the method of maximum likelihood</td>
</tr>
<tr>
<td></td>
<td>confidence intervals and classical significance testing</td>
</tr>
<tr>
<td></td>
<td>pairs of random variables; distribution and dependence</td>
</tr>
<tr>
<td></td>
<td>classical regression analysis</td>
</tr>
<tr>
<td></td>
<td>basic use of the software R to apply those methods</td>
</tr>
<tr>
<td>Literatureempfehlungen</td>
<td>Will be available in Stud.IP</td>
</tr>
<tr>
<td>Links</td>
<td>English</td>
</tr>
<tr>
<td>Duration (semesters)</td>
<td>1 Semester</td>
</tr>
<tr>
<td>Module frequency</td>
<td>annually, winter term</td>
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<tr>
<td>Module capacity</td>
<td>unlimited</td>
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<td>Modullevel / module level</td>
<td>Wahlpflicht / Elective</td>
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<tr>
<td>Lehr-/Lernform / Teaching/Learning method</td>
<td>basic mathematical knowledge; une of probabilities recommended in combination with neu720 Statistical programming with R</td>
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<tr>
<td>Examination</td>
<td>Prüfungszeiten</td>
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<td>Seminar</td>
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<td>Comment</td>
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### neu780 - Introduction to Data Analysis with Python

<table>
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<tr>
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<tr>
<td>Workload</td>
<td>180 h</td>
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</table>

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/](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, ...

### Literatureempfehlungen
- [open access](http://www.swaroopch.com/notes/python/)
- [http://docs.python.org/3/tutorial/index.html](http://docs.python.org/3/tutorial/index.html)

### 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)]

### Modullevel / module level
- Wahlpflicht / Elective

### Lehr-/Lernform / Teaching/Learning method
- Vorkenntnisse / Previous knowledge: No prior knowledge in programming required, but useful.

### Examination
- Final exam of module: term break, immediately after the course (2 weeks in February) assignment of programming exercises, 4 out of 5 exercises to be assessed
- Form of teaching: Lecture 2 SWS, Exercises 2 SWS

<table>
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<th>Comment</th>
<th>SWS</th>
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<th>Workload of compulsory attendance</th>
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### Präsenzzeit Modul insgesamt
- 56 h
neu790 - Communicating Neuroscience

**Module label**: Communicating Neuroscience

**Modulkürzel**: neu790

**Credit points**: 3.0 KP

**Workload**: 90 h

(28 h contact / 62 h individual reading and preparing discussion questions)

**Verwendbarkeit des Moduls**
- Master's Programme Biology (Master) > Skills Modules
- Master's Programme Neuroscience (Master) > Skills Modules

**Zuständige Personen**
- Kretzberg, Jutta (Module responsibility)
- Kretzberg, Jutta (Prüfungsberechtigt)
- Köppl, Christine (Prüfungsberechtigt)

**Prerequisites**

Skills to be acquired in this module

- Neurosci. knowlg.
- ++ Scient. Literature
- ++ Social skills
- ++ Interdiscipl. knowlg.
- ++ Data present./disc.
- Scientific English
- ++ Ethics

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

**Literatureempfehlungen**

List of published papers, as well as online resources for preparation will be selected by the teachers and participants and announced 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

<table>
<thead>
<tr>
<th>Links</th>
</tr>
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<tbody>
<tr>
<td>Related content: Science communication workshop:</td>
</tr>
<tr>
<td><a href="https://elearning.uni-oldenburg.de/dispatch.php/course/overview?cid=6fc0dbfa53d7b3f5e3680f52ac7d0f7">https://elearning.uni-oldenburg.de/dispatch.php/course/overview?cid=6fc0dbfa53d7b3f5e3680f52ac7d0f7</a></td>
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</table>

<table>
<thead>
<tr>
<th>Language of instruction</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration (semesters)</td>
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</tr>
<tr>
<td>Module frequency</td>
<td>winter semester</td>
</tr>
<tr>
<td>Module capacity</td>
<td>20 (Registration procedure / selection criteria: StudIP)</td>
</tr>
<tr>
<td>Module level / module level</td>
<td>MM (Mastermodul / Master module)</td>
</tr>
<tr>
<td>Modulart / typ of module</td>
<td>Wahlpflicht / Elective</td>
</tr>
<tr>
<td>Lehr-/Lernform / Teaching/Learning method</td>
<td></td>
</tr>
<tr>
<td>Examination</td>
<td>Prüfungszeiten</td>
</tr>
<tr>
<td>Final exam of module</td>
<td>Type of examination</td>
</tr>
<tr>
<td>Form of teaching</td>
<td>Seminar</td>
</tr>
<tr>
<td>SWS</td>
<td>2</td>
</tr>
<tr>
<td>Frequency</td>
<td>WiSe</td>
</tr>
<tr>
<td>Workload Präsenzzeit</td>
<td>28 h</td>
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</table>
# neu800 - Introduction to Matlab

<table>
<thead>
<tr>
<th>Module label</th>
<th>Introduction to Matlab</th>
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<tbody>
<tr>
<td>Modulkürzel</td>
<td>neu800</td>
</tr>
<tr>
<td>Credit points</td>
<td>3.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>90 h</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>
</tbody>
</table>

### Verwendbarkeit des Moduls
- Master's Programme Biology (Master) > Skills Modules
- Master's Programme Biology (Master) > Skills Modules
- Master's Programme Neuroscience (Master) > Skills Modules

### Zuständige Personen
- Gießing, Carsten (Module responsibility)
- Gießing, Carsten (Prüfungsberechtigt)

### Prerequisites

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

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.

### Literatureempfehlungen

### 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

<table>
<thead>
<tr>
<th>Examination</th>
<th>Prüfungszeiten</th>
<th>Type of examination</th>
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<tbody>
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<td>end of summer term</td>
<td>Working on exercises Regular active participation</td>
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### Form of teaching

<table>
<thead>
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<th>Form of teaching</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload of compulsory attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
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<tr>
<td>Seminar</td>
<td></td>
<td></td>
<td>SoSe</td>
<td>0</td>
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<tr>
<td>Exercises</td>
<td></td>
<td>2</td>
<td>SoSe</td>
<td>28</td>
</tr>
</tbody>
</table>

### Präsenzzeit Modul insgesamt
- 28 h
neu810 - International Meeting Contribution

Module label: International Meeting Contribution

Modulkürzel: neu810

Credit points: 3.0 KP

Workload: 90 h

Verwendbarkeit des Moduls:
- Master's Programme Biology (Master) > Skills Modules
- Master's Programme Neuroscience (Master) > Skills Modules

Zuständige Personen:
- Kretzberg, Jutta (Module responsibility)
- Kretzberg, Jutta (Prüfungsberechtigt)
- Köppl, Christine (Prüfungsberechtigt)

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.

Literatureempfehlungen: 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

Vorkenntnisse / Previous knowledge:

Examination Prüfungszeiten Type of examination
Final exam of module presentation (ungraded, pass/fail)

Form of teaching:
Seminar

SWS: 2
<table>
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<th>Frequency</th>
<th>Sose und WiSe</th>
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<tbody>
<tr>
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<tr>
<td></td>
<td>Multivariate Statistics and Applications in R</td>
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| Verwendbarkeit des Moduls| • Master's Programme Biology (Master) > Skills Modules  
• Master's Programme Biology (Master) > Skills Modules  
• Master's Programme Neuroscience (Master) > Skills Modules |
| Zuständige Personen      |                                             |
| Prerequisites            |                                             |
| Skills to be acquired in this module |                                      |
| Module contents          |                                             |
| Literatureempfehlungen   |                                             |
| Links                    |                                             |
| Languages of instruction | German, English                            |
| Duration (semesters)     | 1 Semester                                  |
| Module frequency         |                                             |
| Module capacity          | unlimited                                   |
| Modulelevel / module level| MM (Mastermodul / Master module)            |
| Modulart / typ of module | Wahlpflicht / Elective                      |
| Lehr-/Lernform / Teaching/Learning method |                                  |
| Vorkenntnisse / Previous knowledge |                                 |
| Examination              |                                             |
| Prüfungszeiten           |                                             |
| Type of examination      |                                             |
| Final exam of module     |                                             |
| Form of teaching         |                                             |
| Comment                  |                                             |
| SWS                      |                                             |
| Frequency                |                                             |
| Workload of compulsory attendance |                      |
| Lecture                  | 2 Sose oder WiSe 28                        |
| Exercises                | 2 Sose oder WiSe 28                        |
| Präsenzzeit Modul insgesamt | 56 h                                         |
# neu825 - Neuroscience Journal Club

<table>
<thead>
<tr>
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<tbody>
<tr>
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- **Verwendbarkeit des Moduls**
  - Master's Programme Biology (Master) > Skills Modules
  - Master's Programme Biology (Master) > Skills Modules
  - Master's Programme Neuroscience (Master) > Skills Modules

- **Zuständige Personen**

- **Prerequisites**

- **Skills to be acquired in this module**

- **Module contents**

- **Literaturempfehlungen**

- **Links**

- **Languages of instruction** German, English

- **Duration (semesters)** 1 Semester

- **Module capacity** unlimited

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

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

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

- **Vorkenntnisse / Previous knowledge**

<table>
<thead>
<tr>
<th>Examination</th>
<th>Prüfungszeiten</th>
<th>Type of examination</th>
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</thead>
<tbody>
<tr>
<td>Final exam of module</td>
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<td>Präsentation</td>
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</table>

- **Form of teaching** Seminar

- **SWS**

- **Frequency** Sose oder WiSe

<table>
<thead>
<tr>
<th>Workload Präsenzzzeit</th>
<th>28 h</th>
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</table>
# Abschlussmodul

**mam - Master’s Thesis Module**

<table>
<thead>
<tr>
<th>Module label</th>
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<tbody>
<tr>
<td>Modulkürzel</td>
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<td>Credit points</td>
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**Verwendung des Moduls**

- Master’s Programme Biology (Master) > Abschlussmodul

**Zuständige Personen**

**Prerequisites**

**Skills to be acquired in this module**

**Module contents**

**Literaturempfehlungen**

**Links**

**Languages of instruction**

- German, English

**Duration (semesters)**

- 1 Semester

**Module frequency**

- unlimited

**Module level / module level**

- Abschlussmodul (Abschlussmodul / Conclude)

**Modulart / typ of module**

- Pflicht / Mandatory

**Vorkenntnisse / Previous knowledge**

**Examination**

<table>
<thead>
<tr>
<th>Final exam of module</th>
<th>Type of examination</th>
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</table>

**Form of teaching**

- Colloquium

**SWS**

- 2

**Frequency**

- Sose oder WiSe

**Workload Präsenzzeit**

- 28 h