**Basismodule**

**bio210 - General Biology**

<table>
<thead>
<tr>
<th>Module label</th>
<th>General Biology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio210</td>
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<tr>
<td>Credit points</td>
<td>12.0 KP</td>
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<tr>
<td>Workload</td>
<td>360 h</td>
</tr>
<tr>
<td>Used in course of study</td>
<td>Fach-Bachelor Biologie &gt; Basismodule</td>
</tr>
<tr>
<td></td>
<td>Fach-Bachelor Mathematik &gt; Nebenfachmodule</td>
</tr>
<tr>
<td></td>
<td>Zwei-Fächer-Bachelor Biologie &gt; Basismodule</td>
</tr>
</tbody>
</table>

**Contact person**

Module responsibility
- Gabriele Gerlach

Authorized examiners
- Gabriele Gerlach
- Gerhard Wolfgang Zotz

Module counseling
- Gerhard Wolfgang Zotz

**Entry requirements**

**Skills to be acquired in this module**

++ biological knowledge
+ knowledge of biological working methods
++ biologically relevant knowledge in the natural sciences and mathematics
+ interdisciplinary knowledge & thinking

The students are enabled:

- to understand and explain the fundamentals of the subjects dealt with in "Purves" or "Campbell" and to give examples,
- to find the rôle of biology in other special fields according to their inclinations and abilities,
- to reflect upon the rôle of biology in other special fields and in a modern society,
- to approach their individual planning of studies according to their inclinations and abilities

**Module contents**

The lecture imparts the basic knowledge of biology and covers the subjects dealt with in the textbooks "Purves" or "Campbell"

**Reader's advisory**

Purves, Spektrum Verlag, latest edition
Campbell, Pearson Verlag, latest edition

**Links**

Language of instruction
- German

Duration (semesters)
- 2 Semester

Module frequency
- jährlich

Module capacity
- unlimited

Modullevel
- ---

Modulart
- je nach Studiengang Pflicht oder Wahlpflicht

**Lern-/Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

**Examination**

**Time of examination**

**Type of examination**

**Final exam of module**

Written examination either in the final week of the semester or in the first week of the semester vacation

One written examination in the winter and summer terms (50 % each)

PLEASE NOTE:
Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

**Course type**

**Comment**

**SWS**

**Frequency**

**Workload attendance**

Lecture
- 8.00

112 h
<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tutorial</td>
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<td>0.00</td>
<td>WiSe</td>
<td>0 h</td>
</tr>
<tr>
<td>Seminar</td>
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<td>SuSe and WiSe</td>
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**Total time of attendance for the module** 112 h
bio215 - Introduction to Biology

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<tr>
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<th>Introduction to Biology</th>
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<tbody>
<tr>
<td>Module code</td>
<td>bio215</td>
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<tr>
<td>Credit points</td>
<td>9.0 KP</td>
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<tr>
<td>Workload</td>
<td>270 h</td>
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<td>Used in course of study</td>
<td>Fach-Bachelor Biologie &gt; Basismodule</td>
</tr>
<tr>
<td></td>
<td>Fach-Bachelor Mathematik &gt; Nebenfachmodule</td>
</tr>
<tr>
<td></td>
<td>Zwei-Fächer-Bachelor Biologie &gt; Basismodule</td>
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<table>
<thead>
<tr>
<th>Contact person</th>
<th>Module responsibility</th>
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<tbody>
<tr>
<td></td>
<td>Gabriele Gerlach</td>
</tr>
<tr>
<td></td>
<td>Christine Köppl</td>
</tr>
</tbody>
</table>

| Authorized examiners | Gabriele Gerlach   |
|                      | Christine Köppl     |
|                      | Gerhard Wolfgang Zotz|
|                      | Ulrike Sienknecht   |

| Module counseling | Gabriele Gerlach   |
|                  | Christine Köppl     |
|                  | Gerhard Wolfgang Zotz|
|                  | Ulrike Sienknecht   |

| Entry requirements | ++ biological knowledge  |
|                   | ++ knowledge of techniques in biology  |
|                   | ++ biologically relevant knowledge in the natural sciences and mathematics  |
|                   | + cross-disciplinary knowledge and thinking  |
| Module contents | Lecture conveys knowledge in  |

| | evolution, ecology and biodiversity (WiSe)  |
| | animal physiology and developmental biology (SoSe)  |

| Reader's advisory | Campbell et al. "Biologie", Pearson  |
|                  | Sadava et al. "Purves, Biologie", Springer  |

| Links | Language of instruction | German  |

| Duration (semesters) | 2 Semester  |
| Module frequency |  |
| Module capacity | 300  |
| Modulelevel | BC (Basiccurriculum / Base curriculum)  |
| Modulart | Pflicht / Mandatory  |

| Lern-/Lehrform / Type of program | lecture  |

<table>
<thead>
<tr>
<th>Vorkenntnisse / Previous knowledge</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final exam of module</td>
<td>lecture-free periods after each series</td>
<td>2 written examinations (WiSe and SoSe)</td>
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<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>6.00</td>
<td>SuSe and WiSe</td>
<td>84 h</td>
<td></td>
</tr>
<tr>
<td>Seminar</td>
<td>0.00</td>
<td>WiSe</td>
<td>0 h</td>
<td></td>
</tr>
<tr>
<td>Tutorial</td>
<td>0.00</td>
<td>--</td>
<td>0 h</td>
<td></td>
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</table>

| Total time of attendance for the module | 84 h  |
bio220 - Introductory Zoology-Botany

Module label: Introductory Zoology-Botany
Module code: bio220
Credit points: 9.0 KP
Workload: 270 h

Used in course of study:
- Fach-Bachelor Biologie > Basismodule
- Zwei-Fächer-Bachelor Biologie > Basismodule

Contact person:
- Module responsibility:
  - Gerhard Wolfgang Zotz
  - Olaf Bininda-Emonds
- Authorized examiners:
  - Wilko Ahlrichs
  - Olaf Bininda-Emonds
  - Thomas Glatzel
  - Gerhard Wolfgang Zotz
- Module counseling:
  - Wilko Ahlrichs
  - Thomas Glatzel

Entry requirements:

Skills to be acquired in this module:

++ biological knowledge
+ knowledge of biological working methods
++ biologically relevant knowledge in the natural sciences and mathematics
+ abstract, logical, analytical thinking
+ independent learning and (research-based) working
+ teamwork

THEORY:

* To understand the fundamentals of reconstructing phylogenetic relationships
* To know the phylogenetic system and ground pattern of high-ranking ancestral animal species
* To know the cell structures, organization, and reproduction of plants and animals
* To know the morphology and anatomy of individual species

PRACTICE:

* To improve and verify the theoretical knowledge acquired from lectures and textbooks by studying the original
* To train visual and tactile perception by studying various species
* To learn that representations in textbooks are abstractions of a much more complex reality
* To be able to criticize representations in textbooks and models
* To acquire the knowledge of the function in living animals and plants by studying preserved specimens
* Learning how to follow preparation instructions
* Learning that the organization of individual species may be highly variable
* Preparing records or drawings from the information obtained by original specimens studied

Module contents:

GENERAL: Light microscopic methods are applied to study structures in plants and animals. Records in the form of descriptions and drawings.

BOTANY: Morphological structure and reproduction of various plant organization types with a focus on the structure of plant tissue. Representation of the relationships between structure and function with regard to absorption processes, transport processes, transpiration, and photosynthesis.


Reader's advisory:

GENERAL: Campbell: Biologie (Spektrum Verlag) or Purves: Biologie (Spektrum Verlag), latest edition


Links
Language of instruction
German
Duration (semesters)
1 Semester
Module frequency
jährlich
Module capacity
unlimited
Modullevel
BC (Basiscurriculum / Base curriculum)
Modulart
Pflicht / Mandatory

Lern-/Lehrform / Type of program
Vorkenntnisse / Previous knowledge

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
</table>
| Final exam of module| Written examination in the final week of the current part                           | 1 written examination (50%) following the part
|                     |                                                                                    | Zoology                                                                             |
|                     |                                                                                    | 1 written examination (50%) following the part
|                     |                                                                                    | Botany;                                                                             |
|                     |                                                                                    | voluntary bonus (10%) in the second part (botany)                                  |

PLEASE NOTE:
Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

Course type

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>2.00</td>
<td></td>
<td>28 h</td>
</tr>
<tr>
<td>Exercises</td>
<td></td>
<td>4.00</td>
<td></td>
<td>56 h</td>
</tr>
<tr>
<td>Tutorial</td>
<td></td>
<td>0.00</td>
<td>WiSe</td>
<td>0 h</td>
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</table>

Total time of attendance for the module

84 h
bio233 - Basics in Microbiology and Genetics

<table>
<thead>
<tr>
<th>Module label</th>
<th>Basics in Microbiology and Genetics</th>
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</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio233</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>Used in course of study</td>
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</tr>
<tr>
<td></td>
<td>Fach-Bachelor Biologie &gt; Basismodule</td>
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<tr>
<td></td>
<td>Zwei-Fächer-Bachelor Biologie &gt; Basismodule</td>
</tr>
<tr>
<td>Contact person</td>
<td></td>
</tr>
<tr>
<td>Module responsibility</td>
<td>Ralf Andreas Rabus</td>
</tr>
<tr>
<td>Authorized examiners</td>
<td>Maike Claußen</td>
</tr>
<tr>
<td>Module counseling</td>
<td>Maike Claußen</td>
</tr>
<tr>
<td>Entry requirements</td>
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</tr>
<tr>
<td>Skills to be acquired in this module</td>
<td>++ biological knowledge</td>
</tr>
<tr>
<td></td>
<td>+ knowledge of biological working methods</td>
</tr>
<tr>
<td></td>
<td>+ biologically relevant knowledge in the natural sciences and mathematics</td>
</tr>
<tr>
<td></td>
<td>+ deepened expertise in biological specialist field</td>
</tr>
<tr>
<td></td>
<td>+ independent learning and (research-based) working</td>
</tr>
</tbody>
</table>

Module contents

Reader's advisory

Links

Language of instruction

German

Duration (semesters)

1 Semester

Module frequency

unlimited

Module capacity

unlimited

Modullevel

BC (Basiscurriculum / Base curriculum)

Modulart

Pflicht / Mandatory

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination | Time of examination | Type of examination
---|---|---

Final exam of module

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>4.00</td>
<td>SuSe or WiSe</td>
<td>56 h</td>
</tr>
<tr>
<td>Tutorial</td>
<td></td>
<td>0.00</td>
<td>SuSe and WiSe</td>
<td>0 h</td>
</tr>
</tbody>
</table>

Total time of attendance for the module

56 h
# bio236 - Basics in Biochemistry and Cell Biology

**Module label**  
Basics in Biochemistry and Cell Biology

**Module code**  
bio236

**Credit points**  
6.0 KP

**Workload**  
180 h

**Used in course of study**  
- Fach-Bachelor Biologie > Basismodule
- Zwei-Fächer-Bachelor Biologie > Basismodule

**Contact person**  
Module responsibility
  - Karl-Wilhelm Koch

Authorized examiners
  - Karl-Wilhelm Koch
  - Michael Winkhofer

Module counseling
  - Michael Winkhofer

**Entry requirements**  
**Skills to be acquired in this module**  
++ biological knowledge  
+ knowledge of biological working methods  
++ biologically relevant knowledge in the natural sciences and mathematics  
+ abstract, logical, analytical thinking

**Module contents**  
Introduction to structure and function of main biochemical building blocks; amino acids, carbohydrates, proteins, nucleic acids, introduction to metabolism; biological membranes and transmembrane transport; structure and function of cell organelles; protein synthesis and posttranslational modification; intracellular transport and trafficking, signalling agents and cellular communication, cell division, controlled cell death

**Reader's advisory**  
Biochemie, Müller-Esterl  
Stryer Biochemie, Berg, Tymoczko, Stryer  
Lehninger Prinzipien der Biochemie, David L. Nelson und Michael M. Cox  
Principles of Biochemistry, Horton et al.  
Zellbiologie, Helmut Plattner und Joachim Hentschel  
Molekulare Zellbiologie, Gerald Karp  
Molekularbiologie der Zelle, Bruce Alberts

**Links**

**Language of instruction**  
German

**Duration (semesters)**  
1 Semester

**Module frequency**  
unlimited

**Module capacity**  
unlimited

**Modullevel**  
BC (Basiscurriculum / Base curriculum)

**Modulart**  
Pflicht / Mandatory

**Lern-/Lehrform / Type of program**  
lecture

**Vorkenntnisse / Previous knowledge**

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
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<tbody>
<tr>
<td>Final exam of module</td>
<td>during the semester</td>
<td>written exam</td>
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</table>

**Course type**  
Lecture

**SWS**  
4.00

**Frequency**  
WiSe

**Workload attendance**  
56 h
**bio230 - Microbiology and Cell Biology**

<table>
<thead>
<tr>
<th>Module label</th>
<th>Microbiology and Cell Biology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio230</td>
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<tr>
<td>Credit points</td>
<td>9.0 KP</td>
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<tr>
<td>Workload</td>
<td>270 h</td>
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<tr>
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<td>Fach-Bachelor Biologie &gt; Basismodule</td>
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<td>Zwei-Fächer-Bachelor Biologie &gt; Basismodule</td>
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<tr>
<td>Contact person</td>
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<td>Module responsibility</td>
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<td></td>
<td>Ralf Andreas Rabus</td>
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<tr>
<td>Authorized examiners</td>
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<td></td>
<td>Ralf Andreas Rabus</td>
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<tr>
<td></td>
<td>Hans Gerd Nothwang</td>
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<tr>
<td>Module counseling</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maike Claußen</td>
</tr>
</tbody>
</table>

**Entry requirements**

**Skills to be acquired in this module**

++ biological knowledge  
++ knowledge of biological working methods  
+ biologically relevant knowledge in the natural sciences and mathematics  
+ abstract, logical, analytical thinking  
+ deepened expertise in biological specialist field  
+ teamwork  

Theory: Basic knowledge in Biochemistry, Microbiology, Cell Biology and Genetics  
Practice: Basic methodological skills acquired by performing experiments  

**Module contents**

Fundamentals of Microbiology and Cell Biology:  
Molecules of life; energy and enzymes; central metabolism; breathing; photosynthesis; anaerobic metabolism;  
chemolithotrophy; procaryotic and eucaryotic cell structures; microbial diversity; importance of microorganisms for human beings, plants, animals, biotechnology and earth system  
cell group; signal transmission and communication between cells; meiosis; mitosis; mendelian inheritance;  
chromosomal and molecular basis of inheritance; replication; transcription; translation; genomic organization;  
mutation and repair.

**Reader's advisory**

Purves et al., Biologie (Spektrum Verlag), latest edition  
Campbell, Pearson Verlag, latest edition  
Fuchs, Allgemeine Mikrobiologie (Thieme Verlag), latest edition  
Lodisch et al., Molekulare Zellbiologie (Spektrum Verlag), latest edition

**Links**

<table>
<thead>
<tr>
<th>Language of instruction</th>
<th>German</th>
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<tbody>
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<td>Duration (semesters)</td>
<td>1 Semester</td>
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<tr>
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<tr>
<td>Module capacity</td>
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<tr>
<td>Modullevel</td>
<td>BC (Basiscurriculum / Base curriculum)</td>
</tr>
<tr>
<td>Modularart</td>
<td>Pflicht / Mandatory</td>
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</table>

**Lern-/Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

**Examination**

<table>
<thead>
<tr>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written examination in the final week of the current part</td>
<td>1 written examination (50%) following the part Microbiology</td>
</tr>
<tr>
<td>1 written examination (50%) following the part Cell Biology</td>
<td></td>
</tr>
<tr>
<td>Records are collected following every course day.</td>
<td>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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</tbody>
</table>

**Course type**

<table>
<thead>
<tr>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
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<tr>
<td>Course type</td>
<td>Comment</td>
<td>SWS</td>
<td>Frequency</td>
</tr>
<tr>
<td>-------------</td>
<td>---------</td>
<td>-----</td>
<td>-----------</td>
</tr>
<tr>
<td>Lecture</td>
<td></td>
<td>4.00</td>
<td></td>
</tr>
<tr>
<td>Exercises</td>
<td></td>
<td>2.00</td>
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**Total time of attendance for the module** 84 h
Aufbaumodule

bio255 - Basics in Biochemistry and Cell Biology

Module label
Basics in Biochemistry and Cell Biology

Module code
bio255

Credit points
9.0 KP

Workload
270 h

Used in course of study
- Fach-Bachelor Biologie > Aufbaumodule
- Zwei-Fächer-Bachelor Biologie > Aufbaumodule

Contact person
Module responsibility
- Arne Nolte

Authorized examiners
- Arne Nolte

Entry requirements

Skills to be acquired in this module
++ biological knowledge
++ knowledge of biological working methods
++ biologically relevant knowledge in the natural sciences and mathematics
+ statistics & scientific programming
++ interdisciplinary knowledge & thinking
++ abstract, logical, analytical thinking
++ deepened expertise in biological specialist field

The field of molecular ecology examines relationships among genotypes, phenotypes and the environment to explain evolution and diversity of organisms. The lecture will introduce basics in genomics, molecular evolution and population genetics to explore properties of the genome and the organism from an evolutionary perspective. Central aspects are the adaptation of species to their environment and ecological change, speciation, the genetic basis of phenotypic change. Methods and data used in genomics and molecular ecology will be introduced during the lecture and exercises.

Module contents
Lecture: the lecture conveys knowledge about the fields of genomics, evolution and organismic biology. Moreover laboratory methods as well as basics and background information on the analysis of genetic and genomic datasets are given.

Exercise: Modern data sets and up to date methods in genomics and population genetics are introduced. The practical emphasizes computer based data analyses.

Reader's advisory

Links

Language of instruction
German

Duration (semesters)
1 Semester

Module frequency

Module capacity
30

Modullevel
AC (Aufbaucurriculum / Composition)

Modultyp
Wahlpflicht / Elective

Lern-/Lehrform / Type of program
lecture, exercise

Vorkenntnisse / Previous knowledge

Examination
Time of examination
Type of examination

Final exam of module

Course type
Comment
SWS
Frequency
Workload attendance
Lecture
1.50
WiSe
21 h

Exercises
4.50
WiSe
63 h

Total time of attendance for the module
84 h
bio256 - Form and Identification - Flora and Fauna

**Module label**
Form and Identification - Flora and Fauna

**Module code**
bio256

**Credit points**
12.0 KP

**Workload**
360 h

**Used in course of study**
- Fach-Bachelor Biologie > Aufbaumodule

**Contact person**

Module responsibility
- Dirk Carl Albach
- Thomas Glatzel

Authorized examiners
- Dirk Carl Albach
- Thomas Glatzel
- Maria Will
- Rolf Niedringhaus
- Klaus Bernhard von Hagen
- Frank Henrik Donat

Module counseling
- Maria Will
- Rolf Niedringhaus
- Klaus Bernhard von Hagen
- Frank Henrik Donat

**Entry requirements**

**Skills to be acquired in this module**
- biological knowledge
- knowledge of biological working methods
- independent learning and (research-based) working
- knowledge of safety and environmental issues

The module conveys the basic knowledge in animal and plant identification and their diversity. This is essential for all parts of biology concerned with plants and animals. Especially, education for the field of conservation and schools rely on these expertise. Therefore, topics and methods relevant for these professions are emphasized. Students shall get a basic knowledge of species and learn methods to identify them. This is connected with a systemic knowledge of habitats in Northwestern Germany. Basic evaluation competence in the field of biodiversity, species diversity and conservation is conveyed to sensitize students for a respectful treatment of organisms.

**Module contents**

**L:** Introduction to the diversity of native flora and fauna, presentation of important plant and animal groups, introduction to systematics and major traits, ecological perspectives of species diversity

**EXE:** Working with identification keys for plants and animals and their classification

**EXC:** Excursion to characteristic habitats of Northwestern Germany, practicing work with field guides and identification of important traits

**Reader's advisory**

Botany:
Rothmaler - Exkursionsflora von Deutschland, Band 2 - Grundband, Spektrum Akademischer Verlag

Zoology:
M. Schaefer: Brohmer - Fauna von Deutschland, ab 20. Auflage
B. Klausnitzer: Stresemann - Exkursionsfauna von Deutschland. Band 1: Wirbellose (ohne In-sekten)

**Links**

**Language of instruction**
German

**Duration (semesters)**
2 Semester

**Module frequency**

unlimited

**Module level**
AC (Aufbaucurriculum / Composition)

**Modulart**
Pflicht / Mandatory

**Lern-/Lehrform / Type of program**
lecture, exercise, excursion

**Vorkenntnisse / Previous knowledge**

**Examination**

Time of examination
- exams at the end of the semester

**Type of examination**
- 1 written exam (botany) 50%, 1 written exam (zoology) 50%, excursion protocols (ungraded), additional requirements regarding presence and ungraded activities as specified by docents responsible for the module

11 / 85
<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>2.00</td>
<td>SuSe or WiSe</td>
<td>28 h</td>
</tr>
<tr>
<td>Exercises</td>
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<td>5.00</td>
<td>SuSe or WiSe</td>
<td>70 h</td>
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<tr>
<td>Study trip</td>
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<td>1.00</td>
<td>SuSe or WiSe</td>
<td>14 h</td>
</tr>
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</table>

**Total time of attendance for the module** 112 h
bio265 - General Microbiology

Module label: General Microbiology
Module code: bio265
Credit points: 9.0 KP
Workload: 270 h

Used in course of study:
- Fach-Bachelor Biologie > Aufbaumodule
- Fach-Bachelor Umweltwissenschaften > Wahlpflichtmodule
- Zwei-Fächer-Bachelor Biologie > Aufbaumodule

Contact person:
Module responsibility: Ralf Andreas Rabus
Authorized examiners:
- Ralf Andreas Rabus
- Erhard Rhiel
- Lars Wöhlbrand
Module counseling:
- Erhard Rhiel
- Lars Wöhlbrand

Entry requirements:
Skills to be acquired in this module: Basic knowledge of microbiology; ability to assess and apply fundamental microbiological techniques.

Module contents:
Imparting basic microbiological skills and working methods: Chemistry and structure of the cell, fundamentals of metabolism, taxonomy and phylogeny of microorganisms, diversity of microorganisms, insight into Applied Microbiology, propagation of microorganisms.

Reader's advisory:
Allgemeine Mikrobiologie, Schlegel 1992; Brock-Biology of Microorganisms, eds.: Madigan et al., 2003; Grundlagen der Mikrobiologie, Cypionka, 2003

Links:
Language of instruction: German
Duration (semesters): 1 Semester
Module frequency: jährlich
Module capacity: unlimited
Modullevel: AC (Aufbaucurriculum)
Modulart: Wahlpflicht

Lern-/Lehrform / Type of program:
Vorkenntnisse / Previous knowledge:

Examination Time of examination Type of examination
Final exam of module

PLEASE NOTE:
Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

Course type Comment SWS Frequency Workload attendance
Lecture 2.00 WiSe 28 h
Seminar 1.00 WiSe 14 h
Practical 4.00 WiSe 56 h

Total time of attendance for the module 98 h
bio275 - Basics in Physiology

Module label | Basics in Physiology
---|---
Module code | bio275
Credit points | 9.0 KP
Workload | 270 h

Used in course of study
- Fach-Bachelor Biologie > Aufbaumodule
- Fach-Bachelor Mathematik > Nebenfachmodule
- Zwei-Fächer-Bachelor Biologie > Aufbaumodule

Contact person
Module responsibility
- Dominik Heyers

Authorized examiners
- Dominik Heyers
- Christine Köppl
- Karin Dedek

Module counseling
- Christine Köppl
- Karin Dedek

Entry requirements

Skills to be acquired in this module
++ biological knowledge
++ knowledge of biological working methods
+ biologically relevant knowledge in the natural sciences and mathematics
+ statistics & scientific programming
++ abstract, logical, analytical thinking
+ deepened expertise in biological specialist field
++ independent learning and (research-based) working
+ teamwork

Basic knowledge on physiological processes and their underlying mechanisms with a focus on human physiology. Designing, performing, documenting and analysing physiological experiments; troubleshooting, basic statistics, “experimental thinking”.

Module contents

The lecture covers topics such as cell physiology, sensory physiology, neurophysiology, functions of the vegetative system, blood physiology/immune response, blood cycle, respiration and digestion. Emphasis will be on human physiology. In the following lab exercises, students get the opportunity to perform physiological experiments linking to topics from the lecture. By performing experiments on themselves and computer simulations students will gain insight into the underlying physiological principles.

Reader's advisory
Klinke, Pape, Kurtz, Silbernagl: Physiologie, Aufl. 4, 2014
Schmidt, Lang, Heckmann: Physiologie des Menschen mit Pathophysiologie, Aufl. 31, 2011
Wehner, Gehring: Zoologie, Aufl. 25, 2013

Links
Language of instruction | German
Duration (semesters) | 1 Semester
Module frequency | jährlich
Module capacity | 144

Modullevel | AC (Aufbaucurriculum / Composition)
Modulart | Wahlpflicht / Elective

Lern-/Lehrform / Type of program
lecture, exercise

Vorkenntnisse / Previous knowledge

Examination | Time of examination | Type of examination
---|---|---
Final exam of module | within a few weeks after the winter term lecture period | written exam (100%)

Written protocols and active participation in the lab exercises. A cumulative bonus can be obtained with good lab protocols. The decision whether a given protocol deserves the bonus lies with the respective supervisor of each experiment. An exam mark of 1.0 is achievable without a bonus. A bonus cannot be applied to pass a failed exam.

Course type | Comment | SWS | Frequency | Workload attendance
---|---|---|---|---

14 / 85
<table>
<thead>
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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<td>4.00</td>
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<td>Exercises</td>
<td></td>
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<td>28 h</td>
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**Total time of attendance for the module**  
84 h
**bio285 - Plant Physiology, Molecular Biology and Biotechnology**

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<td>Credit points</td>
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<td>Workload</td>
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| Used in course of study | Fach-Bachelor Biologie > Aufbaumodule  
|               | Zwei-Fächer-Bachelor Biologie > Aufbaumodule         |

**Contact person**
- Module responsibility
  - Sascha Laubinger
- Authorized examiners
  - Sascha Laubinger

**Entry requirements**
++ biological knowledge  
++ knowledge of biological working methods  
+ biologically relevant knowledge in the natural sciences and mathematics  
+ statistics & scientific programming  
+ abstract, logical, analytical thinking  
+ independent learning and (research-based) working  
+ teamwork  
+ (scientific) communication skills

**Module contents**

**Reader's advisory**

**Links**

<table>
<thead>
<tr>
<th>Language of instruction</th>
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<td>Duration (semesters)</td>
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<tr>
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<td>Module capacity</td>
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<td>Wahlpflicht / Elective</td>
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<td>Lern-/Lehrform / Type of program</td>
<td>lecture, seminar, exercise</td>
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**Vorkenntnisse / Previous knowledge**

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<td>exam</td>
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<th>Frequency</th>
<th>Workload attendance</th>
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<tbody>
<tr>
<td>Lecture</td>
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<td>2.00</td>
<td>SuSe</td>
<td>28 h</td>
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<td>Seminar</td>
<td></td>
<td>1.00</td>
<td>SuSe</td>
<td>14 h</td>
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<tr>
<td>Practical</td>
<td></td>
<td>4.00</td>
<td>SuSe</td>
<td>56 h</td>
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**Total time of attendance for the module**

98 h
bio295 - Genetics

Module label  Genetics  
Module code  bio295  
Credit points  9.0 KP  
Workload  270 h  

Used in course of study  
- Fach-Bachelor Biologie > Aufbaumodule  
- Master of Education (Sonderpädagogik) Biologie > Frühere Module  
- Zwei-Fächer-Bachelor Biologie > Aufbaumodule

Contact person  
Module responsibility  Maike Claußen  
Authorized examiners  
- Maike Claußen  
- Hans Gerd Nothwang  
- Anna-Maria Hartmann  
- Lena Ebbers

Module counceling  
- Anna-Maria Hartmann  
- Hans Gerd Nothwang  
- Lena Ebbers

Entry requirements

Skills to be acquired in this module  
++ biological knowledge  
++ knowledge of biological working methods  
+ biologically relevant knowledge in the natural sciences and mathematics  
+ abstract, logical, analytical thinking  
++ deepened expertise in biological specialist field  
++ independent learning and (research-based) working  
++ data presentation and evidence-based discussion (written and spoken)  
+ teamwork  
++ (scientific) communication skills  
+ project and time management  
+ knowledge of safety and environmental issues

Module contents  
Fundamentals of genetics, performing experiments, quantitative analyses.

Reader's advisory  

Links

Language of instruction  German  
Duration (semesters)  1 Semester  
Module frequency  jährlich  
Module capacity  72  
Modullevel  AC (Aufbaucurriculum / Composition)  
Modulart  Wahlpflicht / Elective  
Lern-/Lehrform / Type of program  lecture, seminar, exercise

Vorkenntnisse / Previous knowledge

Examination   Time of examination   Type of examination

Final exam of module  
Written examination (100%), ungraded presentation, protocol

Course type  Comment  SWS  Frequency  Workload attendance

Lecture  1.50  WiSe  21 h
Exercises  3.00  WiSe  42 h
Seminar  1.50  WiSe  21 h

Total time of attendance for the module  84 h
bio240 - Flora and Fauna

**Module label**  
Flora and Fauna

**Module code**  
bio240

**Credit points**  
10.0 KP

**Workload**  
300 h

**Used in course of study**  
- Fach-Bachelor Biologie > Aufbaumodule

**Contact person**

Module responsibility
- Dirk Carl Albach
- Thomas Glatzel

Authorized examiners
- Dirk Carl Albach
- Thomas Glatzel
- Klaus Bernhard von Hagen

Module counseling
- Klaus Bernhard von Hagen

**Entry requirements**

**Skills to be acquired in this module**
- + biological knowledge
- + knowledge of biological working methods
- + independent learning and (research-based) working
- + knowledge of safety and environmental issues

To determine species-rich taxa and to verify the results independently using relevant literature

**Module contents**

L: Introduction to the variety of indigenous flora and fauna, presentation of important plant families and animal groups, studying the characteristics important for determination, introduction to systematics. Moreover, subjects are included that present ecological aspects of the taxa dealt with.

E: Applying literature to determine animal and plant species and to classify them systematically.

EX: Excursions to the characteristic North German biotopes. The excursions focus on correct identification and classification of plants and animals according to the properties of the living organism.

**Reader's advisory**

Botany:
- Rothmaler - Exkursionsflora von Deutschland, Band 2 - Grundband, Spektrum Akademischer Verlag

Zoology:
- M. Schaefer: Brohmer - Fauna von Deutschland, from 20th edition

**Links**

**Language of instruction**  
German

**Duration (semesters)**  
2 Semester

**Module frequency**  
jährlich

**Module capacity**  
unlimited

**Modullevel**  
AC (Aufbaucurriculum / Composition)

**Modulart**  
Pflicht / Mandatory

**Lern-/Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

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

**Final exam of module**
- Botany: Written examination before the end of the lecture
- Zoology: Written examination before the end of the lecture

1 written examination (Botany 50 %)
1 written examination (Zoology 50 %)
ungraded minutes

PLEASE NOTE:
Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

**Course type**  
**Comment**  
**SWS**  
**Frequency**  
**Workload attendance**

Lecture  
2.00  
28 h

Exercises  
4.00  
56 h

Study trip  
1.00  
14 h

**Total time of attendance for the module**  
98 h
### bio260 - General Microbiology

<table>
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<th>General Microbiology</th>
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<tr>
<td></td>
<td>• Ralf Andreas Rabus</td>
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<td>Authorized examiners</td>
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<td></td>
<td>• Ralf Andreas Rabus</td>
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<td></td>
<td>• Erhard Rhiel</td>
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<td></td>
<td>• Lars Wöhlbrand</td>
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<tr>
<td>Module counseling</td>
<td></td>
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<tr>
<td></td>
<td>• Erhard Rhiel</td>
</tr>
<tr>
<td></td>
<td>• Lars Wöhlbrand</td>
</tr>
</tbody>
</table>

### Entry requirements

**Skills to be acquired in this module**

++ biological knowledge  
++ knowledge of biological working methods  
+ biologically relevant knowledge in the natural sciences and mathematics  
+ interdisciplinary knowledge & thinking  
+ abstrakt, logical, analytical thinking  
++ deepened expertise in biological specialist field  
+ independent learning and (research-based) working  
+ data presentation and evidence-based discussion (written and spoken)  
++ teamwork  
+ project and time management  
+ knowledge of safety and environmental issues

Basic knowledge of microbiology; ability to assess and apply fundamental microbiological techniques.

### Module contents

Imparting basic microbiological skills and working methods: Chemistry and structure of the cell, fundamentals of metabolism, taxonomy and phylogeny of microorganisms, diversity of microorganisms, insight into Applied Microbiology, propagation of microorganisms.

### Reader's advisory

Allgemeine Mikrobiologie, Schlegel 1992; Brock-Biology of Microorganisms, eds.: Madigan et al., 2003; Grundlagen der Mikrobiologie, Cyponika, 2003

### Links

http://www-icbm.de/~gmb/11429.html

### Language of instruction

German

### Duration (semesters)

1 Semester

### Module frequency

jährlich

### Module capacity

unlimited

### Modullevel

AC (Aufbaucurriculum / Composition)

### Modulart

Wahlpflicht / Elective

### Lern- / Lehrform / Type of program

### Vorkenntnisse / Previous knowledge

### Examination

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

PLEASE NOTE: Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

### Course type

<table>
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<th>Frequency</th>
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<td>Lecture</td>
<td></td>
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<td></td>
<td>28 h</td>
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<tr>
<td>Seminar</td>
<td></td>
<td>1.00</td>
<td></td>
<td>14 h</td>
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<td>Practical</td>
<td></td>
<td>4.00</td>
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<td>56 h</td>
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**Total time of attendance for the module** 98 h
Basic Concepts in Animal Physiology

Module label: Basic Concepts in Animal Physiology

Module code: bio270

Credit points: 10.0 KP

Workload: 300 h

Used in course of study: Fach-Bachelor Biologie > Aufbaumodule

Contact person:
- Module responsibility
  - Dominik Heyers
- Authorized examiners
  - Dominik Heyers
  - Christine Köppl
  - Karin Dedek
- Module counseling
  - Christine Köppl
  - Karin Dedek

Entry requirements

Skills to be acquired in this module:
++ biological knowledge
++ knowledge of biological working methods
+ biologically relevant knowledge in the natural sciences and mathematics
+ statistics & scientific programming
++ abstract, logical, analytical thinking
+ deepened expertise in biological specialist field
++ independent learning and (research-based) working
+ teamwork

Basic knowledge on physiological processes and their underlying mechanisms with a focus on human physiology. Performing, analysing and documenting physiological experiments.

Module contents

The lecture (Vorlesung: 5.02.271 - Physiologie der Tiere und des Menschen) covers topics such as cell physiology, sensory physiology, neurophysiology, functions of the vegetative system, blood physiology/immune response, blood cycle, respiration and digestion. Emphasis will be on human physiology. In the following lab exercises, students get the opportunity to perform physiological experiments linking to topics from the lecture. By performing experiments on themselves and computer simulations students will gain insight into the underlying physiological principles.

Reader's advisory

Klinke, Pape, Kurtz, Silbernagl: Physiologie, Aufl. 6, 2010
Schmidt, Lang, Heckmann: Physiologie des Menschen mit Pathophysiologie, Aufl. 31, 2011
(if available: Wehner, Gehring: Zoologie)

Links

Language of instruction: German

Duration (semesters): 1 Semester

Module frequency: jährlich

Module capacity: unlimited

Modullevel: AC (Aufbaucurriculum / Composition)

Modulart: Wahlpflicht / Elective

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination

Time of examination: within a few weeks after the winter term lecture period

Type of examination: written exam (100%)

To qualify for the exam, the following additional requirements need to be met:

- regular participation in the laboratory experiments (no more than 1 day of absence)
- lab protocols for each experiment which have been accepted by the respective supervisors

A cumulative bonus can be obtained with good lab performance.
protocols. The decision whether a given protocol deserves the bonus lies with the respective supervisor of each experiment. The bonus improves the exam mark by maximally two steps (0.7). 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.

PLEASE NOTE:
Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tr>
<td>Lecture</td>
<td></td>
<td>4.00</td>
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<tr>
<td>Exercises</td>
<td></td>
<td>3.00</td>
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<td>98 h</td>
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bio280 - Plant Physiology

**Module label**  
Plant Physiology

**Module code**  
bio280

**Credit points**  
10.0 KP

**Workload**  
300 h

**Used in course of study**  
- Fach-Bachelor Biologie > Aufbaumodule

**Contact person**
- Module responsibility: Sascha Laubinger
- Authorized examiners: Sascha Laubinger, Gerhard Wolfgang Zotz
- Module counseling: Gerhard Wolfgang Zotz

**Entry requirements**

++ biological knowledge  
++ knowledge of biological working methods  
+ biologically relevant knowledge in the natural sciences and mathematics  
+ statistics & scientific programming  
+ abstract, logical, analytical thinking  
+ independent learning and (research-based) working  
+ teamwork  
+ (scientific) communication skills

Fundamentals of metabolism and developmental physiology of plants. Theoretical knowledge acquired from lectures and textbooks is improved by experiments, the instructions for experiments are applied independently, laboratory device is handled independently, measured values are calculated independently, the correctness of experimental results is assessed, the results obtained are interpreted and compared to theoretical expectations.

**Module contents**

L: Theoretical knowledge of metabolism and of the control of development in plant organisms, introduction to genetic engineering.  
S: Presentation of experiments, presentation of theoretical fundamentals of experiments.  
L: Photosynthesis: Physiology of light and dark reactions, photosynthetic ability and environmental factors.  
Ecophysiology: Influence of mineral substances on plant growth, function of light as developmental factor, function of plant hormones as developmental factors.

**Reader's advisory**

Campbell: Biologie; Taiz/Zeiger: Physiologie der Pflanzen (Verlag Spektrum); Buchanan/Gruissem/Jones: Biochemistry and molecular biology of plants (American Society of Plant Physiologists); Kutschera: Prinzipien der Pflanzenphysiologie (Spektrum Akademischer Verlag).

**Links**

Language of instruction: German

Duration (semesters): 1 Semester

Module frequency: jährlich

Module capacity: unlimited

Modullevel: AC (Aufbaucurriculum / Composition)

Modulart: Wahlpflicht / Elective

**Lern-/Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

**Examination**  
Time of examination: in the final week of the semester at the latest  
Type of examination: Records

PLEASE NOTE:  
Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

<table>
<thead>
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<th>SWS</th>
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<td></td>
<td>2.00</td>
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<td>28 h</td>
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<tr>
<td>Seminar</td>
<td></td>
<td>1.00</td>
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<td>14 h</td>
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<td>Practical</td>
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<td>4.00</td>
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<td>Comment</td>
<td>SWS</td>
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bio290 - Genetics

Module label: Genetics
Module code: bio290
Credit points: 10.0 KP
Workload: 300 h
Used in course of study: Fach-Bachelor Biologie > Aufbaumodule

Contact person
- Module responsibility: Maike Claußen
- Authorized examiners: Maike Claußen, Hans Gerd Nothwang, Anna-Maria Hartmann
- Module counseling: Hans Gerd Nothwang, Anna-Maria Hartmann

Entry requirements

Skills to be acquired in this module
- ++ biological knowledge
- ++ knowledge of biological working methods
- + biologically relevant knowledge in the natural sciences and mathematics
- + abstract, logical, analytical thinking
- ++ deepened expertise in biological specialist field
- ++ independent learning and (research-based) working
- ++ data presentation and evidence-based discussion (written and spoken)
- + teamwork
- ++ (scientific) communication skills
- + project and time management
- + knowledge of safety and environmental issues

Fundamentals of genetics, performing experiments, quantitative analyses.

Module contents
- general and molecular genetics; mechanisms of mutation, recombination, DNA repair, regulation of transcription; quantitative experiments, prokaryotes and eukaryotes, human genome project, personalized medicine, genetic engineering, safety regulations, sterile working

Reader's advisory
- Campbell/Reece Biologie (latest edition, Pearson Verlag), Strachan & Read Molekulare Humangenetik (latest edition, Sprektrum Verlag);
- Purves Biologie (latest edition, Spektrum Verlag).

Links
- Language of instruction: German
- Duration (semesters): 1 Semester
- Module frequency: jährlich
- Module capacity: unlimited
- Modullevel: AC (Aufbaucurriculum / Composition)
- Modulart: Wahlpflicht / Elective

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination
- Time of examination
- Type of examination

Final exam of module
- Written examination (100%)
- ungraded presentation
- ungraded protocol

PLEASE NOTE:
- Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

Course type
- Lecture: 1.00
- Exercises: 0.00
- Seminar: 1.00

Frequency
- WiSe

Workload attendance
- 14 h
- 0 h
- 14 h
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<tbody>
<tr>
<td>Practical</td>
<td></td>
<td>4.00</td>
<td>WiSe</td>
<td>56 h</td>
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Total time of attendance for the module: 84 h
Akzentsetzungsmodul

bio300 - Evolutionary Biology

<table>
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<td>Credit points</td>
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- **Used in course of study**
  - Fach-Bachelor Biologie > Akzentsetzungsmodule
  - Master of Education (Gymnasium) Biologie > Mastermodule
  - Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule

- **Contact person**
  - Module responsibility
    - Olaf Bininda-Emonds
    - Wilko Ahlrichs
    - Dirk Carl Albach
    - Gabriele Gerlach
    - Arne Nolte
  - Authorized examiners
    - Olaf Bininda-Emonds
    - Wilko Ahlrichs
    - Dirk Carl Albach
    - Gabriele Gerlach
    - Arne Nolte

- **Entry requirements**

- **Skills to be acquired in this module**
  - ++ biological knowledge
  - + knowledge of biological working methods
  - ++ biologically relevant knowledge in the natural sciences and mathematics
  - + statistics & scientific programming
  - + interdisciplinary knowledge & thinking
  - + abstract, logical, analytical thinking
  - ++ deepened expertise in biological specialist field
  - + independent learning and (research-based) working
  - ++ data presentation and evidence-based discussion (written and spoken)
  - + teamwork
  - ++ (scientific) communication skills
  - + project and time management

- **Module contents**
  - The lecture imparts basic knowledge in areas including population biology, phylogenetic systematics, phyloinformatics, behavioural and reproduction ecology. These fundamentals are extended in the seminar and exercises.

- **Reader’s advisory**

- **Links**
  - Language of instruction: German
  - Duration (semesters): 1 Semester
  - Module frequency: jährlich
  - Module capacity: unlimited
  - Modulelevel: AS (Akzentsetzung / Accentuation)
  - Modulart: Wahlpflicht / Elective

- **Lern-/Lehrform / Type of program**

- **Vorkenntnisse / Previous knowledge**

- **Examination**
  - Time of examination: Written examination in the final week of the semester or in the first week following the lecture
  - Type of examination: Written examination (60%) Portfolio (40%)
Examination | Time of examination | Type of examination period. | 
|-----------------|-------------------|----------------------------|

PLEASE NOTE: Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

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**Total time of attendance for the module** 140 h
## Module: General Ecology

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<td></td>
<td>- Helmut Hillebrand</td>
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<td>++ biologically relevant knowledge in the natural sciences and mathematics</td>
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<td>+ statistics &amp; scientific programming</td>
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<td>+ interdisciplinary knowledge &amp; thinking</td>
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<td>++ abstract, logical, analytical thinking</td>
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<td>+ data presentation and evidence-based discussion (written and spoken)</td>
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<td>+ (scientific) communication skills</td>
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bio325 - Pollination and Dispersal - Concepts

Module label: Pollination and Dispersal - Concepts
Module code: bio325
Credit points: 6.0 KP
Workload: 180 h
Used in course of study:
- Fach-Bachelor Biologie > Akzentsetzungsmodule
- Fach-Bachelor Mathematik > Nebenfachmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule

Contact person
Module responsibility:
- Dirk Carl Albach
Authorized examiners:
- Dirk Carl Albach
- Klaus Bernhard von Hagen
- Maria Will
Module counseling:
- Klaus Bernhard von Hagen
- Maria Will

Entry requirements:
bio256 Flora and Fauna

Skills to be acquired in this module:
+ biological knowledge
+ knowledge of biological working methods
+ abstract, logical, analytical thinking
+ deepened expertise in biological specialist field
+ independent learning and (research-based) working
+ data presentation and evidence-based discussion (written and spoken)
+ teamwork
+ (scientific) communication skills
+ project and time management
+ knowledge of safety and environmental issues

Extended knowledge of biodiversity and evolution of plants focusing on reproduction, dispersal, germination and establishment of plants

Module contents:
L: Pollination, dispersal, germination of plants, plant breeding
S: Pollination and dispersal biology of plants in a systematic context

Reader’s advisory:
The course does not follow a special textbook. The following German literature is recommended to students interested in the course: Dieter Heß – Die Blüte, Eugen Ulmer Verlag as well as Leins & Erbar -Blüte und Frucht, Schweizerbart'sche Verlagsbuchhandlung.

Links
Language of instruction: German
Duration (semesters): 1 Semester
Module frequency: The module will be offered every other year
Module capacity: 12
Module level: AS (Akzentsetzung / Accentuation)
Modulart: Wahlpflicht / Elective
Lern-/Lehrform / Type of program: lecture, seminar

Vorkenntnisse / Previous knowledge
Examination | Time of examination | Type of examination
--- | --- | ---

Final exam of module | Comment | SWS | Frequency | Workload attendance
--- | --- | --- | --- | ---
Lecture |  | 2.00 | SuSe | 28 h
Seminar |  | 2.00 | SuSe | 28 h

Total time of attendance for the module: 56 h
## bio326 - Pollination and Dispersal - Methods

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<td></td>
<td>Klaus Bernhard von Hagen</td>
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<td>Maria Will</td>
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<td>bio256 Flora/Fauna</td>
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<td>+ abstract, logical, analytical thinking</td>
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<td>+ project and time management</td>
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<td></td>
<td>+ knowledge of safety and environmental issues</td>
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<td>Module contents</td>
<td>Extended knowledge of biodiversity and evolution of plants focusing on reproduction, dispersal, germination and establishment of plants</td>
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<td>The course does not follow a special textbook. The following German literature is recommended to students interested in the course: Dieter Heß – Die Blüte, Eugen Ulmer Verlag as well as Leins &amp; Erbar -Blüte und Frucht, Schweizerbart'sche Verlagbuchhandlung.</td>
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**bio327 - Pollination and Dispersal - Methods not just for Schools**

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**Used in course of study**
- Fach-Bachelor Biologie > Akzentsetzungsmodul
- Fach-Bachelor Mathematik > Nebenfachmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodul

**Contact person**
- Module responsibility: Dirk Carl Albach
- Authorized examiners:
  - Dirk Carl Albach
  - Klaus Bernhard von Hagen
  - Maria Will
- Module counseling:
  - Klaus Bernhard von Hagen
  - Maria Will

**Entry requirements**
- bio325 Pollination and dispersal concepts
- bio256 Flora/fauna

**Skills to be acquired in this module**
- biological knowledge
- knowledge of biological working methods
- abstract, logical, analytical thinking
- deepened expertise in biological specialist field
- independent learning and (research-based) working
- data presentation and evidence-based discussion (written and spoken)
- teamwork
- (scientific) communication skills
- project and time management
- knowledge of safety and environmental issues

Extended knowledge of biodiversity and evolution of plants focusing on reproduction, dispersal, germination and establishment of plants

**Module contents**
The module introduces methods to study pollination, fertilisation, dispersal and germination in regard of adaptation to environmental factors. Experiments applicable to school lessons will be presented and especially thoroughly discussed.

**Reader's advisory**
The course does not follow a special textbook. The following German literature is recommended to students interested in the course: Dieter Heß – Die Blüte, Eugen Ulmer Verlag as well as Leins & Erbar -Blüte und Frucht, Schweizerbart'sche Verlagsbuchhandlung.

**Links**
- Language of instruction: German
- Duration (semesters): 1 Semester
- Module frequency: 12
- Module level: AS (Akzentsetzung / Accentuation)
- Modultype: Wahlpflicht / Elective
- Lern-/Lehrform / Type of program: exercise

**Vorkenntnisse / Previous knowledge**

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**Course type**
- Exercises

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bio330 - Marine Ecology

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<td>++ data presentation and evidence-based discussion (written and spoken)</td>
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<td>+ teamwork</td>
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<td>++ (scientific) communication skills</td>
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<td>+ project and time management</td>
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<tr>
<td>Basic knowledge and practical experience in biological oceanography</td>
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<tr>
<td>Apply theoretical concepts from different fields in marine ecology</td>
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<td>Analyse, present, and interpret results from the marine ecological literature and own investigations</td>
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<td>Acknowledge the importance of general ecological concepts for ecosystem management</td>
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<tr>
<td>Gain experience in the application of field and lab methods in ecology</td>
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<tr>
<td>Lecture Biological Oceanography</td>
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<tr>
<td>2 SWS = 3 CP. Presence time 24 h, additional study time 66h, winter-term</td>
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<tr>
<td>Abiotic environmental conditions in marine systems (light, temperature, chemical and physical proper-ties of the water, waves, tides, global distribution of water masses and currents. Pelagic communities, plankton (phyt-, zoo-, bacterio-, viroplankton), microbial loop, sedimentation, C-and N cycling, Nekton, Fisheries, El Nino, Benthic communities, estuaries.</td>
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<td>Exercise Concepts in marine ecology</td>
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<td>6 SWS = 9 CP. Presence time 70 h, additional study time 200h, winter-term</td>
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<td>Practical and theoretical exercises on marine ecology, including field studies, experiments and working with case studies from the literature. The focus is on concepts here, pinpointing at general ecological frameworks.</td>
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<tr>
<td>Lecture Marine Ecology</td>
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<td>2 SWS = 3 CP. Presence time 24 h, additional study time 66h, winter-term</td>
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<tr>
<td>Ecology of marine systems: estuaries, rocky and sediment coasts, pelagial, shelves, mangroves, seagrass meadows, coral reefs, deep sea, polar regions. The focus is on ecological specifics and interactions in the biotic communities of these systems. The second half of the lecture will focus on importance and consequences of overfishing, habitat destruction, pollution, climate change and bioinvasion on marine systems.</td>
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<table>
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<tr>
<td>U. Sommer, Biologische Meereskunde, Springer Verlag, Heidelberg.</td>
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**Lern-/Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
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<tbody>
<tr>
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<td>Written exam at the end of the Lecture Marine Ecology</td>
<td>1 written exam (Lecture) (50%), 1 oral presentation (Exercise) (50%)</td>
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**Course type**

<table>
<thead>
<tr>
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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tbody>
<tr>
<td>Lecture</td>
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<tr>
<td>Exercises</td>
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<td>84 h</td>
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</tbody>
</table>

**Total time of attendance for the module**

140 h
bio340 - Morphology, Phylogeny, and Evolution of Metazoa

Module label: Morphology, Phylogeny, and Evolution of Metazoa

Module code: bio340

Credit points: 15.0 KP

Workload: 450 h

Used in course of study:
- Fach-Bachelor Biologie > Akzentsetzungsmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule

Contact person:
- Module responsibility: Olaf Bininda-Emonds
- Authorized examiners:
  - Olaf Bininda-Emonds
  - Wilko Ahlrichs
- Module counseling:
  - Wilko Ahlrichs

Entry requirements:

- ++ biological knowledge
- + knowledge of biological working methods
- ++ biologically relevant knowledge in the natural sciences and mathematics
- + statistics & scientific programming
- + interdisciplinary knowledge & thinking
- + abstract, logical, analytical thinking
- ++ deepened expertise in biological specialist field
- + independent learning and (research-based) working
- ++ data presentation and evidence-based discussion (written and spoken)
- + teamwork
- ++ (scientific) communication skills
- + project and time management

 Upon successful completion of the module the students will gain:
1. a survey of topical subjects relating to the morphology and phylogeny of animals,
2. a thorough knowledge of the development of morphological characteristics,
3. technical skills in studying morphological structures, and
4. knowledge into recent hypotheses on the phylogeny of animals.

Module contents:
- Lecture: Details regarding the morphology and evolution of Metazoa from an explicit phylogenetic framework
- Seminar: Presentation and discussion of recent subjects and issues relating to the evolution of Metazoa; presentation of individual metazoan taxa
- Exercise: Preparation and documentation of exemplary species of Metazoa; various field studies (e.g. visit to the Dierenpark Emmen or to the Zoo am Meer (Bremerhaven), sampling aquatic micrometazoans, observing birds)

Reader's advisory:
Relevant literature will be announced during the first seminar and is contingent on the latest developments in the research field.

Links:

- Language of instruction: German
- Duration (semesters): 1 Semester
- Module frequency: jährlich
- Module capacity: unlimited
- Modullevel: AS (Akzentsetzung / Accentuation)
- Modulart: Wahlpflicht / Elective

Lern-/Lehrform / Type of program:

Vorkenntnisse / Previous knowledge:

Examination Time of examination Type of examination

- Final exam of module:
  - Portfolio during the course of the seminar; written examination in the final week of the course or in the first week following the lecture period.
  - 1 Written examination (50%),
  - 1 Portfolio (50%),

PLEASE NOTE:
Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.
<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tr>
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<td>Exercises</td>
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<td>5.00</td>
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**Total time of attendance for the module**

126 h
bio355 - Microscopical Anatomy

Module label: Microscopical Anatomy
Module code: bio355
Credit points: 9.0 KP
Workload: 270 h

Used in course of study:
- Fach-Bachelor Biologie > Akzentsetzungsmodul
- Fach-Bachelor Mathematik > Nebenfachmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodul

Contact person:
Module responsibility: Wilko Ahlrichs
Authorized examiners:
- Wilko Ahlrichs
- Alexander Kieneke
- Mona Hoppenrath

Module counseling:
- Alexander Kieneke
- Mona Hoppenrath

Entry requirements:

Skills to be acquired in this module:
- ++ biological knowledge
- ++ knowledge of biological working methods
- ++ biologically relevant knowledge in the natural sciences and mathematics
- * interdisciplinary knowledge & thinking
- ++ abstract, logical, analytical thinking
- ++ deepened expertise in biological specialist field
- ++ independent learning and (research-based) working
- ++ data presentation and evidence-based discussion (written and spoken)
- + teamwork
- ++ (scientific) communication skills
- + project and time management
- + knowledge of safety and environmental issues

This course is designed for students to learn about the basic light and electron optical methods. Students will be able to work with preparative techniques for scanning electron microscopy, transmission electron microscopy, and light microscopy, and confocal scanning laser microscopy. Students completing this course will have learned basic principles for fixing and embedding biological materials for electron microscopy. Students will have learned how to operate a transmission electron microscope, a scanning electron microscope, several ultramicrotomes, a vacuum evaporator, a critical point dryer, and a sputter coater. Digital imaging techniques that will be learned include print making, design and assembly of materials for publication, PowerPoint presentations, and poster design. Students will be introduced to the principles of light microscopy utilizing different optical sys-tems and will have the opportunity to have hands-on experience with a Leica photomicroscope as well as the Leica SP5 confocal laser scanning.

Module contents:
Microscopy of protists and micro metazoans. Students are required plan and carry out a research pro-ject that exposes them to some of the challenges and problems encountered by microscopical anato-my - and some of the techniques that are used to solve these problems. Students have to present a scientific poster, a short oral presentation and a scientific paper.

Reader's advisory:
Will be announced in the course.

Links:
Language of instruction: German
Duration (semesters): 1 Semester
Module frequency: annually

Module capacity: 8
For more applicants than places, a motivation letter decides on the admission.

Module level: AS (Akzentsetzung / Accentuation)
Module type: Wahlpflicht / Elective

Lern- / Lehrform / Type of program:
lecture/seminar, exercise

Vorkenntnisse / Previous knowledge:

Examination Time of examination Type of examination
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<th>Workload attendance</th>
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<td>Frequency</td>
<td>Workload attendance</td>
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**bio360 - Marine Biodiversity**

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<td><strong>Module code</strong></td>
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<tr>
<td><strong>Credit points</strong></td>
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<td><strong>Workload</strong></td>
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| **Used in course of study** | Fach-Bachelor Biologie > Akzentsetzungs module  
| | Master of Education (Gymnasium) Biologie > Mastermodule  
| | Zwei-Fächer-Bachelor Biologie > Akzentsetzungs module |

**Contact person**

- Module responsibility
  - Thomas Glatzel

- Authorized examiners
  - Thomas Glatzel
  - Pedro-Miguel Martinez-Arbizu
  - Mona Hoppenrath

**Module counseling**

- Pedro-Miguel Martinez-Arbizu
- Mona Hoppenrath

**Entry requirements**

**Skills to be acquired in this module**

- ++ biological knowledge
- ++ knowledge of biological working methods
- + interdisciplinary knowledge & thinking
- + abstract, logical, analytical thinking
- ++ deepened expertise in biological specialist field
- ++ independent learning and (research-based) working
- ++ data presentation and evidence-based discussion (written and spoken)
- + teamwork
- + (scientific) communication skills
- + project and time management

By active participation the students acquire the following knowledge/abilities/qualification:

- * Preparation and organization of sampling
- * Marine deposits, development of marine sediments and their effects on the fauna
- * Methods of meiofauna and macrofauna sampling, also plankton sampling
- * Methods of quantitative community analysis
- * Diversity comparison of various sites applying statistical methods
- * Multivariate statistics for correlation of biocenoses and environmental variables
- * Biocenoses of marine habitats
- * Biology, morphology, systematics, behaviour and ecology of selected taxa in marine water systems
- * Formulation and definition of scientific questions and selection of methods
- * Habitat and biocenoses, interstitial, littoral (lotic, lentic), diversity
- * Planning behavioural experiments
- * Presentation and discussion of scientific results
- * Independent scientific work in groups and presentation of results

**Module contents**

The module gives an introduction to marine biodiversity research demonstrated by various animal groups from the Wadden Sea and the North Sea including independent sampling on the coast and on the islands. The students will collect the organisms in the field or on board using sampling equipment. In the laboratory course, the biology and morphology as well as the ecology and behaviour of certain species are investigated and documented. The morphology of marine sediments and their development are further aspects of this module.

**Reader's advisory**


The literature listed above is available in the university library. More reading will be recommended in the course of the lecture.

Literature inquiry:
web of science: externhttp://www.bis.uni-oldenburg.de - Datenbanken(DBIS) - Biologie - TOP-Datenbanken z. B. ASFA, Science Citation Index, Zoological Record http://www.biodiversitylibrary.org/bibliography/14107 externhttp://scholar.google.de/
externhttp://www.vifabio.de
Open access journals: externhttp://www.doaj.org/ - externhttp://www.plosone.org

Links

Language of instruction German
Duration (semesters) 1 Semester
Module frequency jährlich
Module capacity unlimited
Modullevel AS (Akzentsetzung / Accentuation)
Modulart Wahlpflicht / Elective

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination Time of examination Type of examination
Final exam of module During lectures 1 Portfolio

Please note:
Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

Course type Comment SWS Frequency Workload attendance
Lecture 2.00 28 h
Exercises 9.00 126 h
Seminar 2.00 28 h

Total time of attendance for the module 182 h
bio375 - Flora - Advanced Concepts

<table>
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<th>Module label</th>
<th>Flora - Advanced Concepts</th>
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<tbody>
<tr>
<td>Module code</td>
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<td>Credit points</td>
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<td>Fach-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
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<tr>
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<tr>
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<td></td>
<td>▷ Dirk Carl Albach</td>
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<td>▷ Klaus Bernhard von Hagen</td>
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<td></td>
<td>▷ Maria Will</td>
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<td>Module counseling</td>
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<td></td>
<td>▷ Klaus Bernhard von Hagen</td>
</tr>
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<td></td>
<td>▷ Maria Will</td>
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<tr>
<td>Entry requirements</td>
<td>bio256 Flora and Fauna</td>
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<tr>
<td>Skills to be acquired in this module</td>
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<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
<td>▶ knowledge of safety and environmental issues</td>
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</tbody>
</table>

The module is intended to give students in-depth knowledge on plant determination and the diversity of plants. Students shall increase their knowledge on species and learn and improve their abilities in plant determination and plant conservation. Subjects and methods relevant for nature conservation are emphasized. Along with these, students shall improve their systemic thinking with relation to nature in northwestern Germany and its flora. Students learn about plants and how to group them according to their phylogeny and evolutionary adaptations, so they can pass this knowledge on to others. Competence in assessment is conveyed in the areas of diversity and nature conservation to sensibilize students for a respectful treatment of nature and passing on this ability to others. Finally, we will discuss sustainable use of plants and habitats and their restoration.

Module contents

The module comprises a lecture in the Botanical Garden, where plants will be observed and investigated. This includes algae, bryophytes, ferns, gymnosperms and various families of angiosperms. The seminar is intended to let students study in-depth additional plant families with their typical characters.

Reader's advisory

Rothmaler - Exkursionsflora von Deutschland. Gefäßpflanzen: Grundband

Links

Language of instruction  German
Duration (semesters)     1 Semester
Module frequency         The module will be offered every other year
Module capacity          12
Module level             AS (Akzentsetzung / Accentuation)
Moduleart                Wahlpflicht / Elective
Lern-/Lehrform / Type of program  lecture, seminar

Vorkenntnisse / Previous knowledge

<table>
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<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
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<tbody>
<tr>
<td>Final exam of module</td>
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<tr>
<td>Lecture</td>
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<td>Seminar</td>
<td>2.00</td>
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Total time of attendance for the module  56 h
bio376 - Flora - Advanced Methods

Module label
Flora - Advanced Methods

Module code
bio376

Credit points
6.0 KP

Workload
180 h

Used in course of study
- Fach-Bachelor Biologie > Akzentsetzungsmodule
- Fach-Bachelor Mathematik > Nebenfachmodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule

Contact person

Module responsibility
- Dirk Carl Albach

Authorized examiners
- Dirk Carl Albach
- Klaus Bernhard von Hagen
- Maria Will

Module counseling
- Klaus Bernhard von Hagen
- Maria Will

Entry requirements
- bio256 Flora and Fauna
- bio375 Flora - Advanced concepts

Skills to be acquired in this module
- biological knowledge
- knowledge of biological working methods
- deepened expertise in biological specialist field
- independent learning and (research-based) working
- data presentation and evidence-based discussion (written and spoken)
- (scientific) communication skills
- knowledge of safety and environmental issues

The module is intended to give students in-depth knowledge on plant determination and the diversity of plants. Students shall increase their knowledge on species and learn and improve their abilities in plant determination and plant conservation. Subjects and methods relevant for nature conservation are emphasized. Along with these, students shall improve their systemic thinking with relation to nature in northwestern Germany and its flora. Students learn about plants and how to group them according to their phylogeny and evolutionary adaptations, so they can pass this knowledge on to others. Competence in assessment is conveyed in the areas of diversity and nature conservation to sensibilize students for a respectful treatment of nature and passing on this ability to others. Finally, we will discuss sustainable use of plants and habitats and their restoration.

Module contents

The exercises will be used to apply the abilities to plant species in the vicinity of Oldenburg and to practice methods in mapping and surveying plant species.

Reader's advisory
Rothmaler - Exkursionsflora von Deutschland. Gefäßpflanzen: Grundband

Links

Language of instruction
German

Duration (semesters)
1 Semester

Module frequency
The module will be offered every other year

Module capacity
12

Modulelevel
AS (Akzentsetzung / Accentuation)

Modulart
Wahlpflicht / Elective

Lern-/Lehrform / Type of program
exercise

Vorkenntnisse / Previous knowledge

Examination
Time of examination
Type of examination

Final exam of module
portfolio

Course type
Exercises

SWS
4.00

Frequency
SuSe

Workload attendance
56 h
**bio377 - Flora - Advanced Methods not just for schools**

<table>
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<tr>
<th>Module label</th>
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<tbody>
<tr>
<td>Module code</td>
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<td>• Dirk Carl Albach</td>
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<td>• Klaus Bernhard von Hagen</td>
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<td>• Klaus Bernhard von Hagen</td>
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<td>bio375 Flora - Advanced Concepts</td>
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<td>+ knowledge of safety and environmental issues</td>
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The module is intended to give students in-depth knowledge on plant determination and the diversity of plants. Students shall increase their knowledge on species and learn and improve their abilities in plant determination and plant conservation. Subjects and methods relevant for nature conservation are emphasized. Along with these, students shall improve their systemic thinking with relation to nature in northwestern Germany and its flora. Students learn about plants and how to group them according to their phylogeny and evolutionary adaptations, so they can pass this knowledge on to others. Competence in assessment is conveyed in the areas of diversity and nature conservation to sensibilize students for a respectful treatment of nature and passing on this ability to others. Finally, we will discuss sustainable use of plants and habitats and their restoration.

**Module contents**

The exercises will be used to apply the abilities to identify plant species in the vicinity of Oldenburg and to practice methods in mapping and surveying plant species. Investigations applicable to school lessons will be presented and especially thoroughly discussed.

**Reader's advisory**

Rothmaler - Exkursionsflora von Deutschland, Gefäßpflanzen: Grundband

**Links**

Language of instruction: German

Duration (semesters): 1 Semester

Module frequency: The module will be offered every other year

Module capacity: 12

Module level: AS (Akzentsetzung / Accentuation)

Modulart: Wahlpflicht / Elective

Lern-/Lehrform / Type of program: exercise

Vorkenntnisse / Previous knowledge

Vorkenntnisse / Previous knowledge: 

**Course type**

Exercises

**Final exam of module**

Type of examination: portfolio

**Course type**

Exercises

**SWS**

6.00

**Frequency**

SuSe

**Workload attendance**

84 h
## bio385 - Specific Microbiology

<table>
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<tr>
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<td>- Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodulte</td>
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<td>Contact person</td>
<td>Module responsibility</td>
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<tr>
<td></td>
<td>- Ralf Andreas Rabus</td>
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<td>Authorized examiners</td>
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<td>- Ralf Andreas Rabus</td>
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<tr>
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<td>- Daniel Wünsch</td>
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<td>- Daniel Wünsch</td>
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<td>bio233 Basics in microbiology and genetics</td>
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<td>bio265 general microbiology</td>
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<td>Lern-/Lehrform / Type of program</td>
<td>lecture, seminar, exercise</td>
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<td>Vorkenntnisse / Previous knowledge</td>
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<td>Examination</td>
<td>Time of examination</td>
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<td>Type of examination</td>
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<tr>
<td>Course type</td>
<td>Comment</td>
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<tr>
<td></td>
<td>Lecture</td>
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<tr>
<td></td>
<td>Seminar</td>
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<tr>
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<td>Practical</td>
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<tr>
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<td>140 h</td>
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</table>
bio395 - Plant Molecular Biology and Genetics I

Module label: Plant Molecular Biology and Genetics I
Module code: bio395
Credit points: 6.0 KP
Workload: 180 h

Used in course of study:
- Fach-Bachelor Biologie > Akzentsetzungsmodule
- Fach-Bachelor Mathematik > Nebenfachmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule

Contact person:
- Module responsibility: Sascha Laubinger
- Authorized examiners:
  - Sascha Laubinger
  - Udo Gowik
- Module counselling:
  - Udo Gowik

Entry requirements:
Skills to be acquired in this module:
- ++ biological knowledge
- ++ knowledge of biological working methods
- + biologically relevant knowledge in the natural sciences and mathematics
- + statistics & scientific programming
- ++ interdisciplinary knowledge & thinking
- ++ abstract, logical, analytical thinking
- ++ deepened expertise in biological specialist field
- ++ independent learning and (research-based) working
- ++ data presentation and evidence-based discussion (written and spoken)
- ++ teamwork
- ++ (scientific) communication skills
- ++ project and time management
- + knowledge of safety and environmental issues

The module serves the in-depth study of state-of-the-art techniques and problems in the field of molecular plant biology and plant genetics.

Special competencies: basic knowledge in plant genetics, plant developmental genetics, plant/environment interactions and molecular basis of gene regulation

General competencies: Presentation of scientific papers, presentation techniques, teamwork, problem solving competencies

Module contents:
Part of this module is a lecture that addresses several topics of modern plant molecular biology. The main focus is on plant developmental genetics, plant/environment interactions and the underlying molecular mechanisms of gene regulation in plants. At the beginning of the module, the students will present diverse molecular biology techniques and the latest developments in the field in a "method and techniques" seminar. In a "literature" seminar, the students will present and discuss a recent publication on one of the above-mentioned topics.

Reader's advisory:
Literature will be handed out at the beginning of the course.

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

Module frequency: 16
Reference text:
This module is mandatory for "Plant molecular biology and genetics II"

Modullevel: AS (Akzentsetzung / Accentuation)
Modulart: Wahlpflicht / Elective

Lern-Lehrform / Type of program:
lecture, seminar

Vorkenntnisse / Previous knowledge:

Examination:
Type of examination: Written examination (good seminar presentations improve the grade)

Final exam of module:
Course type: Lecture
Comment: 2.00
SWS: 45 / 85
Frequency: WiSe
Workload attendance: 28 h
<table>
<thead>
<tr>
<th>Course type</th>
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<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tbody>
<tr>
<td>Seminar</td>
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<td>2.00</td>
<td>WiSe</td>
<td>28 h</td>
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**Total time of attendance for the module**  
56 h
### bio396 - Plant Molecular Biology and Genetics II

<table>
<thead>
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<tbody>
<tr>
<td>Module code</td>
<td>bio396</td>
</tr>
<tr>
<td>Credit points</td>
<td>6.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>180 h</td>
</tr>
</tbody>
</table>

**Used in course of study**
- Fach-Bachelor Biologie > Akzentsetzungsmodule
- Fach-Bachelor Mathematik > Nebenfachmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmoduls

**Contact person**

- Module responsibility
  - Sascha Laubinger

- Authorized examiners
  - Sascha Laubinger
  - Udo Gowik

- Module counseling
  - Udo Gowik

**Entry requirements**

- bio395 Plant molecular biology and genetics I

**Skills to be acquired in this module**

- ++ biological knowledge
- ++ knowledge of biological working methods
- + biologically relevant knowledge in the natural sciences and mathematics
- ++ statistics & scientific programming
- ++ interdisciplinary knowledge & thinking
- ++ abstract, logical, analytical thinking
- ++ deepened expertise in biological specialist field
- ++ independent learning and (research-based) working
- ++ data presentation and evidence-based discussion (written and spoken)
- ++ teamwork
- ++ (scientific) communication skills
- ++ project and time management
- + knowledge of safety and environmental issues

The module serves the in-depth study of state-of-the-art techniques and problems in the field of molecular plant biology and plant genetics.

Specialist competencies: Acquiring basic skill in plant molecular biology, genetics and plant biochemistry

Methodological competencies: molecular biology techniques, conducted independently

General competencies: Presentation of scientific results, presentation techniques, teamwork, problem solving competencies

**Module contents**

Part of this module is a lecture that addresses several topics of modern plant molecular biology. The main focus is on plant developmental genetics, plant/environment interactions and the underlying molecular mechanisms of gene regulation in plants. At the beginning of the module, the students will present diverse molecular biology techniques and the latest developments in the field in a "method and techniques" seminar. In a "literature" seminar, the students will present and discuss a recent publication on one of the above-mentioned topics.

**Reader's advisory**

Literature will be handed out at the beginning of the course.

**Links**

- **Languages of instruction**
  - German, English
- **Duration (semesters)**
  - 1 Semester
- **Module frequency**
  - annually
- **Module capacity**
  - 16
- **Modullevel**
  - AS (Akzentsetzung / Accentuation)
- **Modultyp**
  - Wahlpflicht / Elective
- **Lern-/Lehrform / Type of program**
  - exercise
- **Vorkenntnisse / Previous knowledge**
- **Examination**
  - Time of examination
  - Type of examination
- **Final exam of module**
  - portfolio (presentation, protocols)
- **Course type**
  - Exercises
- **SWS**
  - 4.00
- **Frequency**
  - WiSe
| Workload attendance | 56 h |
bio405 - Introduction to Neurobiology I

<table>
<thead>
<tr>
<th>Module label</th>
<th>Introduction to Neurobiology I</th>
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</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio405</td>
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<tr>
<td>Credit points</td>
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<td>Workload</td>
<td>360 h</td>
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<td>Fach-Bachelor Mathematik &gt; Nebenfachmodule</td>
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<td></td>
<td>Master of Education (Gymnasium) Biologie &gt; Mastermodule</td>
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<td></td>
<td>Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
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</table>

Contact person

Module responsibility
- Martin Greschner

Authorized examiners
- Martin Greschner
- Ulrike Janssen-Bienhold
- Georg Martin Klump

Module counseling
- Karl-Wilhelm Koch
- Ulrike Janssen-Bienhold
- Georg Martin Klump

Entry requirements

Skills to be acquired in this module
- + deepened biological expertise
- + deepened knowledge of biological working methods
- + scientific/mathematical basic knowledge relevant for biology
- + critical and analytical thinking
- ++ data presentation and discussion in German (written and spoken)
- + teamwork

Module contents
The lecture covers the molecular and cellular basis of neurobiology, the electrical properties of nerve cells, the organization and development of the nervous system and the function of the motor system. In the seminar, topics related to the lectures of the week are covered in more depth. In the exercises, the theoretical knowledge from the lectures will be tested in small experiments.

Reader's advisory

Links

Language of instruction
German

Duration (semesters)
1 Semester

Module frequency
annually

Module capacity
30

Reference text
associated with the modules bio415 and bio416 Introduction to Neurobiology II in the winter semester

Modulelevel
AS (Akzentsetzung / Accentuation)

Modulart
Wahlpflicht / Elective

Lern-/Lehrform / Type of program
lecture, seminar, exercise

Vorkenntnisse / Previous knowledge
Basics in physiology and cellular biology

Examination

<table>
<thead>
<tr>
<th>Course type</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
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<tbody>
<tr>
<td>Lecture</td>
<td>3.00</td>
<td>SuSe</td>
<td>42 h</td>
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<tr>
<td>Seminar</td>
<td>1.00</td>
<td>SuSe</td>
<td>14 h</td>
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<tr>
<td>Exercises</td>
<td>4.00</td>
<td>SuSe</td>
<td>56 h</td>
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<tr>
<td>Tutorial</td>
<td>0.00</td>
<td>SuSe and WiSe</td>
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Total time of attendance for the module
112 h
### bio415 - Introduction to Neurobiology II

<table>
<thead>
<tr>
<th>Module label</th>
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<tbody>
<tr>
<td>Module code</td>
<td>bio415</td>
</tr>
<tr>
<td>Credit points</td>
<td>6.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>180 h</td>
</tr>
</tbody>
</table>
| Used in course of study| - Fach-Bachelor Biologie > Akzentsetzungsmodule  
                         | - Fach-Bachelor Mathematik > Nebenfachmodule  
                         | - Master of Education (Gymnasium) Biologie > Mastermodule  
                         | - Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule |
| Contact person         | Module responsibility  
                         |  - Georg Martin Klump |
|                        | Authorized examiners  
                         |  - Georg Martin Klump  
                         |  - Christiane Margarete Thiel  
                         |  - Christine Köppl  
                         |  - Martin Greschner  
                         |  - Jannis Hildebrandt |
|                        | Module counseling  
                         |  - Christiane Margarete Thiel  
                         |  - Christine Köppl  
                         |  - Martin Greschner  
                         |  - Jannis Hildebrandt |
| Entry requirements     | Skills to be acquired in this module  
                         |  ++ deepened biological expertise  
                         |  ++ deepened knowledge of biological working methods  
                         |  + scientific/mathematical basic knowledge relevant for biology  
                         |  + critical and analytical thinking |
|                       | Module contents  
                         | The lecture covers the basics of systemic neuroscience with a focus on processing in sensory systems, the plasticity of the nervous system and the mechanisms underlying cognitive processing. In the seminar, topics related to the lectures of the week are covered in more depth. |
|                       | Reader's advisory  
|                       | Links  
                         | German |
|                       | Duration (semesters)  
                         | 1 Semester |
|                       | Module frequency  
                         | - Lecture: 3.00 SWS  
                         | - Seminar: 1.00 SWS |
|                       | Module capacity  
                         | 30 |
|                       | Modullevel  
                         | AS (Akzentsetzung / Accentuation) |
|                       | Modulart  
                         | Wahlpflicht / Elective |
|                       | Lern-Lehrform / Type of program  
                         | lecture, seminar |
|                       | Vorkenntnisse / Previous knowledge  
                         | Basics in physiology and perception |
|                       | Examination  
                         | Time of examination  
                         | Type of examination  
                         | end of semester  
                         | written exam |
|                       | Final exam of module  
                         | Course type  
                         | Comment  
                         | SWS  
                         | Frequency  
                         | Workload attendance |
| Lecture               | 3.00  
                         | WSe  
                         | 42 h |
| Seminar               | 1.00  
                         | WSe  
                         | 14 h |
| Total time of attendance for the module | 56 h |
**bio416 - Experiments in Neurobiology II**

<table>
<thead>
<tr>
<th>Module label</th>
<th>Experiments in Neurobiology II</th>
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</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio416</td>
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<tr>
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<td>6.0 KP</td>
</tr>
<tr>
<td>Workload</td>
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</tbody>
</table>

**Used in course of study**
- Fach-Bachelor Biologie > Akzentsetzungsmodule
- Fach-Bachelor Mathematik > Nebenfachmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule

**Contact person**
- Module responsibility
  - Georg Martin Klump
- Authorized examiners
  - Georg Martin Klump
  - Christiane Margarete Thiel
  - Ulrike Langemann
- Module counseling
  - Christiane Margarete Thiel
  - Ulrike Langemann

**Entry requirements**
- bio415 "Introduction to Neurobiology II"

**Skills to be acquired in this module**
- ++ deepened biological expertise
- ++ deepened knowledge of biological working methods
- ++ data analysis skills
- ++ data presentation and discussion in German and English (written and spoken)
- + teamwork
- + scientific/mathematical basic knowledge relevant for biology

**Module contents**
The exercise immediately follows the module "Introduction to Neurobiology II". By experimenting with each other, the students deepen their knowledge in the fields of cognitive neuroscience and hearing science. The students analyze their own data (incl. statistics) in a written report.

**Reader's advisory**

**Links**
- Language of instruction: German
- Duration (semesters): 1 Semester
- Module frequency: annually
- Module capacity: 30
- Modullevel: AS (Akzentsetzung / Accentuation)
- Modulart: Wahlpflicht / Elective
- Lern-/Lehrform / Type of program: exercise
- Vorkenntnisse / Previous knowledge: Neurobiology II

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
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<tbody>
<tr>
<td>Final exam of module</td>
<td>end of module</td>
<td>portfolio (data analysis, presentation)</td>
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</table>

**Course type**
- Exercises

**SWS**
- 4.00

**Frequency**
- WiSe

**Workload attendance**
- 56 h
bio420 - Biochemistry of the Cell

Module label  
Biochemistry of the Cell

Module code  
bio420

Credit points  
6.0 KP

Workload  
180 h

Used in course of study  
- Fach-Bachelor Biologie > Akzentsetzungsmodul
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodul

Contact person

Module responsibility
- Alexander Scholten

Authorized examiners
- Alexander Scholten

Entry requirements

Skills to be acquired in this module
++ biological knowledge
+ knowledge of biological working methods
+ biologically relevant knowledge in the natural sciences and mathematics
+ abstract, logical, analytical thinking
+ data presentation and evidence-based discussion (written and spoken)
++ (scientific) communication skills

Module contents
supramolecular organization in the cell, interactions of biomolecules, signalling fluxes

Reader's advisory
Biochemie, Müller-Esterl
Biochemie, Lubert Stryer
Lehninger Prinzipien der Biochemie, David L. Nelson und Michael M. Cox
Principles of Biochemistry, Horton et al.

Links

Language of instruction  
German

Duration (semesters)  
1 Semester

Module frequency  
annually

Module capacity  
20

Module level  
AS (Akzentsetzung / Accentuation)

Modulart  
Wahlpflicht / Elective

Lern-/Lehrform / Type of program  
lecture, seminar, exercise

Vorkenntnisse / Previous knowledge  
Biochemistry

Examination  
Time of examination  
Type of examination

Final exam of module during the semester oral presentation

Course type  
Comment  
SWS  
Frequency  
Workload attendance

Lecture  
1.00  
WiSe  
14 h

Exercises  
1.00  
WiSe  
14 h

Seminar  
2.00  
WiSe  
28 h

Total time of attendance for the module  
56 h
bio430 - Analytical Biochemistry

Module label: Analytical Biochemistry
Module code: bio430
Credit points: 6.0 KP
Workload: 180 h

Used in course of study:
- Fach-Bachelor Biologie > Akzentsetzungsmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule

Contact person:
- Module responsibility: Karl-Wilhelm Koch
- Authorized examiners: Alexander Scholten, Karl-Wilhelm Koch
- Module counseling: Alexander Scholten

Entry requirements:
Skills to be acquired in this module:
- ++ biological knowledge
- ++ knowledge of biological working methods
- + biologically relevant knowledge in the natural sciences and mathematics
- + abstract, logical, analytical thinking
- + deepened expertise in biological specialist field
- ++ data presentation and evidence-based discussion (written and spoken)
- + teamwork

The students get a survey of current techniques in Biochemistry and learn some essential techniques such as column chromatography and enzyme kinetic measurements in practice. They understand the theoretical fundamentals of these techniques and assess experimentally collected data bases.

Module contents:
Bioanalytical methods in theory and practice

Reader's advisory:
Bioanalytik, Lottspeich/Engels

Links:

Language of instruction: German
Duration (semesters): 1 Semester
Module frequency: annually
Module capacity: 20
Module level: PB (Professionalisierungsbereich / Professionalization)
Modulart: Ergänzung/Professionalisierung

Lern-/Lehrform / Type of program:
lecture, seminar, exercise

Vorkenntnisse / Previous knowledge:
Biochemistry and Molecular Biology

Examination:
Type of examination: oral presentation and protocol

<table>
<thead>
<tr>
<th>Final exam of module</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course type</td>
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<td>SWS</td>
</tr>
<tr>
<td>Lecture</td>
<td>1.00</td>
<td>SuSe</td>
</tr>
<tr>
<td>Seminar</td>
<td>1.00</td>
<td>SuSe</td>
</tr>
<tr>
<td>Exercises</td>
<td>2.00</td>
<td>SuSe</td>
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Total time of attendance for the module: 56 h
bio440 - Microfauna, Mircoflora & Protista of limnic and marine habitats

Module label: Microfauna, Mircoflora & Protista of limnic and marine habitats
Module code: bio440
Credit points: 6.0 KP
Workload: 180 h

Used in course of study:
- Fach-Bachelor Biologie > Akzentsetzungsmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule

Contact person:
Module responsibility:
- Wilko Ahlrichs

Authorized examiners:
- Wilko Ahlrichs
- Alexander Kieneke
- Mona Hoppenrath

Module counseling:
- Alexander Kieneke
- Mona Hoppenrath

Entry requirements:
Skills to be acquired in this module:
- ++ biological knowledge
- ++ knowledge of biological working methods
- ++ biologically relevant knowledge in the natural sciences and mathematics
- + statistics & scientific programming
- ++ interdisciplinary knowledge & thinking
- + abstract, logical, analytical thinking
- ++ deepened expertise in biological specialist field
- ++ independent learning and (research-based) working
- ++ data presentation and evidence-based discussion (written and spoken)
- + teamwork
- ++ (scientific) communication skills
- + project and time management

The objectives of the module are the teaching and learning of methods in the field of taxonomy, systematics, morphology, ecology, and evolution. Competencies for finding, identifying, preparing, micro-copying, illustrating, describing, and publishing species are taught. It learns how a scientific collection is created and managed. Another goal is the teaching of basics of molecular systematics and barcoding. The focus is on taxa of the microfauna and protists of limnic and marine habitats. The goal is the knowledge of biotic and abiotic properties of aquatic habitats, their formation and biodiversity. The students should learn to hypothesize structural adaptations of organisms to aquatic habitats.

Module contents:
We study microfauna and protists of limnic and marine habitats. Microfauna refers to microscopic animals. They live together with protists aquatic habitats in high diversity. Animals of the microfauna and protists usually belong to groups that developed early in evolution. The study of communities of these groups gives a unique insight into the evolution of animals and protists. The microfauna and the protists are little studied compared to other groups of animals and offer great potential. But they must be examined under the optical microscope. This requires special techniques and knowledge. Fortunately, through digital techniques, the investigation and publications have been greatly simplified. We will make excursions to ponds, ponds, lakes, rivers, bogs, sea beaches, etc. It teaches where, when, and how to find species of microfauna and protists. The collected organisms are determined, prepared, microscoped, photographed, drawn, and digitally illustrated. Art descriptions are produced. Attention is paid to the correct application of nomenclature rules. We show how a scientific collection is built and managed. For this purpose, basic knowledge in SQL database technology is taught. Dichotomous, synoptic, and digital identification keys are presented and developed. In addition to the classical morphological methods, it will be shown how species for molecular barcoding and phylogenetic analyzes are investigated. The students will create art portraits. The results are communicated in the form of posters, short lectures, and scientific publications.

Reader's advisory:
Will be announced in the course.

Links:
Language of instruction: German
Duration (semesters): 1 Semester
Module frequency: irregular
Module capacity: 12 (For more applicants than places, a motivation letter decides on the admission.)
<table>
<thead>
<tr>
<th>Modullevel</th>
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</thead>
<tbody>
<tr>
<td>Modulart</td>
<td>je nach Studiengang Pflicht oder Wahlpflicht</td>
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<tr>
<td>Lern-/Lehrform / Type of program</td>
<td></td>
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<tr>
<td>Vorkenntnisse / Previous knowledge</td>
<td></td>
</tr>
<tr>
<td>Examination</td>
<td>Time of examination</td>
</tr>
<tr>
<td>Final exam of module</td>
<td>Portfolio</td>
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<tr>
<td>Course type</td>
<td>Comment</td>
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<tr>
<td>Study trip</td>
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<td>Seminar</td>
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<tr>
<td>Exercises</td>
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<tr>
<td>Total time of attendance for the module</td>
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</table>
bio450 - Posters, Pictures, Presentations and Papers

<table>
<thead>
<tr>
<th>Module label</th>
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</tr>
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<tbody>
<tr>
<td>Module code</td>
<td>bio450</td>
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<tr>
<td>Credit points</td>
<td>9.0 KP</td>
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<td>Workload</td>
<td>270 h</td>
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<td>- Master of Education (Gymnasium) Biologie &gt; Mastermodule</td>
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<td></td>
<td>- Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodul</td>
</tr>
<tr>
<td>Contact person</td>
<td>Module responsibility</td>
</tr>
<tr>
<td></td>
<td>- Olaf Bininda-Emonds</td>
</tr>
<tr>
<td></td>
<td>Authorized examiners</td>
</tr>
<tr>
<td></td>
<td>- Olaf Bininda-Emonds</td>
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<tr>
<td></td>
<td>- Wilko Ahlrichs</td>
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<td></td>
<td>Module counseling</td>
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<tr>
<td></td>
<td>- Wilko Ahlrichs</td>
</tr>
<tr>
<td>Entry requirements</td>
<td></td>
</tr>
<tr>
<td>Skills to be acquired in this module</td>
<td>+ interdisciplinary knowledge &amp; thinking</td>
</tr>
<tr>
<td></td>
<td>+ abstract, logical, analytical thinking</td>
</tr>
<tr>
<td></td>
<td>+ deepened expertise in biological specialist field</td>
</tr>
<tr>
<td></td>
<td>++ independent learning and (research-based) working</td>
</tr>
<tr>
<td></td>
<td>++ data presentation and evidence-based discussion (written and spoken)</td>
</tr>
<tr>
<td></td>
<td>++ (scientific) communication skills</td>
</tr>
<tr>
<td></td>
<td>+ project and time management</td>
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</tbody>
</table>

Practical experience with four forms of scientific presentation: papers, presentations, scientific drawings, and posters. The students will learn / gain: 1) the logical and structural form of a scientific paper (or protocol or thesis) so as to communicate their results more effectively; 2) the distillation of the key information out of a project and its focused presentation in a lecture or poster; 3) experience with constructive criticism in a group setting as well as the critical assessment of scientific studies; 4) experience with scientific English; and 5) the art of scientific drawing, including the making of high-quality photo montages for papers or posters through microphotography and digital editing.

Module contents

Theoretical part: General tips regarding the logical and structural form of a scientific paper, presentation, or posters, including how to avoid making the most common mis-takes.

Practical part: Critical analysis of selected papers from the (evolutionary biological) literature. Writing of a scientific paper using pre-given results. Construction and presentation of a lecture and poster in front of the group based on a recent paper from the literature. Through the feedback obtained in this process, improvements will be made in both cases. Microscopic photography of selected zoological specimens that will then be transferred to / drawn on transparent paper before being rescanned for digital editing. High-quality photo montages of both the photos themselves and the drawings derived from them will be obtained through diverse software (e.g., Adobe Illustrator or InDesign).

Reader's advisory

None. The relevant scientific literature will be distributed during the course.

Links

<table>
<thead>
<tr>
<th>Languages of instruction</th>
<th>German, English</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration (semesters)</td>
<td>1 Semester</td>
</tr>
<tr>
<td>Module frequency</td>
<td>annually</td>
</tr>
<tr>
<td>Module capacity</td>
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<td>Modulart</td>
<td>Wahlpflicht / Elective</td>
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<tr>
<td>Lern-/Lehrform / Type of program</td>
<td>exercise</td>
</tr>
<tr>
<td>Vorkenntnisse / Previous knowledge</td>
<td>Experience with the use of Microsoft Excel (or programs with graphing capabilities), Adobe Photoshop, and Microsoft PowerPoint or Keynote (or similar programs).</td>
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<tr>
<td>Examination</td>
<td>Time of examination</td>
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<td>Portfolio (100%)</td>
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<td>Exercises</td>
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<td>SWS</td>
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<td>Frequency</td>
<td>SuSe</td>
</tr>
<tr>
<td>Workload attendance</td>
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</table>
**bio460 - Diversity of marine Invertebrates**

**Module label**  
Diversity of marine Invertebrates

**Module code**  
bio460

**Credit points**  
6.0 KP

**Workload**  
180 h

**Used in course of study**  
- Fach-Bachelor Biologie > Akzentsetzungsmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule

**Contact person**  
Module responsibility
- Thomas Glatzel

**Authorized examiners**  
- Thomas Glatzel

**Entry requirements**

**Skills to be acquired in this module**

- ++ biological knowledge
- + knowledge of biological working methods
- + interdisciplinary knowledge & thinking
- ++ deepened expertise in biological specialist field
- ++ independent learning and (research-based) working
- ++ data presentation and evidence-based discussion (written and spoken)
- + teamwork
- ++ (scientific) communication skills
- ++ project and time management
- + knowledge of safety and environmental issues

By actively participating in this module the students acquire qualifications in the fields stated below:
- Survey of recent subjects concerning the biology and morphology of aquatic organisms
- Extended knowledge of how morphological characteristics have developed
- Technical skills in preparing and documenting morphological structures
- Knowledge of organizational principles of these structures

**Module contents**

The module serves an extended examination of selected aquatic animals from a functional morphological point of view. Living and fixed animals are investigated and histological preparations are analysed. Thus, the morphology, anatomy, and histology are studied in detail. The biology and ecology of these animals are also considered, which enables the organisms to be studied very intensively and provides an illustrative basis for theoretical discussions.

**Reader's advisory**


GRÜNER, H.-E., 1993: „Der Kaestner“, A., Lehrbuch der speziellen Zoologie. All volumes, Gustav Fischer/Spektrum Akademischer Verlag, Jena, Stuttgart. Many interesting details are found only in these volumes!

GRÜTER, W., 2001: Leben im Meer – Vielfalt und Zusammenhänge. Dr. Friedrich Pfeil Verlag, München. This book arouses your curiosity about the underwater world.

HAYWARD, P. NELSON-SMITH, T., SHIELDS, C. & M. KREMER, 2008: Der neue Kosmos Strandführer - 1500 Arten der Küsten Europas. Franckh-Kosmos Verlag. This coastal guide provides excellent and clearly arranged colour tables for individual groups.


The literature listed above is available in the university library in Wechloy. Further reading will be recommended in the course of the lecture.

Literature inquiry:
- web of science: http://rzblx10.uni-regensburg.de/dbinfo/dbliste.php?bib_id=ubol&colors=7&colors=40&lett=f&gebiete=5 – Data banks(DBIS) - Biology - TOPData banks e.g. ASFA, Science Citation Index, Zoological Record
- http://www.biodiversitylibrary.org/bibliography/14107
- http://scholar.google.de/
- http://www.vnfabio.de

Open access journals: http://www.doaj.org/ - www.plosone.org

**Links**

**Language of instruction**  
German

**Duration (semesters)**  
1 Semester
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<td>Modulart</td>
<td>Wahlpflicht / Elective</td>
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<td>Lern-/Lehrform / Type of program</td>
<td>seminar, exercise</td>
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**Vorkenntnisse / Previous knowledge**

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<td>During the lecture</td>
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**PLEASE NOTE:**
Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

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<td>3.00</td>
<td>WiSe</td>
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<td>WiSe</td>
<td>14 h</td>
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**Total time of attendance for the module**

56 h
bio470 - Marine Biology Field Trip

Module label | Marine Biology Field Trip
--- | ---
Module code | bio470
Credit points | 6.0 KP
Workload | 180 h

Used in course of study
- Fach-Bachelor Biologie > Akzentsetzungsmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule

Contact person
Module responsibility
- Wilko Ahirichs

Authorized examiners
- Wilko Ahirichs
- Alexander Kieneke

Module counseling
- Alexander Kieneke

Entry requirements
Skills to be acquired in this module
- ++ biological knowledge
- ++ knowledge of biological working methods
- ++ biologically relevant knowledge in the natural sciences and mathematics
- + statistics & scientific programming
- + interdisciplinary knowledge & thinking
- + abstract, logical, analytical thinking
- ++ deepened expertise in biological specialist field
- ++ independent learning and (research-based) working
- ++ data presentation and evidence-based discussion (written and spoken)
- + teamwork
- ++ (scientific) communication skills
- + project and time management

On completion of this module students will: have a basic knowledge of the diversity of marine life; understand the fundamental physiochemical and physiological processes underlying the productivity of marine environments; understand the ecological dynamics of marine ecosystems; appreciate the role of humans in disturbing and exploiting marine ecosystems; have developed a critical, analytical approach to scientific research; have developed skills in writing scientific reports and in oral communication of scientific information.

Module contents
Microscopy of marine fauna and flora of the wadden sea; Students are required plan and carry out a research project that exposes them to some of the challenges and problems encountered by field biologists - and some of the techniques that are used to solve these problems. Students have to present a scientific poster and a short oral presentation.

Reader’s advisory
Will be announced in the course.

Links
Language of instruction | German
Duration (semesters) | 1 Semester
Module frequency | annually
Module capacity | 14 (For more applicants than places, a letter of motivation decides on the admission.)

Module level | AS (Akzentsetzung / Accentuation)
Modulart | Wahlpflicht / Elective

Lern-/Lehrform / Type of program
seminar, exercise, excursion

Vorkenntnisse / Previous knowledge

<table>
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<tr>
<th>Examination</th>
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<th>Type of examination</th>
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<td>SuSe</td>
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<tr>
<td>Exercises</td>
<td>2.00</td>
<td>SuSe</td>
</tr>
<tr>
<td>Study trip</td>
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<td>SuSe</td>
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# bio480 - Functional Morphology of Plants

<table>
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<tbody>
<tr>
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<td>Credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
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| Used in course of study | Fach-Bachelor Biologie > Akzentsetzungsmodule  
                      | Master of Education (Gymnasium) Biologie > Mastermodule  
                      | Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule |
| Contact person | Module responsibility  
                      | Gerhard Wolfgang Zotz  
                      | Authorized examiners  
                      | Gerhard Wolfgang Zotz  
                      | Helena Einzmann  
                      | Module counseling  
                      | Helena Einzmann |
| Entry requirements | Skills to be acquired in this module  
                      | ++ biological knowledge  
                      | + knowledge of biological working methods  
                      | + biologically relevant knowledge in the natural sciences and mathematics  
                      | + interdisciplinary knowledge & thinking  
                      | + abstract, logical, analytical thinking  
                      | + deepened expertise in biological specialist field  
                      | + independent learning and (research-based) working |
| Students acquire knowledge in macroscopic and microscopic morphology of plants, always putting form in the context of function |
| Students understand the concepts of allometry and scaling |
| Students put this knowledge in the context of theoretical concepts of ecology and evolution |
| Students learn experimental techniques in diverse topics, e.g. biomechanics or water relations |
| Module contents | V: Functional Morphology of Plants (1 SWS)  
                      | E: Mikroskopy, biomechanical Experiments, Form/Function Experiments regarding water uptake, storage and loss (2 SWS)  
                      | S new studies in the field of functional morphology (1 SWS) |
| Links | Language of instruction: German  
                      | Duration (semesters): 1 Semester  
                      | Module frequency: annually  
                      | Module capacity: 10  
                      | Modullevel: AS (Akzentsetzung / Accentuation)  
                      | Modulart: Wahlpflicht / Elective  
                      | Lern-/Lehrform / Type of program: lecture, seminar, exercise  
                      | Vorkenntnisse / Previous knowledge: Ecology, Flora  
                      | Examination: 1 Portfolio (oral presentation and 1 report)  
                      | Time of examination:  56 h  
                      | Type of examination:  
                      | Final exam of module: 1 Portfolio (oral presentation and 1 report)  
                      | Course type: Lecture  
                      | Comment:  
                      | SWS: 1.00  
                      | Frequency: SuSe  
                      | Workload attendance: 14 h  
                      | Seminar  
                      | Comment:  
                      | SWS: 1.00  
                      | Frequency: SuSe  
                      | Workload attendance: 14 h  
                      | Exercises  
                      | Comment:  
                      | SWS: 2.00  
                      | Frequency: SuSe  
                      | Workload attendance: 28 h  
                      | Total time of attendance for the module: 56 h |
## bio320 - Pollination and Dispersal Biology

<table>
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<tbody>
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<td>Credit points</td>
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<tr>
<td>Workload</td>
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**Used in course of study**
- Fach-Bachelor Biologie > Akzentsetzungsmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule

**Contact person**
- Module responsibility
  - Dirk Carl Albach
- Authorized examiners
  - Dirk Carl Albach
  - Klaus Bernhard von Hagen
- Module counseling
  - Klaus Bernhard von Hagen

**Entry requirements**
- + biological knowledge
- + knowledge of biological working methods
- + abstract, logical, analytical thinking
- + deepened expertise in biological specialist field
- + independent learning and (research-based) working
- + data presentation and evidence-based discussion (written and spoken)
- + teamwork
- + (scientific) communication skills
- + project and time management
- + knowledge of safety and environmental issues

**Extended knowledge of biodiversity and evolution of plants focusing on reproduction, dispersal, germination and establishment of plants**

**Module contents**
- L: Pollination, dispersal, germination of plants, plant breeding
- S: Pollination and dispersal biology of plants in a systematic context
- LC: Pollination, fertilisation, dispersal and germination biological experiments in regard of adaptation to environmental factors

**Reader's advisory**
The course does not follow a special textbook. The following German literature is recommended to students interested in the course: Dieter Heß – Die Blüte, Eugen Ulmer Verlag as well as Leins & Erbar -Blüte und Frucht, Schweizerbart’sche Verlagsbuchhandlung.

**Links**
- Language of instruction: German
- Duration (semesters): 1 Semester
- Module frequency: jährlich
- Module capacity: unlimited
- Modullevel: AS (Akzentsetzung / Accentuation)
- Modulart: Wahlpflicht / Elective

**Lern-/Lehrform / Type of program**
- Vorkenntnisse / Previous knowledge

**Examination**

<table>
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<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
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<tr>
<td>Final exam of module</td>
<td>Four weeks after the end of the exercises at the latest.</td>
<td>1 Portfolio</td>
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PLEASE NOTE:
Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

**Course type**

<table>
<thead>
<tr>
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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tbody>
<tr>
<td>Lecture</td>
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<tr>
<td>Seminar</td>
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<td></td>
<td>14 h</td>
</tr>
<tr>
<td>Practical</td>
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<td>70 h</td>
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**Total time of attendance for the module**

| Total time of attendance for the module | 112 h |
### Module Contents

**Entry requirements**

**Skills to be acquired in this module**

- ++ biological knowledge
- ++ knowledge of biological working methods
- ++ biologically relevant knowledge in the natural sciences and mathematics
- + interdisciplinary knowledge & thinking
- ++ abstract, logical, analytical thinking
- ++ deepened expertise in biological specialist field
- ++ independent learning and (research-based) working
- ++ data presentation and evidence-based discussion (written and spoken)
- + teamwork
- ++ (scientific) communication skills
- + project and time management
- + knowledge of safety and environmental issues

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**Module Contents**

**Reader's advisory**

**Links**

**Language of instruction**

**German**

**Duration (semesters)**

**1 Semester**

**Module frequency**

**jährlich**

**Module capacity**

**unlimited**

**Module level**

**AS (Akzentsetzung / Accentuation)**

**Moduleart**

**Wahlpflicht / Elective**

**Lern-/Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

<table>
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<td>Master of Education: 1 oral exam</td>
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**Course type**

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<td>Exercises</td>
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<tr>
<td>Study trip</td>
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<td>14 h</td>
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**Total time of attendance for the module**

| 126 h |
bio370 - Flora Advanced Plant Biodiversity

Module label: Flora Advanced Plant Biodiversity
Module code: bio370
Credit points: 15.0 KP
Workload: 450 h

Used in course of study:
- Fach-Bachelor Biologie > Akzentsetzungsmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule

Contact person:
Module responsibility:
- Dirk Carl Albach
Authorized examiners:
- Dirk Carl Albach
- Klaus Bernhard von Hagen
Module counseling:
- Klaus Bernhard von Hagen

Entry requirements:
- passed module Flora/Fauna

Skills to be acquired in this module:
- + biological knowledge
- + knowledge of biological working methods
- + deepened expertise in biological specialist field
- + independent learning and (research-based) working
- + data presentation and evidence-based discussion (written and spoken)
- + (scientific) communication skills
- + knowledge of safety and environmental issues

The module is intended to give students in-depth knowledge on plant determination and the diversity of plants. Students shall increase their knowledge on species and learn and improve their abilities in plant determination and plant conservation.

Module contents:
The module comprises a lecture in the Botanical Garden, where plants will be observed and investigated. This includes algae, bryophytes, ferns, gymnosperms and various families of angiosperms.
The seminar is intended to let students study in-depth additional plant families with their typical characters.
The exercises will be used to apply the abilities to plant species in the vicinity of Oldenburg and to practice methods in mapping and surveying plant species.

Reader's advisory:
Rothmaler - Exkursionsflora von Deutschland. Gefäßpflanzen: Grundband

Links:
Language of instruction: German
Duration (semesters): 1 Semester
Module frequency: im 2-Jahres-Zyklus
Module capacity: unlimited
Reference text:
The module will be offered biennially.

Modulart:
je nach Studiengang Pflicht oder Wahlpflicht

Lern-/Lehrform / Type of program:

Vorkenntnisse / Previous knowledge:

Examination:
Type of examination: Portfolio
Time of examination: 

Final exam of module:
PLEASE NOTE:
Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

Course type:
- Lecture
- Exercises
- Seminar

Comment:
- SWS
- Frequency
- Workload attendance

Lecture: 2.00
Exercises: 5.00
Seminar: 3.00

Total time of attendance for the module: 140 h
bio380 - Specific Microbiology

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<tr>
<td>Used in course of study</td>
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<tr>
<td></td>
<td>Master of Education (Gymnasium) Biologie &gt; Mastermodule</td>
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<td></td>
<td>Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
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<tr>
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<td>Module responsibility</td>
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<td></td>
<td>Ralf Andreas Rabus</td>
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<tr>
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<td>Authorized examiners</td>
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<td></td>
<td>Ralf Andreas Rabus</td>
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<tr>
<td></td>
<td>Kathleen Trautwein</td>
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<td>Kathleen Trautwein</td>
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<tr>
<td>Entry requirements</td>
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</tr>
<tr>
<td>Skills to be acquired in this module</td>
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</tr>
<tr>
<td></td>
<td>++ knowledge of biological working methods</td>
</tr>
<tr>
<td></td>
<td>++ biologically relevant knowledge in the natural sciences and mathematics</td>
</tr>
<tr>
<td></td>
<td>++ interdisciplinary knowledge &amp; thinking</td>
</tr>
<tr>
<td></td>
<td>++ abstract, logical, analytical thinking</td>
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<tr>
<td></td>
<td>++ deepened expertise in biological specialist field</td>
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</tr>
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<td></td>
<td>++ data presentation and evidence-based discussion (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>++ knowledge of safety and environmental issues</td>
</tr>
<tr>
<td>Emphasis on:</td>
<td>Theory: Different cultivation strategies (batch, fed-batch, continuous) and physiological interpretation of measuring parameters (growth rates, respiration rates, yield)</td>
</tr>
<tr>
<td></td>
<td>Practice: Knowledge of device and handling of bioreactors including sensor systems</td>
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<tr>
<td>Module contents</td>
<td>Fundamentals of process-controlled cultivation in bioreactors</td>
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<td>Part A: Handling of bioreactors, determination of the KLa??? value (oxygen yield rate)</td>
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<tr>
<td></td>
<td>Part B: Cultivation of marine bacteria under controlled conditions in a bioreactor, balance of metabolic activities</td>
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<tr>
<td>Reader's advisory</td>
<td>Schmauder HP (1994) Methoden der Biotechnologie, Kapitel 3.2.2. Gustav Fischer Verlag Jena</td>
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<td>Links</td>
<td><a href="http://www.icbm.de/ammb/index.html">www.icbm.de/ammb/index.html</a></td>
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<td>Wahlpflicht / Elective</td>
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**Lern-/Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

**Examinaion**  
**Time of examination**  
**Type of examination**

**Final exam of module**  
1 written examination (50%)  
1 record (50%)  

PLEASE NOTE:  
Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

<table>
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<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
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</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>4.00</td>
<td></td>
<td>56 h</td>
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<tr>
<td>Exercises</td>
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**Total time of attendance for the module** 140 h
bio400 - Basic Concepts in Neurobiology I

Module label: Basic Concepts in Neurobiology I
Module code: bio400
Credit points: 15.0 KP
Workload: 450 h

Used in course of study:
- Fach-Bachelor Biologie > Akzentsetzungsmodul
- Fach-Bachelor Mathematik > Nebenfachmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodul

Contact person:
Module responsibility:
- Martin Greschner
- Karl-Wilhelm Koch

Authorized examiners:
- Martin Greschner
- Karl-Wilhelm Koch
- Ulrike Janssen-Bienhold

Module counseling:
- Ulrike Janssen-Bienhold
- Christiane Richter-Landsberg
- Olaf Goldbaum

Entry requirements:
Skills to be acquired in this module:
++ biological knowledge
++ knowledge of biological working methods
+ abstract, logical, analytical thinking
+ deepened expertise in biological specialist field
+ data presentation and evidence-based discussion (written and spoken)

Imparting basic knowledge and relations of neurobiology. Transfer achievement: Preparing scientific records from the results of independent experiments.

Module contents:
In its first part, the lecture (4 H/W) covers the molecular and cellular fundamentals of neurobiology, the electrical processes in nervous cells, the organization and development of the nervous system, its function explained by simple circuits as well as the sensorimotor integration underlying any behaviour.

In the seminar (1 H/W), individual subjects of the lecture are consolidated. In the subsequent block laboratory course (6 H/W), this theoretical knowledge is verified under real-world conditions by simple experiments related to the subjects dealt with in the lecture. Unobjectionable scientific minutes are to be prepared of the experiments and the individual results are to be presented in a seminar paper.

Reader's advisory:

Links:
Language of instruction: German
Duration (semesters): 1 Semester
Module frequency: jährlich
Module capacity: unlimited
Modullevel: AS (Akzentsetzung / Accentuation)
Modulart: Wahlpflicht / Elective

Lern-/Lehrform / Type of program:

Vorkenntnisse / Previous knowledge:

Examination:
Time of examination: 1 written examination, signed minutes

PLEASE NOTE:
Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

Course type:
Comment: SWS
Frequency: Workload attendance
Lecture: 4.00 56 h
Exercises: 6.00 84 h
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Total time of attendance for the module 182 h
bio410 - Basic Concepts in Neurobiology II

Module label: Basic Concepts in Neurobiology II
Module code: bio410
Credit points: 15.0 KP
Workload: 450 h

Used in course of study:
- Fach-Bachelor Biologie > Akzentsetzungsmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule

Contact person:
Module responsibility:
- Georg Martin Klump

Authorized examiners:
- Georg Martin Klump
- Ulrike Langemann
- Christiane Margarete Thiel
- Christine Köppl

Module counseling:
- Ulrike Langemann
- Christiane Margarete Thiel
- Christine Köppl

Entry requirements:

Skills to be acquired in this module:
++ biological knowledge
++ knowledge of biological working methods
+ abstract, logical, analytical thinking
+ deepened expertise in biological specialist field
+ data presentation and evidence-based discussion (written and spoken)

Basic knowledge and relations of sensory science, cognition, and motor functions are imparted. Transfer achievement: Presentation of personal experimental results.

Module contents:
The lecture covers the anatomy and function of simple sensory and motory systems as well as higher cognitive functions. Selected subjects are treated in more detail in the seminar. In the subsequent block practical course, this theoretical knowledge is verified under real-world conditions by simple experiments related to the subjects dealt with in the lecture including data analysis and presentation of results.

Reader's advisory:

Links:

Language of instruction: German
Duration (semesters): 1 Semester
Module frequency: jährlich
Module capacity: unlimited
Modullevel: AS (Akzentsetzung / Accentuation)
Modulart: Wahlpflicht / Elective

Lern-/Lehrform / Type of program:

Vorkenntnisse / Previous knowledge:

Examination:
Written examination in the course of the semester vacation (usually in March)
1 written examination

Type of examination:

Final exam of module:

PLEASE NOTE:
Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

Course type:
- Lecture: 4.00, Frequency: 56 h
- Exercises: 5.00, Frequency: 70 h
- Seminar: 1.00, Frequency: 14 h

Total time of attendance for the module: 140 h
## bio390 - Plant molecular biology and genetics

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Naturwissenschaftliche Grundlagen

bio150 - Statistics for Biologists

Module label: Statistics for Biologists
Module code: bio150
Credit points: 6.0 KP
Workload: 180 h

Used in course of study:
- Fach-Bachelor Biologie > Naturwissenschaftliche Grundlagen
- Zwei-Fächer-Bachelor Biologie > Ergänzungsmodul

Contact person:
Module responsibility
- Jutta Kretzberg

Authorized examiners
- Jutta Kretzberg

Entry requirements:
Skills to be acquired in this module:
- knowledge of biological working methods
- biologically relevant knowledge in the natural sciences and mathematics
- statistics & scientific programming
- interdisciplinary knowledge & thinking
- abstract, logical, analytical thinking
- independent learning and (research-based) working
- data presentation and evidence-based discussion (written and spoken)
- teamwork

Knowledge in applied statistics
- Basic knowledge of programming language R
- Ability to plan, conduct and interpret statistical analysis of biological data

Module contents:
- Introduction to applied statistics - background and application in R:
  Logic, set theory, combinatorics, probability theory, distributions, descriptive statistics, inferential statistics, statistical tests, ANOVA, study design, Bayes' statistics, correlation, regression, curve fitting

Reader's advisory:
- A detailed script for lecture and exercises is available in Stud.IP

Links:
- Language of instruction: German
- Duration (semesters): 1 Semester
- Module frequency: jährlich
- Module capacity: unlimited
- Modullevel: EB (Ergänzungsbereich / Complementary)
- Modulart: Pflicht / Mandatory

Lern-/Lehrform / Type of program
- lecture, excercise

Vorkenntnisse / Previous knowledge

Examination Time of examination Type of examination
Final exam of module within two weeks after lecture time written exam (+15% bonus points from exercises)
Course type Comment SWS Frequency Workload attendance
Lecture 2.00 -- 28 h
Exercises 2.00 -- 28 h

Total time of attendance for the module 56 h
bio251 - Exercises in Biochemistry and Molecular Biology

Module label
Exercises in Biochemistry and Molecular Biology

Module code
bio251

Credit points
6.0 KP

Workload
180 h

Used in course of study
• Fach-Bachelor Biologie > Naturwissenschaftliche Grundlagen
• Zwei-Fächer-Bachelor Biologie > Ergänzungsmodulle

Contact person
Module responsibility
- Alexander Scholten
- Karl-Wilhelm Koch

Authorized examiners
- Alexander Scholten
- Karl-Wilhelm Koch
- Sascha Laubinger
- Arne Nolte

Module counseling
- Sascha Laubinger
- Arne Nolte

Entry requirements
admission of BSc students in Biology

Skills to be acquired in this module
++ biological knowledge
++ knowledge of biological working methods
+ biologically relevant knowledge in the natural sciences and mathematics
+ abstract, logical, analytical thinking
+ data presentation and evidence-based discussion (written and spoken)
+ teamwork
+ knowledge of safety and environmental issues

Module contents
General introduction to principles of laboratory work in Biochemistry and Cell Biology

Reader's advisory
Script

Links

Language of instruction
German

Duration (semesters)
1 Semester

Module frequency

Module capacity
unlimited

Modullevel
EB (Ergänzungsbereich / Complementary)

Modulart
Pflicht / Mandatory

Lern-/Lehrform / Type of program
Biochemistry and Cell Biology

Examination Time of examination Type of examination
Final exam of module during semester written exam; additionally ungraded protocols

Course type Comment SWS Frequency Workload attendance
Seminar 1.00 SuSe 14 h
Exercises 3.00 SuSe 42 h

Total time of attendance for the module
56 h

74 / 85
che101 - Basic Chemistry

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| Used in course of study | - Fach-Bachelor Biologie > Naturwissenschaftliche Grundlagen  
                          - Fach-Bachelor Mathematik > Nebenfachmodule  
                          - Zwei-Fächer-Bachelor Biologie > Ergänzungsmodule |
| Contact person | Module responsibility  
                - Oliver Janka  
                - Alle hier genannten  
                - Thomas Müller  
                - Rüdiger Beckhaus |
| Entry requirements |            |
| Skills to be acquired in this module |            |
| Module contents |            |
| Reader's advisory |            |
| Links |            |
| Language of instruction | German |
| Duration (semesters) | 1 Semester |
| Module frequency | jährlich |
| Module capacity | unlimited |
| Modullevel | BC (Basiscurriculum) |
| Modulart | Pflicht/Wahlpflicht * |
| Lern-/Lehrform / Type of program |            |
| Vorkenntnisse / Previous knowledge |            |
| Examination | Time of examination | Type of examination |
| Final exam of module | written exam (100%) |            |
| Course type | Seminar |            |
| SWS |            |
| Frequency |            |
| Workload attendance | 0 h |
**che102 - Basic Chemistry Laboratory**

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<td>Oliver Janka</td>
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<td>Rainer Koch</td>
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# che190 - Basic Organic Chemistry

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<td>Jens Christoffers</td>
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<td>Gerhard Hilt</td>
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<td>Vorkenntnisse / Previous knowledge</td>
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<td>Final exam of module</td>
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che290 - Experimental Organic Chemistry

Module label: Experimental Organic Chemistry
Module code: che290
Credit points: 6.0 KP
Workload: 180 h

Used in course of study:
- Fach-Bachelor Biologie > Naturwissenschaftliche Grundlagen
- Master of Education (Wirtschaftspädagogik) Chemie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Ergänzungsmodule
- Zwei-Fächer-Bachelor Chemie > Aufbaumodule

Contact person:
Module responsibility:
- Sven Doye
Authorized examiners:
- Jürgen Martens
- Sven Doye
- Jens Christoffers
Module counseling:
- Jürgen Martens
- Jens Christoffers

Entry requirements

Skills to be acquired in this module

Module contents

Reader's advisory

Links

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

Module frequency
Module capacity: unlimited

Modullevel: ---
Modulart: je nach Studiengang Pflicht oder Wahlpflicht

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination: Time of examination
Type of examination: KL

Final exam of module

Course type | Comment | SWS | Frequency | Workload attendance
---|---|---|---|---
Seminar | | 3.00 | | 42 h
Practical | | 3.00 | | 42 h

Total time of attendance for the module: 84 h
mat980 - Mathematics for the Life Sciences

Module label: Mathematics for the Life Sciences
Module code: mat980
Credit points: 6.0 KP
Workload: 180 h

Used in course of study:
- Fach-Bachelor Biologie > Naturwissenschaftliche Grundlagen
- Zwei-Fächer-Bachelor Biologie > Ergänzungsmodule

Contact person:
- Module responsibility
  - Peter Harmand
- Authorized examiners
  - Peter Harmand

Entry requirements
Skills to be acquired in this module
Module contents
Reader's advisory
Links
Language of instruction: German
Duration (semesters): 1 Semester

Module frequency
Module capacity: unlimited
Modulart: je nach Studiengang Pflicht oder Wahlpflicht

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination
Time of examination
Type of examination
Final exam of module
KL

Course type
Comment
SWS
Frequency
Workload attendance

Lecture
3.00
42 h
Exercises
1.00
14 h

Total time of attendance for the module
56 h
phy910 - Physics for Students of Biology and Dual Subject Chemistry

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<td>Manuela Schiek</td>
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<td>SWS</td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td></td>
</tr>
<tr>
<td>Workload attendance</td>
<td>0 h</td>
</tr>
</tbody>
</table>
**bio250 - Biochemistry**

<table>
<thead>
<tr>
<th>Module label</th>
<th>Biochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio250</td>
</tr>
<tr>
<td>Credit points</td>
<td>6.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>180 h</td>
</tr>
</tbody>
</table>

**Used in course of study**
- Fach-Bachelor Biologie > Naturwissenschaftliche Grundlagen
- Zwei-Fächer-Bachelor Biologie > Ergänzungsmodule

**Contact person**
- Module responsibility
  - Karl-Wilhelm Koch
- Authorized examiners
  - Karl-Wilhelm Koch
  - Alexander Scholten
- Module counseling
  - Alexander Scholten

**Entry requirements**
++ biological knowledge
++ knowledge of biological working methods
+ biologically relevant knowledge in the natural sciences and mathematics
++ abstract, logical, analytical thinking
+ independent learning and (research-based) working
++ data presentation and evidence-based discussion (written and spoken)
++ teamwork
+ (scientific) communication skills
+ project and time management
+ knowledge of safety and environmental issues

The students have a survey of the arrangement, function, and biosynthesis of the most important substance classes and metabolic processes, learn basic experimental methods of biochemistry and are able to present and interpret experimental results.

**Module contents**
The module gives an introduction to conceptions and methods of biochemistry.

**Reader's advisory**
General textbooks of Biochemistry, e.g.:
- Biochemie, Müller-Esterl
- Biochemie, Lubert Stryer
- Lehninger Prinzipien der Biochemie, David L. Nelson und Michael M. Cox
- Principles of Biochemistry, Horton et al.

**Links**

**Language of instruction**
German

**Duration (semesters)**
1 Semester

**Module frequency**
jährlich

**Module capacity**
unlimited

**Modullevel**
EB (Ergänzungsbereich / Complementary)

**Modulart**
Wahlpflicht / Elective

**Lern-/Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

**Examination**

<table>
<thead>
<tr>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written examination following the end of lectures or end of the semester.</td>
<td>1 written examination signed minutes</td>
</tr>
</tbody>
</table>

**PLEASE NOTE:**
Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

**Course type**

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>2.00</td>
<td></td>
<td>28 h</td>
</tr>
<tr>
<td>Tutorial</td>
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<td>0.00</td>
<td>WiSe</td>
<td>0 h</td>
</tr>
<tr>
<td>Seminar</td>
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<td>1.00</td>
<td>WiSe</td>
<td>14 h</td>
</tr>
<tr>
<td>Practical</td>
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<td>2.00</td>
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<td>28 h</td>
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<td>Course type</td>
<td>Comment</td>
<td>SWS</td>
<td>Frequency</td>
<td>Workload attendance</td>
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<tr>
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<td><strong>Total time of attendance for the module</strong></td>
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<td>70 h</td>
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</table>
**Abschlussmodul**

**bam - Bachelor’s Thesis Module**

<table>
<thead>
<tr>
<th>Module label</th>
<th>Bachelor’s Thesis Module</th>
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<tbody>
<tr>
<td>Module code</td>
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<tr>
<td>Credit points</td>
<td>15.0 KP</td>
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<td>Workload</td>
<td>450 h</td>
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<td>Used in course of study</td>
<td>Fach-Bachelor Biologie &gt; Abschlussmodul</td>
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<tr>
<td>Contact person</td>
<td></td>
</tr>
<tr>
<td>Entry requirements</td>
<td></td>
</tr>
<tr>
<td>Skills to be acquired in this module</td>
<td>++ biological knowledge</td>
</tr>
<tr>
<td></td>
<td>++ knowledge of biological working methods</td>
</tr>
<tr>
<td></td>
<td>+ statistics &amp; scientific programming</td>
</tr>
<tr>
<td></td>
<td>+ abstract, logical, analytical thinking</td>
</tr>
<tr>
<td></td>
<td>++ deepened expertise in biological specialist field</td>
</tr>
<tr>
<td></td>
<td>++ independent learning and (research-based) working</td>
</tr>
<tr>
<td></td>
<td>++ data presentation and evidence-based discussion (written and spoken)</td>
</tr>
<tr>
<td></td>
<td>+ (scientific) communication skills</td>
</tr>
<tr>
<td></td>
<td>++ project and time management</td>
</tr>
</tbody>
</table>

**Module contents**

**Reader's advisory**

**Links**

**Languages of instruction**

Duration (semesters) 1 Semester

**Module frequency**

Module capacity unlimited

**Modullevel** Abschlussmodul (Abschlussmodul / Conclude)

**Modulart** Pflicht / Mandatory

**Lern-Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

**Examination**

<table>
<thead>
<tr>
<th>Final exam of module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor’s thesis (12 CP) and accompanying seminar (3 CP)</td>
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**Course type** Seminar

**SWS**

**Frequency**

<table>
<thead>
<tr>
<th>Workload attendance</th>
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</thead>
<tbody>
<tr>
<td>0 h</td>
</tr>
</tbody>
</table>
Frühere Module
che100 - Introduction to Chemistry

Module label: Introduction to Chemistry
Module code: che100
Credit points: 12.0 KP
Workload: 360 h

Used in course of study:
- Fach-Bachelor Biologie > Frühere Module
- Fach-Bachelor Chemie > Basismodule
- Zwei-Fächer-Bachelor Biologie > Frühere Module
- Zwei-Fächer-Bachelor Chemie > Basismodule

Contact person:
Module responsibility:
- Thomas Müller
- Rüdiger Beckhaus

Authorized examiners:
- Rüdiger Beckhaus
- Thomas Müller

Module counseling:
- Lena Albers

Entry requirements

Skills to be acquired in this module

Module contents

Reader's advisory

Links

Language of instruction: German

Duration (semesters): 1 Semester

Module frequency

Module capacity: unlimited

Module level: ---

Modulart: je nach Studiengang Pflicht oder Wahlpflicht

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination:

Time of examination

Type of examination

Final exam of module

Course type
Lecture
Exercises
Practical
Seminar

Comment
KL
KL
KL

SWS
4.00
1.00
6.00

Frequency

KL
KL
KL

KL

Workload attendance
56 h
14 h
84 h
0 h

Total time of attendance for the module: 154 h