# 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>
</tr>
<tr>
<td>Credit points</td>
<td>12.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>360 h</td>
</tr>
</tbody>
</table>
| Used in course of study | Fach-Bachelor Biologie > Basismodule  
|               | Fach-Bachelor Mathematik > Nebenfachmodule  
|               | Zwei-Fächer-Bachelor Biologie > Basismodule |
| 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

**Modulart**

je nach Studiengang Pflicht oder Wahlpflicht

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

**Vorkenntnisse / Previous knowledge**

**Examination**

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

**Course type**

Lecture

**Comment**

8.00

**SWS**

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>
<td></td>
<td>0.00</td>
<td>WiSe</td>
<td>0 h</td>
</tr>
<tr>
<td>Seminar</td>
<td></td>
<td>0.00</td>
<td>SuSe and WiSe</td>
<td>0 h</td>
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</table>

**Total time of attendance for the module**  
112 h
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
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
```markdown
Links
Language of instruction: German
Duration (semesters): 1 Semester
Module frequency: jährlich
Module capacity: unlimited
Module level: BC (Basiscurriculum / Base curriculum)
Module type: 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>Lecture</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2.00</td>
<td></td>
<td>28 h</td>
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<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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Total time of attendance for the module: 84 h
```
bio230 - Microbiology and Cell Biology

<table>
<thead>
<tr>
<th>Module label</th>
<th>Microbiology and Cell Biology</th>
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</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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</table>
| Used in course of study | • Fach-Bachelor Biologie > Basismodule  
|                     | • Zwei-Fächer-Bachelor Biologie > Basismodule                   |
| Contact person     | Module responsibility  
|                    | • Ralf Andreas Rabus                                             |
|                    | Authorized examiners:  
|                    | • Ralf Andreas Rabus                                             
|                    | • Hans Gerd Nothwang                                             
|                    | • Maike Claußen                                                  |
|                    | Module counseling:  
|                    | • Maike Claußen                                                  |
| 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; prokaryotic 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              | Language of instruction: German                                  |
|                    | Duration (semesters): 1 Semester                                  |
|                    | Module frequency: jährlich                                       |
|                    | Module capacity: unlimited                                       |
|                    | Modulelevel: BC (Basicscurriculum / Base curriculum)             |
|                    | Modulart: Pflicht / Mandatory                                    |
|                    | Lern-/Lehrform / Type of program:                                |
|                    | Vorkenntnisse / Previous knowledge:                              |
| Examination        | Time of examination: Written examination in the final week of the current part |
|                    | Type of examination: 1 written examination (50%) following the part |
|                    | Microbiology: 1 written examination (50%) following the part Cell Biology |
|                    | Records are collected following every course day.               |
| 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:                                            |

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<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>
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<tr>
<td>Lecture</td>
<td></td>
<td>4.00</td>
<td></td>
<td>56 h</td>
</tr>
<tr>
<td>Exercises</td>
<td></td>
<td>2.00</td>
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<td>28 h</td>
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<td></td>
<td></td>
<td></td>
<td><strong>84 h</strong></td>
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bio215 - Introduction to Biology

<table>
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<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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<tr>
<td>Used in course of study</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fach-Bachelor Biologie &gt; Basismodule</td>
</tr>
<tr>
<td></td>
<td>Fach-Bachelor Mathematik &gt; Nebenfachmodule</td>
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<td></td>
<td>Zwei-Fächer-Bachelor Biologie &gt; Basismodule</td>
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<tr>
<td>Contact person</td>
<td>Module responsibility</td>
</tr>
<tr>
<td></td>
<td>Gabriele Gerlach</td>
</tr>
<tr>
<td></td>
<td>Christine Köppl</td>
</tr>
<tr>
<td>Authorized examiners</td>
<td>Gabriele Gerlach</td>
</tr>
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<td></td>
<td>Christine Köppl</td>
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<td>Gerhard Wolfgang Zotz</td>
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<td>Ulrike Sienknecht</td>
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<td>Module counseling</td>
<td>Gerhard Wolfgang Zotz</td>
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<tr>
<td></td>
<td>Ulrike Sienknecht</td>
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<tr>
<td>Entry requirements</td>
<td>++ biological knowledge</td>
</tr>
<tr>
<td></td>
<td>+ knowledge of techniques in biology</td>
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<tr>
<td></td>
<td>++ biologically relevant knowledge in the natural sciences and mathematics</td>
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<tr>
<td></td>
<td>+ cross-disciplinary knowledge and thinking</td>
</tr>
<tr>
<td>Module contents</td>
<td>Lecture conveys knowledge in</td>
</tr>
<tr>
<td></td>
<td>evolution, ecology and biodiversity (WiSe)</td>
</tr>
<tr>
<td></td>
<td>animal physiology and developmental biology (SoSe)</td>
</tr>
<tr>
<td>Reader's advisory</td>
<td>Campbell et al. &quot;Biologie&quot;, Pearson</td>
</tr>
<tr>
<td></td>
<td>Sadava et al. &quot;Purves, Biologie&quot;, Springer</td>
</tr>
<tr>
<td>Links</td>
<td>Language of instruction</td>
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<tr>
<td></td>
<td>Duration (semesters)</td>
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<td>Module frequency</td>
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<tr>
<td></td>
<td>Module capacity</td>
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<tr>
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<td>Modullevel</td>
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<tr>
<td></td>
<td>Modulart</td>
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<tr>
<td></td>
<td>Lern-/Lehrform / Type of program</td>
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<tr>
<td></td>
<td>Vorkenntnisse / Previous knowledge</td>
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<tr>
<td></td>
<td>Examination</td>
</tr>
<tr>
<td>Final exam of module</td>
<td>lecture-free periods after each series</td>
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<tr>
<td>Course type</td>
<td>Comment</td>
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<tr>
<td>Lecture</td>
<td>6.00</td>
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<tr>
<td>Seminar</td>
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<tr>
<td>Tutorial</td>
<td>0.00</td>
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<tr>
<td>Total time of attendance for the module</td>
<td>84 h</td>
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</table>
Bio233 - Basics in Microbiology and Genetics

Module label: Basics in Microbiology and Genetics
Module code: bio233
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:
- Ralf Andreas Rabus
Authorized examiners:
- Ralf Andreas Rabus
- Maike Claußen
Module counseling:
- Maike Claußen

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
- + deepened expertise in biological specialist field
- + independent learning and (research-based) working

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
Course type: Comment: SWS: Frequency: Workload attendance
Lecture: 4.00: SuSe or WiSe: 56 h
Tutorial: 0.00: SuSe and WiSe: 0 h

Total time of attendance for the module: 56 h
### bio236 - Basics in Biochemistry and Cell Biology

<table>
<thead>
<tr>
<th><strong>Module label</strong></th>
<th>Basics in Biochemistry and Cell Biology</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module code</strong></td>
<td>bio236</td>
</tr>
<tr>
<td><strong>Credit points</strong></td>
<td>6.0 KP</td>
</tr>
<tr>
<td><strong>Workload</strong></td>
<td>180 h</td>
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| **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, signaling 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:  

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

#### Course type
- Lecture

<table>
<thead>
<tr>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.00</td>
<td>WiSe</td>
<td>56 h</td>
</tr>
</tbody>
</table>
bio239 - Didactical Excercises and Genetics

Module label: Didactical Excercises and Genetics
Module code: bio239
Credit points: 6.0 KP
Workload: 180 h
Used in course of study: Zwei-Fächer-Bachelor Biologie > Basismodule

Contact person
Module responsibility
- Corinna Hößle
- Birgit Weusmann

Authorized examiners
- Corinna Hößle
- Birgit Weusmann
- Ulrich Kapteina
- Edgar Knapp
- Isabelle Plewka
- Maike Claußen

Module counseling
- Ulrich Kapteina
- Edgar Knapp
- Isabelle Plewka
- Maike Claußen

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: 4 x 16 Studierende
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 | KL
Course type | Comment | SWS | Frequency | Workload attendance
---|---|---|---|---
Lecture | | 2.00 | SuSe or WiSe | 28 h
Seminar | | 2.00 | SuSe or WiSe | 28 h

Total time of attendance for the module: 56 h
Aufbaumodule

bio100 - Introduction into Didactics of Biology

<table>
<thead>
<tr>
<th>Module label</th>
<th>Introduction into Didactics of Biology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio100</td>
</tr>
<tr>
<td>Credit points</td>
<td>6.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>180 h</td>
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</table>

**Used in course of study**
- Master of Education (Sonderpädagogik) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Aufbaumodule

**Contact person**
- Module responsibility
  - Corinna Hößle
- Authorized examiners
  - Corinna Hößle
  - Wiebke Rathje
  - Bianca Kuhlemann
- Module counseling
  - Wiebke Rathje

**Entry requirements**
- Skills to be acquired in this module
  - Skills taught by this module:
    The students will be introduced to the basics of didactics of biology. In the beginning the focus will lie on the standards of education and school-curriculums. Afterwards scientific methods, different methods of education, media, social forms and the culture of problem solving in biological classes will be reflected and realized by concrete examples out of everyday practice (micro-teaching). During the second half of the module the students will be able to conceive and reflect own concepts of teaching. Furthermore the possibilities of studying in out-of-school-facilities will be fathomed, excursions planned, realized and reflected.

**Importance of this module during the studies:**
- Teaching skills for all fields of study (compulsory subject for following degrees: teaching post in primary school (Grundschule), extended elementary school (Hauptschule) and secondary school (Realschule)).

**Module contents**
- 3. semester: seminar
  - Introduction to curricular standards, media, methods, social forms, concepts of pupils, instruments of diagnosis, natural scientific methods, culture of exercises in biological classes. Construction of teaching that considers social matters and the environment of the pupils.
- 4. semester: seminar and excursions
  - Forms and places for teaching biology, methods and media for teaching biological contents in different spheres of activity (scientific museums, botanical and zoological gardens, regional environmental centers, the Wadden Sea national park).

**Reader's advisory**

**Links**
- Language of instruction: German
- Duration (semesters): 2 Semester
- Module frequency: jährlich
- Module capacity: unlimited
- Modulelevel: AM (Aufbaumodul)
- Modular: Pflicht

**Lern-/Lehrform / Type of program**
- Vorkenntnisse / Previous knowledge
- Examination / Time of examination
  - Final exam of module: Papers have to be presented or handed in: one week after the end of the course
  - Type of examination: 1 Presentation (50%), 1 oral exam (50%)

**Course type**
- Seminar

**SWS**
- 4.00

**Frequency**
Workload attendance

56 h
bio110 - Practical Biology Experiments for Science Education

Module label                  Practical Biology Experiments for Science Education
Module code                   bio110
Credit points                 6.0 KP
Workload                      180 h
Used in course of study       • Master of Education (Gymnasium) Biologie > Mastermodule
                                 • Master of Education (Sonderpädagogik) Biologie > Mastermodule
                                 • Zwei-Fächer-Bachelor Biologie > Aufbaumodule
Contact person
  Module responsibility
  Corinna Hößle
  N. N.
  Authorized examiners
  Corinna Hößle
  Wiebke Rathje
  Module counceling
  Wiebke Rathje

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                    MM (Mastermodul)
Modulart                      Ergänzung/Professionalisierung

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination

Time of examination

Type of examination

Final exam of module

Course type

Comment

SWS

Frequency

Workload attendance

Seminar

2.00

28 h

Practical

3.00

42 h

Total time of attendance for the module 70 h
## Bio245 - Flora and Fauna

<table>
<thead>
<tr>
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<th>Flora and Fauna</th>
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</thead>
<tbody>
<tr>
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<td>bio245</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>
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<tr>
<td></td>
<td>• Master of Education (Sonderpädagogik) Biologie &gt; Mastermodule</td>
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<td>• Zwei-Fächern-Bachelor Biologie &gt; Aufbaumodule</td>
</tr>
<tr>
<td>Contact person</td>
<td>Module responsibility</td>
</tr>
<tr>
<td></td>
<td>• Dirk Carl Albach</td>
</tr>
<tr>
<td></td>
<td>• Thomas Glatzel</td>
</tr>
<tr>
<td>Authorized examiners</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Dirk Carl Albach</td>
</tr>
<tr>
<td></td>
<td>• Thomas Glatzel</td>
</tr>
<tr>
<td></td>
<td>• Klaus Bernhard von Hagen</td>
</tr>
<tr>
<td>Module counseling</td>
<td>Klaus Bernhard von Hagen</td>
</tr>
</tbody>
</table>

### 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:** ---
- **Modulart:** je nach Studiengang Pflicht oder Wahlpflicht

### 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>
<tbody>
<tr>
<td>Final exam of module</td>
<td>Botany: Written examination before the end of the lecture</td>
<td>1 written examination (Botany 50 %)</td>
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<tr>
<td></td>
<td>Zoology: Written examination before the end of the lecture</td>
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<tr>
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**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>
</tr>
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<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>Study trip</td>
<td></td>
<td>1.00</td>
<td></td>
<td>14 h</td>
</tr>
<tr>
<td>Total time of attendance for the module</td>
<td></td>
<td></td>
<td></td>
<td>98 h</td>
</tr>
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</table>
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

Type of examination: 1 written examination

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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<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>2.00</td>
<td>WiSe</td>
<td>28 h</td>
</tr>
<tr>
<td>Seminar</td>
<td></td>
<td>1.00</td>
<td>WiSe</td>
<td>14 h</td>
</tr>
<tr>
<td>Practical</td>
<td></td>
<td>4.00</td>
<td>WiSe</td>
<td>56 h</td>
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</tbody>
</table>

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
Modulelevel | 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
---|---|---|---|---
<table>
<thead>
<tr>
<th>Course type</th>
<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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<td>4.00</td>
<td>WiSe</td>
<td>56 h</td>
</tr>
<tr>
<td>Exercises</td>
<td></td>
<td>2.00</td>
<td>WiSe</td>
<td>28 h</td>
</tr>
</tbody>
</table>

**Total time of attendance for the module** 84 h
bio285 - Plant Physiology, Molecular Biology and Biotechnology

Module label: Plant Physiology, Molecular Biology and Biotechnology
Module code: bio285
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:
- Sascha Laubinger

Authorized examiners:
- Sascha Laubinger

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
- + independent learning and (research-based) working
- + teamwork
- + (scientific) communication skills

Module contents:

Reader's advisory:

Links:

Language of instruction: German
Duration (semesters): 1 Semester
Module frequency: jährlich
Module capacity: 32
Modullevel: AC (Aufbaucurriculum / Composition)
Modulart: Wahlpflicht / Elective
Lern-/Lehrform / Type of program: lecture, seminar, exercise

Vorkenntnisse / Previous knowledge:

Examination:

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<th>Type of examination</th>
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<td>Lecture</td>
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<tr>
<td>Seminar</td>
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Final exam of module:

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</thead>
<tbody>
<tr>
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<td>2.00</td>
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<td>28 h</td>
</tr>
<tr>
<td>Seminar</td>
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<td>1.00</td>
<td>SuSe</td>
<td>14 h</td>
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<td>Practical</td>
<td></td>
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<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 counseling:
- 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

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:

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:

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<td>Written examination (100%), ungraded presentation, protocol</td>
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<th>Frequency</th>
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<td>3.00</td>
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<td>42 h</td>
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<tr>
<td>Seminar</td>
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<td>1.50</td>
<td>WiSe</td>
<td>21 h</td>
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Total time of attendance for the module: 84 h
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:
- ++ 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
- Module level: AC (Aufbaucurriculum / Composition)
- Moduleart: Wahlpflicht / Elective

Lern-/Lehrform / Type of program:
- Lecture, exercise

Vorkenntnisse / Previous knowledge:

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<th>Time of examination</th>
<th>Type of examination</th>
<th>Workload attendance</th>
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<tbody>
<tr>
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<td>exam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course type</td>
<td>Comment</td>
<td>SWS</td>
<td>Frequency</td>
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<tr>
<td>Lecture</td>
<td>1.50</td>
<td>WiSe</td>
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<tr>
<td>Exercises</td>
<td>4.50</td>
<td>WiSe</td>
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<tr>
<td>Total time of attendance for the module</td>
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Akzentsetzungsmodule

bio300 - Evolutionary Biology

Module label: Evolutionary Biology
Module code: bio300
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
- 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

Introduction to both microevolution (speciation and species concepts, adaptation and selection, behavioural ecology, reproduction systems) and macroevolution.
Introduction to phylogenetics (phyloinformatics, molecular systematics, phylogeography).

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

Examination

Type of examination:
- Final exam of module
  - Written examination in the final week of the semester or in the first week following the lecture
  - Written examination (60%)
  - Portfolio (40%)
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**PLEASE NOTE:**
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<table>
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<th>Course type</th>
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<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tr>
<td>Lecture</td>
<td></td>
<td>2.00</td>
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<td>28 h</td>
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<tr>
<td>Exercises</td>
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<td>6.00</td>
<td></td>
<td>84 h</td>
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<td>Seminar</td>
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<td>2.00</td>
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<td>28 h</td>
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**Total time of attendance for the module**
140 h
bio310 - General Ecology

Module label General Ecology
Module code bio310
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
- Helmut Hillebrand

Authorized examiners
- Helmut Hillebrand
- Rolf Niedringhaus
- Rainer Buchwald
- Gerhard Wolfgang Zotz
- Peter Schupp
- Sven Rohde
- Maren Striebel

Module counseling
- Rolf Niedringhaus
- Rainer Buchwald
- Gerhard Wolfgang Zotz
- Peter Schupp
- Sven Rohde
- Maren Striebel

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)
+ (scientific) communication skills

Module contents

Reader's advisory

Links

Language of instruction German
Duration (semesters) 2 Semester
Module frequency jährlich
Module capacity unlimited
Modullevel AS (Akzentsetzung / Accentuation)
Modulart Wahlpflicht / Elective

Lern-/Lehrform / Type of program

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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| Final exam of module

<table>
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<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>2.00</td>
<td></td>
<td></td>
<td>28 h</td>
</tr>
<tr>
<td>Seminar</td>
<td>1.00</td>
<td></td>
<td></td>
<td>14 h</td>
</tr>
<tr>
<td>Practical</td>
<td>3.00</td>
<td></td>
<td></td>
<td>42 h</td>
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Total time of attendance for the module 84 h
bio320 - Pollination and Dispersal Biology

Module label: Pollination and Dispersal Biology
Module code: bio320
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:
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
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: Time of examination: Type of examination: 1 Portfolio
Final exam of module: Four weeks after the end of the exercises at the latest.

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: 28 h
Seminar: 1.00: 14 h: 14 h
Practical: 5.00: 70 h: 70 h
Total time of attendance for the module: 112 h
bio330 - Marine Ecology

Module label | Marine Ecology
--- | ---
Module code | bio330
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
- Helmut Hillebrand

Authorized examiners
- Helmut Hillebrand
- Stefanie Moorthi

Module counseling
- Stefanie Moorthi

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

Basic knowledge and practical experience in biological oceanography
Apply theoretical concepts from different fields in marine ecology
Analyse, present, and interpret results from the marine ecological literature and own investigations
Acknowledge the importance of general ecological concepts for ecosystem management
Gain experience in the application of field and lab methods in ecology

Module contents
Lecture Biological Oceanography
2 SWS = 3 CP. Presence time 24 h, additional study time 66h, winter-term
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.

Exercise Concepts in marine ecology
6 SWS = 9 CP. Presence time 70 h, additional study time 200h, winter-term
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.

Lecture Marine Ecology
2 SWS = 3 CP. Presence time 24 h, additional study time 66h, winter-term
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.

Reader's advisory
U. Sommer, Biologische Meereskunde, Springer Verlag, Heidelberg.

Links

Language of instruction | German
Duration (semesters) | 2 Semester
Module frequency | jährlich
Module capacity | unlimited
Modullevel | AS (Akzentsetzung / Accentuation)
Modulart | Wahlpflicht / Elective
### 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>
<td>Final exam of module</td>
<td>Written exam at the end of the Lecture Marine Ecology</td>
<td>1 written exam (Lecture) (50%), 1 oral presentation (Exercise) (50%)</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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<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>4.00</td>
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<tr>
<td>Exercises</td>
<td></td>
<td>6.00</td>
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**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:
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

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: Wahlplicht / 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>
</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>5.00</td>
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<td>70 h</td>
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<tr>
<td>Seminar</td>
<td></td>
<td>2.00</td>
<td></td>
<td>28 h</td>
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</table>

Total time of attendance for the module: 126 h
bio350 - Organismic Microanatomy

Module label: Organismic Microanatomy
Module code: bio350
Credit points: 15.0 KP
Workload: 450 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:
- Wilko Ahlrichs
Authorized examiners:
- Wilko Ahlrichs
- Mona Hoppenrath
- Alexander Kieneke
Module counseling:
- Mona Hoppenrath
- 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
++ 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

Module contents:

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
Type of examination
Final exam of module
Bachelor: 1 Portfolio
Master of Education: 1 oral exam

Course type:
Comment
SWS
Frequency
Workload attendance
Lecture
3.00
Frequency
42 h
Exercises
5.00
Frequency
70 h
Study trip
1.00
Frequency
14 h

Total time of attendance for the module:
126 h
bio360 - Marine Biodiversity

Module label: Marine Biodiversity
Module code: bio360
Credit points: 15.0 KP
Workload: 450 h

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

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
* Keeping organisms – field study
* 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, lenitic), 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:
HIGGINS, R.P. & H., THIEL, 1988: Introduction to the Study of Meiofauna. Smithsonian Institution Press,

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
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.
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  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  5.00  70 h
Seminar  3.00  42 h
Total time of attendance for the module  140 h
**bio380 - Specific Microbiology**

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<td>Fach-Bachelor Biologie &gt; Akzentsetzungsmodule</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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<tr>
<td></td>
<td>- Ralf Andreas Rabus</td>
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<td>- Kathleen Trautwein</td>
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<tr>
<td></td>
<td>- Kathleen Trautwein</td>
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<td>Entry requirements</td>
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<td>Skills to be acquired in this module</td>
<td></td>
</tr>
<tr>
<td>++ biological knowledge</td>
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<tr>
<td>++ knowledge of biological working methods</td>
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<tr>
<td>++ biologically relevant knowledge in the natural sciences and mathematics</td>
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<tr>
<td>* interdisciplinary knowledge &amp; thinking</td>
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<tr>
<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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<tr>
<td>++ teamwork</td>
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<tr>
<td>* project and time management</td>
<td></td>
</tr>
<tr>
<td>* knowledge of safety and environmental issues</td>
<td></td>
</tr>
</tbody>
</table>

**Emphasis on:**
- Theory: Different cultivation strategies (batch, fed-batch, continuous) and physiological interpretation of measuring parameters (growth rates, respiration rates, yield)
- Practice: Knowledge of device and handling of bioreactors including sensor systems

**Module contents**
- Fundamentals of process-controlled cultivation in bioreactors
- Part A: Handling of bioreactors, determination of the kLa?? value (oxygen yield rate)
- Part B: Cultivation of marine bacteria under controlled conditions in a bioreactor, balance of metabolic activities

**Reader’s advisory**
- Schmauder HP (1994) Methoden der Biotechnologie, Kapitel 3.2.2. Gustav Fischer Verlag Jena

**Links**
- www.icbm.de/ammb/index.html

**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**

<table>
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<th>Examination</th>
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<th>Type of examination</th>
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<tbody>
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<td>Final exam of module</td>
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<td>1 record (50%)</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>
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<th>Comment</th>
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<td>Lecture</td>
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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 > Akzentsetzungsmodule
- Fach-Bachelor Mathematik > Nebenfachmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule

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 Type of examination
Final exam of module 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
<table>
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<tr>
<td>Tutorial</td>
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<td>Seminar</td>
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<td>1.00</td>
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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 motor 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:

Type of examination:

Final exam of module:

Written examination in the course of the semester vacation (usually in March)

Type of examination:

1 written examination

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:
4.00
5.00
1.00

SWS:
56 h
70 h
14 h

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

<table>
<thead>
<tr>
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<th>Plant molecular biology and genetics</th>
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<tr>
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<td>Credit points</td>
<td>15.0 KP</td>
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<tr>
<td>Workload</td>
<td>450 h</td>
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| Used in course of study | • Fach-Bachelor Biologie > Akzentsetzungsmodule  
|                     | • Master of Education (Gymnasium) Biologie > Mastermodule  
|                     | • Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule                   |
| Contact person     | Sascha Laubinger                                                         |
| Authorized examiners| Sascha Laubinger                                                         |
| Entry requirements | Sascha Laubinger                                                         |
| Skills to be acquired in this module | Sascha Laubinger                                                         |
| Module contents    | Sascha Laubinger                                                         |
| Reader's advisory  | Sascha Laubinger                                                         |
| Languages of instruction | German, English                                                          |
| Duration (semesters) | 1 Semester                                                               |
| Module frequency   | Sascha Laubinger                                                         |
| Module capacity    | 12 (16)                                                                  |
| Modulelevel        | Sascha Laubinger                                                         |
| Modularart         | Sascha Laubinger                                                         |
| Lern-/Lehrform / Type of program | Sascha Laubinger                                                         |
| Vorkenntnisse / Previous knowledge | Sascha Laubinger                                                         |
| Examination        | Sascha Laubinger                                                         |
| Time of examination| Sascha Laubinger                                                         |
| Type of examination| Sascha Laubinger                                                         |
| Final exam of module | Sascha Laubinger                                                         |
| Course type        | Sascha Laubinger                                                         |
| Comment            | Sascha Laubinger                                                         |
| SWS                | Sascha Laubinger                                                         |
| Frequency          | Sascha Laubinger                                                         |
| Workload attendance| Sascha Laubinger                                                         |

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| Total time of attendance for the module | 140 h |

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</table>

| Duration (semesters) | 1 Semester |
| Module frequency     | Sascha Laubinger |
| Module capacity       | 12 (16) |
| Modulelevel           | Sascha Laubinger |
| Modularart            | Sascha Laubinger |

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<tr>
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<tr>
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<thead>
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<th>Comment</th>
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<td></td>
<td>3.00</td>
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<tr>
<td>Seminar</td>
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<td>3.00</td>
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<td>42 h</td>
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<td>WiSe</td>
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| Total time of attendance for the module | 140 h |

<table>
<thead>
<tr>
<th>Language of instruction</th>
<th>Sascha Laubinger</th>
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<tbody>
<tr>
<td>German, English</td>
<td>Sascha Laubinger</td>
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</table>

| Duration (semesters) | 1 Semester |
| Module frequency     | Sascha Laubinger |
| Module capacity       | 12 (16) |
| Modulelevel           | Sascha Laubinger |
| Modularart            | Sascha Laubinger |
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 > 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:
- 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 Ullmers 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)

Module type: Wahlpflicht / Elective

Lern- / Lehrlform / Type of program: lecture, seminar

Vorkenntnisse / Previous knowledge:

Examination: Time of examination: Type of examination: portfolio

Final exam of module:

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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tr>
<td>Lecture</td>
<td></td>
<td>2.00</td>
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<tr>
<td>Seminar</td>
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<td>2.00</td>
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Total time of attendance for the module: 56 h
# bio326 - Pollination and Dispersal - Methods

**Module label**: Pollination and Dispersal - Methods  
**Module code**: bio326  
**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**  
- 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**  
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**: The module will be offered every other year  
**Module capacity**: 12  
**Modullevel**: AS (Akzentsetzung / Accentuation)  
**Modulart**: Wahlpflicht / Elective  
**Lern-/Lehrform / Type of program**: exercise  

**Vorkenntnisse / Previous knowledge**

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

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<th>Portfolio</th>
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**Course type**  
Exercises

**SWS**  
4.00

**Frequency**  
SuSe

**Workload attendance**  
56 h
bio327 - Pollination and Dispersal - Methods not just for Schools

<table>
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<tr>
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<tr>
<td>Module code</td>
<td>bio327</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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**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
- Module capacity: 12
- Modullevel: AS (Akzentsetzung / Accentuation)
- Modulart: Wahlpflicht / Elective
- Lern-/Lehrform / Type of program: exercise

**Vorkenntnisse / Previous knowledge**

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<td>portfolio</td>
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**Course type**
- Exercises

**SWS**
- 6.00

**Frequency**
- SuSe

**Workload attendance**
- 84 h
bio355 - Microscopical Anatomy

<table>
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<tr>
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<tbody>
<tr>
<td>Module code</td>
<td>bio355</td>
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<tr>
<td>Credit points</td>
<td>9.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>270 h</td>
</tr>
</tbody>
</table>
| Used in course of study      | • Fach-Bachelor Biologie > Akzentsetzungsmodulle  
• Fach-Bachelor Mathematik > Nebenfachmodule  
• Master of Education (Gymnasium) Biologie > Mastermodule  
• Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodulle |
<p>| Contact person               | Module responsibility                   |
|                              | • Wilko Ahlrichs                        |
| Authorized examiners         | • Wilko Ahlrichs                        |
|                              | • Alexander Kieneke                    |
|                              | • Mona Hoppenrath                      |
| Module counseling            | • Alexander Kieneke                    |
|                              | • Mona Hoppenrath                      |
| Entry requirements           | ++ biological knowledge                |
|                              | ++ knowledge of biological working methods |
|                              | ++ biologically relevant knowledge in the natural sciences and mathematics |
|                              | * interdisciplinary knowledge &amp; 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, trans-mission 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 will 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 anatomy - 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. ) |
| Modullevel                   | AS (Akzentsetzung / Accentuation)       |
| Modulart                     | Wahlpflicht / Elective                  |
| Lern-/Lehrform / Type of program | lecture/seminar, exercise              |
| Vorkenntnisse / Previous knowledge | Examination | Time of examination | Type of examination |</p>
<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tbody>
<tr>
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<td>end of module</td>
<td>portfolio</td>
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<tr>
<td>Course type</td>
<td>Comment</td>
<td>SWS</td>
<td></td>
<td>Frequency</td>
<td></td>
</tr>
<tr>
<td>Vorlesung und Seminar</td>
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<td>WiSe</td>
<td></td>
<td></td>
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<td>WiSe</td>
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<td></td>
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Total time of attendance for the module 77 h
bio375 - Flora - Advanced Concepts

Module label: Flora - Advanced Concepts
Module code: bio375
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
- + 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 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)
Module art: Wahlpflicht / Elective

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

Vorkenntnisse / Previous knowledge:

<table>
<thead>
<tr>
<th>Examination</th>
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<th>Type of examination</th>
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<td>portfolio</td>
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<table>
<thead>
<tr>
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<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>SuSe</td>
<td>28 h</td>
</tr>
<tr>
<td>Seminar</td>
<td></td>
<td>2.00</td>
<td>SuSe</td>
<td>28 h</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

**Module label**  Flora - Advanced Methods not just for schools  
**Module code**  bio377  
**Credit points**  9.0 KP  
**Workload**  270 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**  
- bio375 Flora - Advanced Concepts  
- bio256 Flora and 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. 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 level**  
AS (Akzentsetzung / Accentuation)

**Modulart**  
Wahlpflicht / Elective

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

**Vorkenntnisse / Previous knowledge**

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

**Final exam of module**  
Exercises

**Course type**  
Exercises

**SWS**  
6.00

**Frequency**  
SuSe

**Workload attendance**  
84 h
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 counceling
- 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.
Specialist 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

Module capacity
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
Time of examination
Type of examination
Written examination (good seminar presentations improve the grade)

Final exam of module
Course type
Comment
SWS
Frequency
Workload attendance
Lecture
2.00
WiSe
28 h
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<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tr>
<td>Seminar</td>
<td></td>
<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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<th>Module label</th>
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<tbody>
<tr>
<td>Module code</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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| 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                            |
| 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)  
Modulart: 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 |

52 / 81
| Workload attendance | 56 h |
### Module Description

**bio405 - Introduction to Neurobiology I**

<table>
<thead>
<tr>
<th>Module label</th>
<th>Introduction to Neurobiology I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio405</td>
</tr>
<tr>
<td>Credit points</td>
<td>12.0 KP</td>
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<tr>
<td>Workload</td>
<td>360 h</td>
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</table>
- Fach-Bachelor Biologie > Akzentsetzungsmodule  
- Fach-Bachelor Mathematik > Nebenfachmodule  
- Master of Education (Gymnasium) Biologie > Mastermodule  
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule  |
| 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 |  
- ++ 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  |
| 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. |
| 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 |
| Vorkenntnisse / Previous knowledge | Basics in physiology and cellular biology |
| Examination | Time of examination | Type of examination |
| Final exam of module | end of semester | exam and protocol |
| Course type | Comment | SWS | Frequency | Workload attendance |
| Lecture | 3.00 | SuSe |  | 42 h |
| Seminar | 1.00 | SuSe |  | 14 h |
| Exercises | 4.00 | SuSe |  | 56 h |
| Tutorial | 0.00 | SuSe and WiSe |  | 0 h |
| Total time of attendance for the module | 112 h |
bio415 - Introduction to Neurobiology II

Module label: Introduction to Neurobiology II
Module code: bio415
Credit points: 6.0 KP
Workload: 180 h

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

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:

Language of instruction: German
Duration (semesters): 1 Semester
Module frequency: AS (Akzentsetzung / Accentuation)
Modulart: Wahlpflicht / Elective
Lern-Lehrform / Type of program: lecture, seminar

Vorkenntnisse / Previous knowledge:
Basics in physiology and perception

Examination:

<table>
<thead>
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<th>Type of examination</th>
<th>Time of examination</th>
<th>Workload attendance</th>
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<tr>
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<td>Frequency</td>
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<tr>
<td>Seminar</td>
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Total time of attendance for the module: 56 h
### bio416 - Experiments in Neurobiology II

<table>
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<tr>
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<td>Fach-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
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<td>Fach-Bachelor Mathematik &gt; Nebenfachmodule</td>
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<td>Master of Education (Gymnasium) Biologie &gt; Mastermodule</td>
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<td>Module responsibility</td>
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<td></td>
<td>Georg Martin Klump</td>
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<td>Authorized examiners</td>
<td>Georg Martin Klump</td>
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<td></td>
<td>Christiane Margarete Thiel</td>
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<td>Ulrike Langemann</td>
</tr>
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<td>Christiane Margarete Thiel</td>
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<td>Ulrike Langemann</td>
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<td>bio415 &quot;Introduction to Neurobiology II&quot;</td>
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<td>Skills to be acquired in this module</td>
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<tr>
<td></td>
<td>** deepened biological expertise</td>
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<td>** deepened knowledge of biological working methods</td>
</tr>
<tr>
<td></td>
<td>** data analysis skills</td>
</tr>
<tr>
<td></td>
<td>** data presentation and discussion in German and English (written and spoken)</td>
</tr>
<tr>
<td></td>
<td>+ teamwork</td>
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<td>+ scientific/mathematical basic knowledge relevant for biology</td>
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<tr>
<td>Module contents</td>
<td>The exercise immediately follows the module &quot;Introduction to Neurobiology II&quot;. 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) and present these in a written report.</td>
</tr>
<tr>
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<tr>
<td>Language of instruction</td>
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<td>Duration (semesters)</td>
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<td>Module frequency</td>
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<td>Modulart</td>
<td>Wahlpflicht / Elective</td>
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<td>Lern-/Lehrform / Type of program</td>
<td>exercise</td>
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<td>Vorkenntnisse / Previous knowledge</td>
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<td>Examination</td>
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<td>end of module</td>
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<td>portfolio (data analysis, presentation)</td>
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bio385 - Specific Microbiology

Module label Specific Microbiology
Module code bio385
Credit points 12.0 KP
Workload 360 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
- Ralf Andreas Rabus
Authorized examiners
- Ralf Andreas Rabus
- Daniel Wünsch
Module counseling
- Daniel Wünsch

Entry requirements
bio233 Basics in microbiology and genetics
bio265 general microbiology

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 8

Module level AS (Akzentsetzung / Accentuation)

Modulart Wahlpflicht / Elective

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

Vorkenntnisse / Previous knowledge chemistry

Examination
Time of examination Type of examination

Final exam of module exam (50%)
protocol (50%)

Course type Comment SWS Frequency Workload attendance
Lecture 2.00 WiSe 28 h
Seminar 2.00 WiSe 28 h
Practical 6.00 WiSe 84 h

Total time of attendance for the module 140 h
### bio420 - Biochemistry of the Cell

<table>
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<tbody>
<tr>
<td>Module code</td>
<td>bio420</td>
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<tr>
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<td>Workload</td>
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<td>Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodulle</td>
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<tr>
<td>Contact person</td>
<td>Alexander Scholten</td>
</tr>
<tr>
<td>Authorized examiners</td>
<td>Alexander Scholten</td>
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<tr>
<td>Entry requirements</td>
<td>++ biological knowledge</td>
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<td></td>
<td>+ knowledge of biological working methods</td>
</tr>
<tr>
<td></td>
<td>+ biologically relevant knowledge in the natural sciences and mathematics</td>
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<tr>
<td></td>
<td>+ abstract, logical, analytical thinking</td>
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<td></td>
<td>+ data presentation and evidence-based discussion (written and spoken)</td>
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<td></td>
<td>++ (scientific) communication skills</td>
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<tr>
<td>Module contents</td>
<td>supramolecular organization in the cell, interactions of biomolecules, signalling fluxes</td>
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<tr>
<td>Reader’s advisory</td>
<td>Biochemie, Müller-Esterl</td>
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<td></td>
<td>Biochemie, Lubert Stryer</td>
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<tr>
<td></td>
<td>Lehninger Prinzipien der Biochemie, David L. Nelson und Michael M. Cox</td>
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<td></td>
<td>Principles of Biochemistry, Horton et al.</td>
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<td>Links</td>
<td>Language of instruction</td>
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<td>Duration (semesters)</td>
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<td>Module frequency</td>
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<tr>
<td></td>
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<td>Modullevel</td>
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<td>Modulart</td>
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<td>Lern-/Lehrform / Type of program</td>
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<td>Examination</td>
<td>Time of examination</td>
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<td>during the semester</td>
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bio430 - Analytical Biochemistry

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<td>Module responsibility</td>
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<tr>
<td></td>
<td>Karl-Wilhelm Koch</td>
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<td>Authorized examiners</td>
<td>Alexander Scholten</td>
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<td>Karl-Wilhelm Koch</td>
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<tr>
<td>Module counseling</td>
<td>Alexander Scholten</td>
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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

Modullevel                   PB (Professionalisierungsbereich / Professionalization)

Modulart                     Ergänzung/Professionalisierung

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

Vorkenntnisse / Previous knowledge Biochemistry and Molecular Biology

Examination

<table>
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<td>during semester</td>
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<th>Frequency</th>
<th>Workload attendance</th>
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<tr>
<td>Lecture</td>
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<td>SuSe</td>
<td>14 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>2.00</td>
<td>SuSe</td>
<td>28 h</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. Competences 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 give 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.
### Modullevel
---

### Modulart
je nach Studiengang Pflicht oder Wahlpflicht

### 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>
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### Final exam of module

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<th>Workload attendance</th>
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<tbody>
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<td>Study trip</td>
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<td>1.00</td>
<td>SuSe</td>
<td>14 h</td>
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<tr>
<td>Seminar</td>
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<td>1.00</td>
<td>SuSe</td>
<td>14 h</td>
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<tr>
<td>Exercises</td>
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<td>2.00</td>
<td>SuSe</td>
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**Total time of attendance for the module**

56 h
bio450 - Posters, Pictures, Presentations and Papers

Module label Posters, Pictures, Presentations and Papers
Module code bio450
Credit points 9.0 KP
Workload 270 h

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

Contact person
Module responsibility
- Olaf Bininda-Emonds

Authorized examiners
- Olaf Bininda-Emonds
- Wilko Ahlrichs

Module counseling
- Wilko Ahlrichs

Entry requirements

Skills to be acquired in this module
- 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)
- (scientific) communication skills
- project and time management

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 mistakes.

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

Languages of instruction German, English
Duration (semesters) 1 Semester
Module frequency annually
Module capacity 10 (Letter of motivation)
Modulelevel AS (Akzentsetzung / Accentuation)
Modulart Wahlpflicht / Elective

Examination
Time of examination Type of examination
Final exam of module Portfolio (100%)
Course type Exercises
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**bio460 - Diversity of marine Invertebrates**

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<tbody>
<tr>
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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
  - 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&color=40&gebiete=5) – Data banks (DBIS) - Biology - TOPData
- [ASFA](http://www.asfa.de) - Science Citation Index, Zoological Record
- [Biodiversitylibrary.org/bibliography/14107](http://www.biodiversitylibrary.org/bibliography/14107)
- [scholar.google.de](http://scholar.google.de/)
- [www.wifabio.de](http://www.wifabio.de)
- Open access journals: [www.doaj.org/](http://www.doaj.org/) - [www.plosone.org](http://www.plosone.org)

**Links**

<table>
<thead>
<tr>
<th>Language of instruction</th>
<th>German</th>
</tr>
</thead>
</table>

<p>| Duration (semesters) | 1 Semester |</p>
<table>
<thead>
<tr>
<th>Module frequency</th>
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</thead>
<tbody>
<tr>
<td>Module capacity</td>
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</tr>
<tr>
<td>Modullevel</td>
<td>AS (Akzentsetzung / Accentuation)</td>
</tr>
<tr>
<td>Modulart</td>
<td>Wahlpflicht / Elective</td>
</tr>
<tr>
<td>Lern-/Lehrform / Type of program</td>
<td>seminar, exercise</td>
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### Previous knowledge

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

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tbody>
<tr>
<td>Exercises</td>
<td></td>
<td>3.00</td>
<td>WiSe</td>
<td>42 h</td>
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<tr>
<td>Seminar</td>
<td></td>
<td>1.00</td>
<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

<table>
<thead>
<tr>
<th>Module label</th>
<th>Marine Biology Field Trip</th>
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</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio470</td>
</tr>
<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
</tr>
<tr>
<td>Used in course of study</td>
<td>• Fach-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
</tr>
<tr>
<td></td>
<td>• Master of Education (Gymnasium) Biologie &gt; Mastermodule</td>
</tr>
<tr>
<td></td>
<td>• Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
</tr>
<tr>
<td>Contact person</td>
<td>Module responsibility</td>
</tr>
<tr>
<td></td>
<td>• Wilko Ahirichs</td>
</tr>
<tr>
<td></td>
<td>Authorized examiners</td>
</tr>
<tr>
<td></td>
<td>• Wilko Ahirichs</td>
</tr>
<tr>
<td></td>
<td>• Alexander Kieneke</td>
</tr>
<tr>
<td></td>
<td>Module counseling</td>
</tr>
<tr>
<td></td>
<td>• Alexander Kieneke</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>++ biologically relevant knowledge in the natural sciences and mathematics</td>
</tr>
<tr>
<td></td>
<td>++ statistics &amp; scientific programming</td>
</tr>
<tr>
<td></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>+ teamwork</td>
</tr>
<tr>
<td></td>
<td>++ (scientific) communication skills</td>
</tr>
<tr>
<td></td>
<td>+ project and time management</td>
</tr>
<tr>
<td>Module contents</td>
<td>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.</td>
</tr>
<tr>
<td>Reader's advisory</td>
<td>Will be announced in the course.</td>
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<tr>
<td>Module frequency</td>
<td>annually</td>
</tr>
<tr>
<td>Module capacity</td>
<td>14 ( For more applicants than places, a letter of motiva-tion decides on the admission. )</td>
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<td>Modullevel</td>
<td>AS (Akzentsetzung / Accentuation)</td>
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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, excursion</td>
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<tr>
<td>Vorkenntnisse / Previous knowledge</td>
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<table>
<thead>
<tr>
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<th>Time of examination</th>
<th>Type of examination</th>
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</thead>
<tbody>
<tr>
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<td>Comment</td>
<td>SWS</td>
</tr>
<tr>
<td>Course type</td>
<td></td>
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<tr>
<td>Seminar</td>
<td>2.00</td>
<td>SuSe</td>
</tr>
<tr>
<td>Exercises</td>
<td>2.00</td>
<td>SuSe</td>
</tr>
<tr>
<td>Study trip</td>
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<td>Total time of attendance for the module</td>
<td>84 h</td>
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## bio480 - Functional Morphology of Plants

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<th>Module label</th>
<th>Functional Morphology of Plants</th>
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<tbody>
<tr>
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<td>bio480</td>
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<tr>
<td>Credit points</td>
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<td>180 h</td>
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<tr>
<td>Used in course of study</td>
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<tr>
<td></td>
<td>Fach-Bachelor Biologie &gt; Akzentsetzungsmodul</td>
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<tr>
<td></td>
<td>Master of Education (Gymnasium) Biologie &gt; Mastermodule</td>
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<tr>
<td></td>
<td>Zweifächer-Bachelor Biologie &gt; Akzentsetzungsmodul</td>
</tr>
</tbody>
</table>

**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)

**Reader's advisory**

**Links**
- Language of instruction: German
- Duration (semesters): 1 Semester
- Module frequency: annually
- Module capacity: 10
- Modulelevel: AS (Akzentsetzung / Accentuation)
- Modulart: Wahlpflicht / Elective
- Lern-/Lehrform / Type of program: lecture, seminar, exercise
- Vorkenntnisse / Previous knowledge: Ecology, Flora

### Examination

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
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</thead>
<tbody>
<tr>
<td>Final exam of module</td>
<td>1 Portfolio (oral presentation and 1 report)</td>
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</table>

### 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>1.00</td>
<td>SuSe</td>
<td>14 h</td>
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<tr>
<td>Seminar</td>
<td></td>
<td>1.00</td>
<td>SuSe</td>
<td>14 h</td>
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<tr>
<td>Exercises</td>
<td></td>
<td>2.00</td>
<td>SuSe</td>
<td>28 h</td>
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**Total time of attendance for the module:** 56 h
## Ergänzungsmodule

### bio150 - Statistics for Biologists

<table>
<thead>
<tr>
<th>Module label</th>
<th>Statistics for Biologists</th>
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<tbody>
<tr>
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<tr>
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<td>6.0 KP</td>
</tr>
<tr>
<td>Workload</td>
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</table>

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

**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 & statistical 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
- Modulelevel: EB (Ergänzungsbereich / Complementary)
- Modulart: Pflicht / Mandatory

**Lern-/Lehrform / Type of program**
- Lecture, excercise

**Vorkenntnisse / Previous knowledge**

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final exam of module</td>
<td>within two weeks after lecture time</td>
<td>written exam (+15% bonus points from exercises)</td>
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<table>
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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
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<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>2.00</td>
<td></td>
<td>28 h</td>
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</table>

**Total time of attendance for the module**: 56 h
bio250 - Biochemistry

Module label  Biochemistry
Module code  bio250
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
  - Karl-Wilhelm Koch
Authorized examiners
  - Karl-Wilhelm Koch
  - Alexander Scholten
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
  ++ 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  Time of examination  Type of examination
Final exam of module  Written examination following the end of lectures or end of the semester.  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  2.00  28 h
Tutorial  0.00  WiSe  0 h
Seminar  1.00  14 h
Practical  2.00  28 h
<table>
<thead>
<tr>
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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
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<td>70 h</td>
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che101 - Basic Chemistry

Module label Basic Chemistry
Module code che101
Credit points 6.0 KP
Workload 180 h

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
Authorized examiners
- Alle hier genannten
Module counseling
- 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

Module label: Basic Chemistry Laboratory
Module code: che102
Credit points: 6.0 KP
Workload: 180 h

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
- Rainer Koch
Authorized examiners:
- Alle hier genannten

Entry requirements:
Skills to be acquired in this module:

Module contents:

Reader's advisory:

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:
Type of examination:
Final exam of module: not graded

Course type:
Seminar

SWS:

Frequency:

Workload attendance: 0 h
che190 - Basic Organic Chemistry

Module label  Basic Organic Chemistry
Module code  che190
Credit points  6.0 KP
Workload  180 h

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

Contact person
Module responsibility
- Jens Christoffers
Authorized examiners
- Jens Christoffers
- Sven Doye
- Gerhard Hilt
Module counseling
- Jens Christoffers
- Sven Doye
- Gerhard Hilt

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  AC (Aufbaucurriculum)
Modulart  Pflicht

Lern-Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination  Time of examination  Type of examination
Final exam of module  

Course type  Lecture

SWS  0.00
Frequency  WiSe
Workload attendance  0 h
**che290 - Experimental Organic Chemistry**

<table>
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<td>Workload</td>
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</table>

**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**

<table>
<thead>
<tr>
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**Final exam of module**

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<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tbody>
<tr>
<td>Seminar</td>
<td></td>
<td>3.00</td>
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<td>42 h</td>
</tr>
<tr>
<td>Practical</td>
<td></td>
<td>3.00</td>
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<td>42 h</td>
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**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
Module level: ---
ModuleName: 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
Exercises 1.00

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

<table>
<thead>
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<th>Physics for Students of Biology and Dual Subject Chemistry</th>
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<tbody>
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<tr>
<td></td>
<td>• Zwei-Fächer-Bachelor Chemie &gt; Aufbaumodule</td>
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<tr>
<td><strong>Contact person</strong></td>
<td>Module responsibility</td>
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<tr>
<td></td>
<td>• Manuela Schiek</td>
</tr>
<tr>
<td></td>
<td>• Gerd Gülker</td>
</tr>
<tr>
<td></td>
<td>Authorized examiners</td>
</tr>
<tr>
<td></td>
<td>• Alle hier genannten</td>
</tr>
</tbody>
</table>

**Entry requirements**

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Links**

<table>
<thead>
<tr>
<th><strong>Language of instruction</strong></th>
<th>German</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Duration (semesters)</strong></td>
<td>1 Semester</td>
</tr>
<tr>
<td><strong>Module frequency</strong></td>
<td>jährlich</td>
</tr>
<tr>
<td><strong>Module capacity</strong></td>
<td>unlimited</td>
</tr>
<tr>
<td><strong>Modullevel</strong></td>
<td>BM (Basismodul)</td>
</tr>
<tr>
<td><strong>Modulart</strong></td>
<td>Ergänzung/Professionalisierung</td>
</tr>
</tbody>
</table>

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

**Vorkenntnisse / Previous knowledge**

<table>
<thead>
<tr>
<th><strong>Final exam of module</strong></th>
<th>1 written exam or 1 oral exam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course type</strong></td>
<td>Seminar</td>
</tr>
</tbody>
</table>

**SWS**

<table>
<thead>
<tr>
<th><strong>Frequency</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Workload attendance</strong></td>
</tr>
</tbody>
</table>


## bio251 - Exercises in Biochemistry and Molecular Biology

<table>
<thead>
<tr>
<th>Module label</th>
<th>Exercises in Biochemistry and Molecular Biology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio251</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               |                                               |
| • 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    |                                               |
| Vorkenntnisse / Previous knowledge | Biochemistry and Cell Biology                 |
| Examination                         | Time of examination                           |
| Final exam of module                | during semester                                |
| Type of examination                 | written exam; additionally ungraded protocols |
| Course type                         | Comment                                       |
| Seminar                             | 1.00                                           |
| Exercises                           | 3.00                                           |
| Time of examination                 | SWS                                           |
| Frequency                           | SuSe                                          |
| Workload                             | 14 h                                          |
| 42 h                                |                                               |
| Total time of attendance for the module | 56 h                                      |
Abschlussmodul

bam - Bachelor’s Thesis Module

<table>
<thead>
<tr>
<th>Module label</th>
<th>Bachelor’s Thesis Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bam</td>
</tr>
<tr>
<td>Credit points</td>
<td>15.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>450 h</td>
</tr>
<tr>
<td>Used in course of study</td>
<td>Zwei-Fächer-Bachelor Biologie &gt; Abschlussmodul</td>
</tr>
<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>
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<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 | ---

Modulart | je nach Studiengang Pflicht oder Wahlpflicht

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination

| Final exam of module | G |

Course type | Seminar

SWS

Frequency

Workload attendance | 0 h
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 counselng
- 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
Modulart ---

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 4.00
Exercises 1.00
Practical 6.00
Seminar

Total time of attendance for the module 154 h