# Modules for Biology

## 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

**Modullevel**
---

**Modulart**
je nach Studiengang Pflicht oder Wahlpflicht

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

**Vorkenntnisse / Previous knowledge**

**Examination**

<table>
<thead>
<tr>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written examination</td>
<td>One written examination in the winter and summer terms (50 % each)</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>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>112 h</td>
<td>8.00</td>
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<tr>
<td>Course type</td>
<td>Comment</td>
<td>SWS</td>
<td>Frequency</td>
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<tr>
<td>-------------</td>
<td>---------</td>
<td>-----</td>
<td>-----------</td>
</tr>
<tr>
<td>Tutorial</td>
<td></td>
<td>0.00</td>
<td>WiSe</td>
</tr>
<tr>
<td>Seminar</td>
<td></td>
<td>0.00</td>
<td>SuSe and WiSe</td>
</tr>
</tbody>
</table>

**Total time of attendance for the module**

112 h
**bio220 - Introductory Zoology-Botany**

**Module label**
Introductory Zoology-Botany

**Module code**
bio220

**Credit points**
9.0 KP

**Workload**
270 h

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

**Contact person**

Module responsibility
- Gerhard Wolfgang Zotz
- Olaf Bininda-Emonds

Authorized examiners
- Wilko Ahlrichs
- Olaf Bininda-Emonds
- Thomas Glatzel
- Gerhard Wolfgang Zotz

Module counseling
- Wilko Ahlrichs
- Thomas Glatzel

**Entry requirements**

**Skills to be acquired in this module**

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

**THEORY:**

* To understand the fundamentals of reconstructing phylogenetic relationships

* To know the phylogenetic system and ground pattern of high-ranking ancestral animal species

* To know the cell structures, organization, and reproduction of plants and animals

* To know the morphology and anatomy of individual species

**PRACTICE:**

* To improve and verify the theoretical knowledge acquired from lectures and textbooks by studying the original

* To train visual and tactile perception by studying various species

* To learn that representations in textbooks are abstractions of a much more complex reality

* To be able to criticize representations in textbooks and models

* To acquire the knowledge of the function in living animals and plants by studying preserved specimens

* Learning how to follow preparation instructions

* Learning that the organization of individual species may be highly variable

* Preparing records or drawings from the information obtained by original specimens studied

**Module contents**

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

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

**ZOOLOGY:** Morphological structure of animal tissues. Biology of selected partial taxa and metazoans. Principles of phylogenetic systematics and the phylogenetic position in the animal system of the taxa dealt with.

**Reader's advisory**

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

**ZOOLOGY:** V. Storch: Kükenthal Zoologisches Praktikum, one of the latest editions; Optional: Ax, P. (1999-2001): Das System der Metazoa (I,II, III), Fischer Verlag.
Links
Language of instruction          German
Duration (semesters)             1 Semester
Module frequency                jährlich
Module capacity                 unlimited
Modullevel                      BC (Basiscurriculum / Base curriculum)
Modulart                        Pflicht / Mandatory

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

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final exam of module</td>
<td>Written examination in the final week of the current part</td>
<td>1 written examination (50%) following the part</td>
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<tr>
<td></td>
<td></td>
<td>Zoology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 written examination (50%) following the part</td>
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<tr>
<td></td>
<td></td>
<td>Botany;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>voluntary bonus (10%) in the second part (botany)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PLEASE NOTE: Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.</td>
</tr>
</tbody>
</table>

Course type          | Comment | SWS | Frequency | Workload attendance |
----------------------|---------|-----|-----------|---------------------|
Lecture               | 2.00    |     |           | 28 h                |
Exercises             | 4.00    |     |           | 56 h                |
Tutorial              | 0.00    |     | WiSe      | 0 h                 |

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>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio230</td>
</tr>
<tr>
<td>Credit points</td>
<td>9.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>270 h</td>
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</tbody>
</table>
| Used in course of study      | Fach-Bachelor Biologie > Basismodule  
<pre><code>                           | Zwei-Fächer-Bachelor Biologie &gt; Basismodule |
</code></pre>
<p>| Contact person               |                                |
| Module responsibility        |                                |
| 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; procaryotic and eucaryotic cell structures; microbial diversity: importance of microorganisms for human beings, plants, animals, biotechnology and earth system cell group; signal transmission and communication between cells; meiosis; mitosis; mendelian inheritance; chromosomal and molecular basis of inheritance; replication; transcription; translation; genomic organization; mutation and repair. |
| Reader's advisory            | Purves et al., Biologie (Spektrum Verlag), latest edition |
|                              | Campbell, Pearson Verlag, latest edition |
|                              | Fuchs, Allgemeine Mikrobiologie (Thieme Verlag), latest edition |
|                              | Lodisch et al., Molekulare Zellbiologie (Spektrum Verlag), latest edition |
| Links                        |                                |
| Language of instruction      | German                         |
| Duration (semesters)         | 1 Semester                     |
| Module frequency             | jährlich                       |
| Module capacity              | unlimited                      |
| Modullevel                   | BC (Basiscurriculum / Base curriculum) |
| Modulart                     | Pflicht / Mandatory            |
| Lern-/Lehrform / Type of program |                                |
| Vorkenntnisse / Previous knowledge | Time of examination | Type of examination |
| Examination                  | Written examination in the final week of the current part |
| 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 |
| final exam of module         | Written examination in the final week of the current part |
| Microbiology                 | 1 written examination (50%) following the part Cell Biology |
| PLEASE NOTE: Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply |</p>
<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>4.00</td>
<td></td>
<td>56 h</td>
</tr>
<tr>
<td>Exercises</td>
<td></td>
<td>2.00</td>
<td></td>
<td>28 h</td>
</tr>
</tbody>
</table>

**Total time of attendance for the module**

84 h
bio215 - Introduction to Biology

Module label: Introduction to Biology
Module code: bio215
Credit points: 9.0 KP
Workload: 270 h

Used in course of study:
- Fach-Bachelor Biologie > Basismodule
- Fach-Bachelor Mathematik > Nebenfachmodule
- Zwe-Fächer-Bachelor Biologie > Basismodule

Contact person:
Module responsibility:
- Gabriele Gerlach
- Christine Köppl

Authorized examiners:
- Gabriele Gerlach
- Christine Köppl
- Gerhard Wolfgang Zotz
- Ulrike Sienknecht

Module counseling:
- Gerhard Wolfgang Zotz
- Ulrike Sienknecht

Entry requirements:

Skills to be acquired in this module:
++ biological knowledge
+ knowledge of techniques in biology
++ biologically relevant knowledge in the natural sciences and mathematics
+ cross-disciplinary knowledge and thinking

Module contents:
Lecture conveys knowledge in:
- evolution, ecology and biodiversity (WiSe)
- animal physiology and developmental biology (SoSe)

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

Links:
Language of instruction: German

Duration (semesters): 2 Semester

Module frequency:
Module capacity: 300

Modullevel: BC (Basiscurriculum / Base curriculum)
Modulart: Pflicht / Mandatory

Lern-/Lehrform / Type of program:
lecture

Vorkenntnisse / Previous knowledge:

Examination:
Final exam of module: lecture-free periods after each series
2 written examinations (WiSe and SoSe)

Course type:
- Lecture:
  Comment: 6.00
  SWS: SuSe and WiSe
  Frequency: 84 h

- Seminar:
  Comment: 0.00
  SWS: WiSe
  Frequency: 0 h

- Tutorial:
  Comment: 0.00
  SWS: --
  Frequency: 0 h

Total time of attendance for the module: 84 h
### bio233 - Basics in Microbiology and Genetics

<table>
<thead>
<tr>
<th>Module label</th>
<th>Basics in Microbiology and Genetics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio233</td>
</tr>
<tr>
<td>Credit points</td>
<td>6.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>180 h</td>
</tr>
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</table>
| Used in course of study               | • Fach-Bachelor Biologie > Basismodule  
• Zwei-Fächer-Bachelor Biologie > Basismodule |
| Contact person                        |                                       |
| Module responsibility                 |                                       |
| 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                   |
| Final exam of module                  | Type of examination                   |
| 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>Module label</th>
<th>Basics in Biochemistry and Cell Biology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio236</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 > Basismodule  
Zwei-Fächer-Bachelor Biologie > Basismodule |

**Contact person**

- Module responsibility
  - Karl-Wilhelm Koch

- Authorized examiners
  - Karl-Wilhelm Koch
  - Michael Winklhofer

- Module counceling
  - Michael Winklhofer

**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 postranslational modification, intracellular transport and trafficking, signalling agents and cellular communication, cell division, controlled cell death

**Reader's advisory**

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

**Links**

- Language of instruction: German
- Duration (semesters): 1 Semester
- Module frequency: unlimited
- Module capacity: unlimited
- Modullevel: BC (Basiscurriculum / Base curriculum)
- Modulart: Pflicht / Mandatory
- Lern-/Lehrform / Type of program: lecture

**Vorkenntnisse / Previous knowledge**

**Examination** | **Time of examination** | **Type of examination**
--- | --- | ---
Final exam of module | during the semester | written exam

**Course type**

- Lecture

**SWS**

- 4.00

**Frequency**

- WiSe

**Workload attendance**

- 56 h
### 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

### Module level
- ---

### Moduleart
- je nach Studiengang Pflicht oder Wahlpflicht

### Lern-Lehrform / Type of program

### Vorkenntnisse / Previous knowledge

### Examination

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final exam of module</td>
<td>KL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecture</td>
<td>2.00</td>
<td>SuSe or WiSe</td>
<td>28 h</td>
</tr>
<tr>
<td>Seminar</td>
<td>2.00</td>
<td>SuSe or WiSe</td>
<td>28 h</td>
</tr>
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</table>

### Total time of attendance for the module
- 56 h
### Aufbaumodule

**bio100 - Introduction into Didactics of Biology**

<table>
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<th>Module label</th>
<th>Introduction into Didactics of Biology</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module code</strong></td>
<td>bio100</td>
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<tr>
<td><strong>Credit points</strong></td>
<td>6.0 KP</td>
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<tr>
<td><strong>Workload</strong></td>
<td>180 h</td>
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<tr>
<td><strong>Used in course of study</strong></td>
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</tr>
</tbody>
</table>
  - 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 their 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). |
  - Spörhase-Eichmann, Ruppert (Hrsg.): Biologie Didaktik. Praxishandbuch für die Sekundarstufe I und II. |  
| **Links**              | German                                 |
| **Language of instruction** | 2 Semester                           |
| **Duration (semesters)** | 2 Semester                           |
| **Module frequency**   | jährlich                               |
| **Module capacity**    | unlimited                              |
| **Modullevel**         | AM (Aufbaumodul)                       |
| **Modulart**           | 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 |
|                        | 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**

<table>
<thead>
<tr>
<th>Module label</th>
<th>Practical Biology Experiments for Science Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio110</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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<td>Used in course of study</td>
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</table>
  - 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 counselling  
    - 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 |
| Modulelevel | MM (Mastermodul) |
| Modulart | Ergänzung/Professionalisierung |
| Lern-/Lehrform / Type of program |  |
| 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>
<th>Module label</th>
<th>Flora and Fauna</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<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>
</tr>
<tr>
<td>Used in course of study</td>
<td>- Master of Education (Sonderpädagogik) Biologie &gt; Mastermodule</td>
</tr>
<tr>
<td></td>
<td>- Zwei-Fächer-Bachelor Biologie &gt; Aufbaumodule</td>
</tr>
</tbody>
</table>

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

**Entry requirements**

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

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

**Module contents**

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

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

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

**Reader's advisory**

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

**Links**

**Language of instruction**
- German

**Duration (semesters)**
- 2 Semester

**Module frequency**
- jährlich

**Module capacity**
- unlimited

**Modullevel**
- ---

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

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

**Vorkenntnisse / Previous knowledge**

**Examination**

<table>
<thead>
<tr>
<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>
</tr>
<tr>
<td></td>
<td>Zoology: Written examination before the end of the lecture</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Type of examination</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>written examination (Botany 50 %)</td>
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<tr>
<td>1</td>
<td>written examination (Zoology 50 %)</td>
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<tr>
<td>ungraded minutes</td>
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**PLEASE NOTE:** Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

**Course type**

<table>
<thead>
<tr>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tbody>
<tr>
<td>Lecture</td>
<td>2.00</td>
<td>28 h</td>
<td></td>
</tr>
<tr>
<td>Exercises</td>
<td>4.00</td>
<td>56 h</td>
<td></td>
</tr>
<tr>
<td>Study trip</td>
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**Total time of attendance for the module**
- 98 h
**bio265 - General Microbiology**

<table>
<thead>
<tr>
<th>Module label</th>
<th>General Microbiology</th>
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<tbody>
<tr>
<td>Module code</td>
<td>bio265</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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**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**
- Basic knowledge of microbiology; ability to assess and apply fundamental microbiological techniques.

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

**Module contents**
- 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**

<table>
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<th>Examination</th>
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<th>Type of examination</th>
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<tbody>
<tr>
<td>Final exam of module</td>
<td>1 written examination</td>
<td></td>
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</tbody>
</table>

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

**Course type**
- **Lecture**: 2.00 SWS, WiSe 28 h
- **Seminar**: 1.00 SWS, WiSe 14 h
- **Practical**: 4.00 SWS, WiSe 56 h

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

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

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

Contact person
Module responsibility
- Dominik Heyers

Authorized examiners
- Dominik Heyers
- Christine Köppl
- Karin Dedek

Module counseling
- Christine Köppl
- Karin Dedek

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

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

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

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

Links
Language of instruction | German
Duration (semesters) | 1 Semester
Module frequency | jährlich
Module capacity | 144
Modullevel | AC (Aufbaucurriculum / Composition)
Modulart | Wahlpflicht / Elective
Lern-Lehrform / Type of program | lecture, exercise

Vorkenntnisse / Previous knowledge

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
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<tbody>
<tr>
<td>Final exam of module</td>
<td>within a few weeks after the winter term lecture period</td>
<td>written exam (100%)</td>
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</table>

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

17 / 81
<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tr>
<td>Exercises</td>
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<td>WiSe</td>
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**Total time of attendance for the module**

84 h
## bio285 - Plant Physiology, Molecular Biology and Biotechnology

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<tr>
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<td>9.0 KP</td>
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<tr>
<td>Workload</td>
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| Used in course of study | Fach-Bachelor Biologie > Aufbaumodule  
Zwei-Fächer-Bachelor Biologie > Aufbaumodule |
| Contact person| Module responsibility  
Sascha Laubinger  
Authorized examiners |
Sascha Laubinger |
| Entry requirements | ++ biological knowledge  
++ knowledge of biological working methods  
+ biologically relevant knowledge in the natural sciences and mathematics  
+ statistics & scientific programming  
+ abstract, logical, analytical thinking  
+ independent learning and (research-based) working  
+ teamwork  
+ (scientific) communication skills |
| 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 |

### Examination

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<tr>
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<tr>
<td>Course type</td>
<td>Comment</td>
<td>SWS</td>
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<tr>
<td>Lecture</td>
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<td>2.00</td>
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<tr>
<td>Seminar</td>
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<td>1.00</td>
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<tr>
<td>Practical</td>
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<td>4.00</td>
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<tr>
<td>Total time of attendance for the module</td>
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<td>98 h</td>
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</table>
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 Nolthwang
- Anna-Maria Hartmann
- Lena Ebbers

Module counseling
- Anna-Maria Hartmann
- Hans Gerd Nolthwang
- 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

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

Course type  Comment  SWS  Frequency  Workload attendance
Lecture  1.50  WiSe  21 h
Exercises  3.00  WiSe  42 h
Seminar  1.50  WiSe  21 h

Total time of attendance for the module: 84 h
bio255 - Basics in Biochemistry and Cell Biology

Module label | Basics in Biochemistry and Cell Biology
Module code | bio255
Credit points | 9.0 KP
Workload | 270 h

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

Contact person
Module responsibility
- Arne Nolte
Authorized examiners
- Arne Nolte

Entry requirements

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

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

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

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

Reader's advisory

Links

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

Module frequency

Module capacity | 30

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

Lern-/Lehrform / Type of program
lecture, exercise

Vorkenntnisse / Previous knowledge

Examination

Type of examination

Final exam of module

<table>
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<tr>
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<td>Lecture</td>
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<tr>
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<td>4.50</td>
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Exam

<table>
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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>1.50</td>
<td>WiSe</td>
<td>21 h</td>
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<td>Exercises</td>
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<td>4.50</td>
<td>WiSe</td>
<td>63 h</td>
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Total time of attendance for the module | 84 h
Akzentsetzungsmodul

bio300 - Evolutionary Biology

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<td>Credit points</td>
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<td>Workload</td>
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**Used in course of study**
- Fach-Bachelor Biologie > 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 capacity**
- unlimited

**Module level**
- AS (Akzentsetzung / Accentuation)

**Modulart**
- Wahlpflicht / Elective

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

**Vorkenntnisse / Previous knowledge**

<table>
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<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
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<td>Written examination in the final week of the semester or in the first week following the lecture</td>
<td>Written examination (60%) Portfolio (40%)</td>
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<td>Examination</td>
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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>2.00</td>
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<td>28 h</td>
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<td>Exercises</td>
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<td>Seminar</td>
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**Total time of attendance for the module** 140 h
### bio310 - General Ecology

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<th>General Ecology</th>
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<td>Workload</td>
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<td></td>
<td>• Fach-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
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<tr>
<td></td>
<td>• Master of Education (Gymnasium) Biologie &gt; Mastermodule</td>
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<td></td>
<td>• Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
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<table>
<thead>
<tr>
<th>Contact person</th>
<th>Module responsibility</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>• Helmut Hillebrand</td>
</tr>
<tr>
<td>Authorized examiners</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Helmut Hillebrand</td>
</tr>
<tr>
<td></td>
<td>• Rolf Niedringhaus</td>
</tr>
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<td></td>
<td>• Rainer Buchwald</td>
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<td></td>
<td>• Gerhard Wolfgang Zotz</td>
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<td>• Peter Schupp</td>
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<td></td>
<td>• Sven Rohde</td>
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<td>• Maren Striebel</td>
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<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>• Rolf Niedringhaus</td>
</tr>
<tr>
<td></td>
<td>• Rainer Buchwald</td>
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<td>• Gerhard Wolfgang Zotz</td>
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<td>• Peter Schupp</td>
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<td>• Sven Rohde</td>
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<td>• Maren Striebel</td>
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<table>
<thead>
<tr>
<th>Entry requirements</th>
<th>Skills to be acquired in this module</th>
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<tbody>
<tr>
<td></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>
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<tr>
<td></td>
<td>+ statistics &amp; scientific programming</td>
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<tr>
<td></td>
<td>+ interdisciplinary knowledge &amp; thinking</td>
</tr>
<tr>
<td></td>
<td>++ abstract, logical, analytical thinking</td>
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<tr>
<td></td>
<td>+ deepened expertise in biological specialist field</td>
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<td>+ independent learning and (research-based) working</td>
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<td></td>
<td>+ data presentation and evidence-based discussion (written and spoken)</td>
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<td>+ (scientific) communication skills</td>
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### Module contents

**Reader's advisory**

**Links**

- Language of instruction: German
- Duration (semesters): 2 Semester
- Module frequency: jährlich
- Module capacity: unlimited
- Module level: AS (Akzentsetzung / Accentuation)
- Moduleart: Wahlpflicht / Elective

<table>
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<tr>
<th>Lern-Lehrform / Type of program</th>
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<tbody>
<tr>
<td>Vorkenntnisse / Previous knowledge</td>
<td>Type of examination</td>
</tr>
<tr>
<td>Examination</td>
<td>Time of examination</td>
</tr>
<tr>
<td>Final exam of module</td>
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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>
<td></td>
<td>28 h</td>
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<tr>
<td>Seminar</td>
<td></td>
<td>1.00</td>
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<td>14 h</td>
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<tr>
<td>Practical</td>
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<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 |
## bio320 - Pollination and Dispersal Biology

<table>
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<td>Workload</td>
<td>450 h</td>
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<td>• Zweifächer-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
</tr>
<tr>
<td>Contact person</td>
<td>Module responsibility</td>
</tr>
<tr>
<td></td>
<td>• Dirk Carl Albach</td>
</tr>
<tr>
<td>Authorized examiners</td>
<td>• Dirk Carl Albach</td>
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<tr>
<td></td>
<td>• Klaus Bernhard von Hagen</td>
</tr>
<tr>
<td>Module counceling</td>
<td>• Klaus Bernhard von Hagen</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>+ 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></td>
<td>+ knowledge of safety and environmental issues</td>
</tr>
<tr>
<td>Extended knowledge of biodiversity and evolution of plants focusing on reproduction, dispersal, germination and establishment of plants</td>
<td></td>
</tr>
<tr>
<td>Module contents</td>
<td>L: Pollination, dispersal, germination of plants, plant breeding</td>
</tr>
<tr>
<td></td>
<td>S: Pollination and dispersal biology of plants in a systematic context</td>
</tr>
<tr>
<td></td>
<td>LC: Pollination, fertilisation, dispersal and germination biological experiments in regard of adaptation to environmental factors</td>
</tr>
<tr>
<td>Reader's advisory</td>
<td>The course does not follow a special textbook. The following German literature is recommended to students interested in the course: Dieter Heß – Die Blüte, Eugen Ulmer Verlag as well as Leins &amp; Erbar -Blüte und Frucht, Schweizerbart'sche Verlagsbuchhandlung.</td>
</tr>
</tbody>
</table>

## 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

<table>
<thead>
<tr>
<th>Vorkenntnisse / Previous knowledge</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final exam of module</td>
<td>Four weeks after the end of the exercises at the latest.</td>
<td>1 Portfolio</td>
</tr>
</tbody>
</table>

**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>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>5.00</td>
<td></td>
<td></td>
<td>70 h</td>
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**Total time of attendance for the module**: 112 h
### bio330 - Marine Ecology

<table>
<thead>
<tr>
<th>Module label</th>
<th>Marine Ecology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio330</td>
</tr>
<tr>
<td>Credit points</td>
<td>15.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>450 h</td>
</tr>
</tbody>
</table>
| 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
- Module level: AS (Akzentsetzung / Accentuation)
- Moduleart: 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>
</tr>
</thead>
<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>
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</table>

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

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>4.00</td>
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<td>56 h</td>
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<td>Exercises</td>
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<td>6.00</td>
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<td>84 h</td>
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**Total time of attendance for the module** 140 h
# Module Information

## Module: Morphology, Phylogeny, and Evolution of Metazoa

### Module Details

<table>
<thead>
<tr>
<th>Label</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module label</strong></td>
<td>Morphology, Phylogeny, and Evolution of Metazoa</td>
</tr>
<tr>
<td><strong>Module code</strong></td>
<td>bio340</td>
</tr>
<tr>
<td><strong>Credit points</strong></td>
<td>15.0 KP</td>
</tr>
<tr>
<td><strong>Workload</strong></td>
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</tbody>
</table>

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

### Contact person
- Olaf Bininda-Emonds
- Wilko Ahlrichs

### 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

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

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

### Previous knowledge

### 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>
<td></td>
<td>70 h</td>
</tr>
<tr>
<td>Seminar</td>
<td></td>
<td>2.00</td>
<td></td>
<td>28 h</td>
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</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Module label</th>
<th>Organismic Microanatomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio350</td>
</tr>
<tr>
<td>Credit points</td>
<td>15.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>450 h</td>
</tr>
</tbody>
</table>

**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 Ahirichs
- Authorized examiners
  - Wilko Ahirichs
  - Mona Hoppenrath
  - Alexander Kieneke
- Module counseling
  - Mona Hoppenrath
  - Alexander Kieneke

**Entry requirements**

++ 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

**Modullevel**
- AS (Akzentsetzung / Accentuation)

**Modulart**
- Wahlpflicht / Elective

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

**Vorkenntnisse / Previous knowledge**

**Examination**

**Final exam of module**

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>3.00</td>
<td></td>
<td>42 h</td>
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<tr>
<td>Exercises</td>
<td></td>
<td>5.00</td>
<td></td>
<td>70 h</td>
</tr>
<tr>
<td>Study trip</td>
<td></td>
<td>1.00</td>
<td></td>
<td>14 h</td>
</tr>
</tbody>
</table>

**Total time of attendance for the module**
- 126 h

**Bachelor:** 1 Portfolio
**Master of Education:** 1 oral exam
### bio360 - Marine Biodiversity

<table>
<thead>
<tr>
<th>Module label</th>
<th>Marine Biodiversity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio360</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>Fach-Bachelor Biologie &gt; Akzentsetzungsmodul</td>
</tr>
<tr>
<td></td>
<td>Master of Education (Gymnasium) Biologie &gt; Mastermodule</td>
</tr>
<tr>
<td></td>
<td>Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodul</td>
</tr>
<tr>
<td>Contact person</td>
<td>Thomas Glatzel</td>
</tr>
<tr>
<td>Authorized examiners</td>
<td>Thomas Glatzel</td>
</tr>
<tr>
<td></td>
<td>Pedro-Miguel Martinez-Arbizu</td>
</tr>
<tr>
<td></td>
<td>Mona Hoppenrath</td>
</tr>
<tr>
<td>Module counseling</td>
<td>Pedro-Miguel Martinez-Arbizu</td>
</tr>
<tr>
<td></td>
<td>Mona Hoppenrath</td>
</tr>
<tr>
<td>Entry requirements</td>
<td>++ biological knowledge</td>
</tr>
<tr>
<td></td>
<td>++ knowledge of biological working methods</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>
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<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>Skills to be acquired in this module</td>
<td>By active participation the students acquire the following knowledge/abilities/qualification:</td>
</tr>
<tr>
<td></td>
<td>* Preparation and organization of sampling</td>
</tr>
<tr>
<td></td>
<td>* Keeping organisms – field study</td>
</tr>
<tr>
<td></td>
<td>* Marine deposits, development of marine sediments and their effects on the fauna</td>
</tr>
<tr>
<td></td>
<td>* Methods of meiofauna and macrofauna sampling, also plankton sampling</td>
</tr>
<tr>
<td></td>
<td>* Methods of quantitative community analysis</td>
</tr>
<tr>
<td></td>
<td>* Diversity comparison of various sites applying statistical methods</td>
</tr>
<tr>
<td></td>
<td>* Multivariate statistics for correlation of biocenoses and environmental variables</td>
</tr>
<tr>
<td></td>
<td>* Biocenoses of marine habitats</td>
</tr>
<tr>
<td></td>
<td>* Biology, morphology, systematics, behaviour and ecology of selected taxa in marine water systems</td>
</tr>
<tr>
<td></td>
<td>* Formulation and definition of scientific questions and selection of methods</td>
</tr>
<tr>
<td></td>
<td>* Habitat and biocenoses, interstitial, littoral (lotic, lentic), diversity</td>
</tr>
<tr>
<td></td>
<td>* Planning behavioural experiments</td>
</tr>
<tr>
<td></td>
<td>* Presentation and discussion of scientific results</td>
</tr>
<tr>
<td></td>
<td>* Independent scientific work in groups and presentation of results</td>
</tr>
<tr>
<td>Module contents</td>
<td>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.</td>
</tr>
</tbody>
</table>

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

<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 lectures</td>
<td>1 Portfolio</td>
</tr>
</tbody>
</table>

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>9.00</td>
<td></td>
<td>126 h</td>
</tr>
<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: 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
- Zweifächer-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: ---
Modalart: 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

<table>
<thead>
<tr>
<th>Module label</th>
<th>Specific Microbiology</th>
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<tbody>
<tr>
<td>Module code</td>
<td>bio380</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></td>
</tr>
<tr>
<td></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>
</tbody>
</table>

Contact person

Module responsibility
- Ralf Andreas Rabus

Authorized examiners
- Ralf Andreas Rabus
- Kathleen Trautwein

Module counseling
- Kathleen Trautwein

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
- ++ project and time management
- ++ knowledge of safety and environmental issues

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

Examination Time of examination Type of examination
Final exam of module

Type examination
1 written examination (50%)
1 record (50%)

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

Course type Comment SWS Frequency Workload attendance
Lecture
4.00
56 h
Exercises
6.00
84 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>Seminar</td>
<td></td>
<td>0 h</td>
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**Total time of attendance for the module** 140 h
bio400 - Basic Concepts in Neurobiology I

<table>
<thead>
<tr>
<th>Module label</th>
<th>Basic Concepts in Neurobiology I</th>
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</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio400</td>
</tr>
<tr>
<td>Credit points</td>
<td>15.0 KP</td>
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<tr>
<td>Workload</td>
<td>450 h</td>
</tr>
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</table>

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

**Contact person**

- **Module responsibility**
  - 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**

<table>
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<th>Time of examination</th>
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</thead>
<tbody>
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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**

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<th>Frequency</th>
<th>Workload attendance</th>
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<tr>
<td>Lecture</td>
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<td>Exercises</td>
<td>6.00</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
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 counselling:
- Ulrike Langemann
- Christiane Margarete Thiel
- Christine Köppl

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

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

Module contents:
The lecture covers the anatomy and function of simple sensory and motory systems as well as higher cognitive functions. Selected subjects are treated in more detail in the seminar. In the subsequent block practical course, this theoretical knowledge is verified under real-world conditions by simple experiments related to the subjects dealt with in the lectures 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 Time of examination Type of examination
Final exam of module Written examination in the course of the semester vacation (usually in March) 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 Comment SWS Frequency Workload attendance
Lecture 4.00
Exercises 5.00
Seminar 1.00

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

<table>
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<tr>
<th>Module label</th>
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<td></td>
<td>• Fach-Bachelor Biologie &gt; Akzentsetzungsmodul</td>
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<td>• Master of Education (Gymnasium) Biologie &gt; Mastermodule</td>
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<td>• Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodul</td>
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<tr>
<td>Contact person</td>
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</tr>
<tr>
<td></td>
<td>• Sascha Laubinger</td>
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<tr>
<td></td>
<td>Authorized examiners</td>
</tr>
<tr>
<td></td>
<td>• Sascha Laubinger</td>
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<tr>
<td>Entry requirements</td>
<td></td>
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<td>Skills to be acquired in this module</td>
<td></td>
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<tr>
<td>Module contents</td>
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<td>Reader's advisory</td>
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<td>Duration (semesters)</td>
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<td>Type of examination</td>
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</tbody>
</table>

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bio325 - Pollination and Dispersal - Concepts

Module label: Pollination and Dispersal - Concepts
Module code: bio325
Credit points: 6.0 KP
Workload: 180 h

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

Contact person
Module responsibility:
- Dirk Carl Albach

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

Module counseling:
- Klaus Bernhard von Hagen
- Maria Will

Entry requirements:
- bio256 Flora and Fauna

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

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

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

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

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

Vorkenntnisse / Previous knowledge
Examination Time of examination Type of examination

Final exam of module portfolio
Course type Comment SWS Frequency Workload attendance
Lecture 2.00 SuSe 28 h
Seminar 2.00 SuSe 28 h
Total time of attendance for the module 56 h
bio326 - Pollination and Dispersal - Methods

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 > Akzentsetzungsmodul
- Fach-Bachelor Mathematik > Nebenfachmodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodul

Contact person:
Module responsibility
- Dirk Carl Albach

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

Module counseling
- Klaus Bernhard von Hagen
- Maria Will

Entry requirements:
- bio325 Pollination and dispersal concepts
- bio256 Flora/Fauna

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

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

Module contents:
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

Module level: AS (Akzentsetzung / Accentuation)

Moduleart: Wahlpflicht / Elective

Lern-Lehrform / Type of program: exercise

Vorkenntnisse / Previous knowledge:

Examination:
- Final exam of module

Time of examination:
- Portfolio

Type of examination:
- Exercises

Course type:
- Exercises

SWS: 4.00

Frequency: SuSe

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

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<tbody>
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<td>Workload</td>
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<td></td>
<td>Fach-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
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<tr>
<td></td>
<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>Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
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<td>Contact person</td>
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<tr>
<td></td>
<td>▷ Dirk Carl Albach</td>
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<td>Authorized examiners</td>
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<td>▷ Dirk Carl Albach</td>
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<tr>
<td></td>
<td>▷ Klaus Bernhard von Hagen</td>
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<td></td>
<td>▷ Maria Will</td>
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<td>Module counseling</td>
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<tr>
<td></td>
<td>▷ Klaus Bernhard von Hagen</td>
</tr>
<tr>
<td></td>
<td>▷ Maria Will</td>
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<tr>
<td>Entry requirements</td>
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<td></td>
<td>bio325 Pollination and dispersal concepts</td>
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<td>bio256 Flora/fauna</td>
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<td>Skills to be acquired in this module</td>
<td></td>
</tr>
<tr>
<td></td>
<td>▶ biological knowledge</td>
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<td>▶ data presentation and evidence-based discussion (written and spoken)</td>
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<td></td>
<td>▶ teamwork</td>
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<td></td>
<td>▶ (scientific) communication skills</td>
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<td></td>
<td>▶ project and time management</td>
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<tr>
<td></td>
<td>▶ knowledge of safety and environmental issues</td>
</tr>
<tr>
<td></td>
<td>Extended knowledge of biodiversity and evolution of plants focusing on reproduction, dispersal, germination and establishment of plants</td>
</tr>
<tr>
<td>Module contents</td>
<td>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.</td>
</tr>
<tr>
<td>Reader's advisory</td>
<td>The course does not follow a special textbook. The following German literature is recommended to students interested in the course: Dieter Heß – Die Blüte, Eugen Ulmer Verlag as well as Leins &amp; Erbar -Blüte und Frucht, Schweizerbart'sche Verlagsbuchhandlung.</td>
</tr>
<tr>
<td>Links</td>
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</tr>
<tr>
<td>Duration (semesters)</td>
<td>1 Semester</td>
</tr>
<tr>
<td>Module frequency</td>
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<tr>
<td>Module capacity</td>
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<tr>
<td>Modulelevel</td>
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<tr>
<td>Modulart</td>
<td>Wahlpflicht / Elective</td>
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<td>Vorkenntnisse / Previous knowledge</td>
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<td>Examination</td>
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<tr>
<td>Course type</td>
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<tr>
<td>SWS</td>
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<tr>
<td>Workload attendance</td>
<td>84 h</td>
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bio355 - Microscopical Anatomy

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

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

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

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

This course is designed for students to learn about the basic light and electron optical methods. Students will be able to work with preparative techniques for scanning electron microscopy, 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 include print making, design and assembly of materials for publication, PowerPoint presentations, and poster design. Students will be introduced to the principles of light microscopy utilizing different optical sys-tems and will have the opportunity to have hands-on experience with a Leica photomicroscope as well as the Leica SP5 confocal laser scanning.

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

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

Links:
Language of instruction: German
Duration (semesters): 1 Semester
Module frequency: annually
Module capacity: 8
For more applicants than places, a motivation letter decides on the admission.
Modulelevel: AS (Akzentsetzung / Accentuation)
Modulart: Wahlpflicht / Elective
Lern-/Lehrform / Type of program: lecture/seminar, exercise

Vorkenntnisse / Previous knowledge:
Examination Time of examination Type of examination

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<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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<tr>
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<td>end of module</td>
<td>portfolio</td>
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### bio375 - Flora - Advanced Concepts

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<tr>
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<td>180 h</td>
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| Used in course of study | - Fach-Bachelor Biologie > Akzentsetzungsmodul  
                           - Fach-Bachelor Mathematik > Nebenfachmodule  
                           - Master of Education (Gymnasium) Biologie > Mastermodule  
                           - Zwei-Fächer-Bachelor Biologie > 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**

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<th>Language of instruction</th>
<th>German</th>
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<tbody>
<tr>
<td>Duration (semesters)</td>
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<td>Module frequency</td>
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<tr>
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<td>Module level</td>
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<tr>
<td>Modulart</td>
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</tr>
<tr>
<td>Lern-/Lehrform / Type of program</td>
<td>lecture, seminar</td>
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**Vorkenntnisse / Previous knowledge**

<table>
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<tr>
<th>Examination</th>
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<th>Type of examination</th>
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<tr>
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<tr>
<td>Lecture</td>
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<td>SuSe</td>
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<tr>
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### bio376 - Flora - Advanced Methods

<table>
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<th>Flora - Advanced Methods</th>
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<tr>
<td>Module code</td>
<td>bio376</td>
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<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
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<tr>
<td>Used in course of study</td>
<td>- Fach-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
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<tr>
<td></td>
<td>- Fach-Bachelor Mathematik &gt; Nebenfachmodule</td>
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<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>- Dirk Carl Albach</td>
</tr>
<tr>
<td>Authorized examiners</td>
<td>- Dirk Carl Albach</td>
</tr>
<tr>
<td></td>
<td>- Klaus Bernhard von Hagen</td>
</tr>
<tr>
<td></td>
<td>- Maria Will</td>
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<td>Module counceling</td>
<td>- Klaus Bernhard von Hagen</td>
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<tr>
<td></td>
<td>- Maria Will</td>
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<td>Entry requirements</td>
<td>bio256 Flora and Fauna</td>
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<td></td>
<td>bio375 Flora - Advanced concepts</td>
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<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>+ deepened expertise in biological specialist field</td>
</tr>
<tr>
<td></td>
<td>+ independent learning and (research-based) working</td>
</tr>
<tr>
<td></td>
<td>+ data presentation and evidence-based discussion (written and spoken)</td>
</tr>
<tr>
<td></td>
<td>+ (scientific) communication skills</td>
</tr>
<tr>
<td></td>
<td>+ knowledge of safety and environmental issues</td>
</tr>
<tr>
<td>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.</td>
<td></td>
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<tr>
<td>Module contents</td>
<td>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.</td>
</tr>
<tr>
<td>Reader's advisory</td>
<td>Rothmaler - Exkursionsflora von Deutschland. Gefäßpflanzen: Grundband</td>
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<td>exercise</td>
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<td>Examination</td>
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<td>SWS</td>
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**bio377 - Flora - Advanced Methods not just for schools**

<table>
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<tbody>
<tr>
<td>Module code</td>
<td>bio377</td>
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<td>Workload</td>
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**Used in course of study**
- Fach-Bachelor Biologie > Akzentsetzungsmodul
- Fach-Bachelor Mathematik > Nebenfachmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodul

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

**Entry requirements**
- 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.

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

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

**Vorkenntnisse / Previous knowledge**

**Examination**
- Final exam of module: portfolio
- 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: 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: Written examination (good seminar presentations improve the grade)
Type of examination: Final exam of module

Course type:
Comment: Written examination (good seminar presentations improve the grade)
SWS: WSe
Frequency: Workload attendance: 28 h

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tr>
<td>Seminar</td>
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<td>WiSe</td>
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**Total time of attendance for the module** 56 h
bio396 - Plant Molecular Biology and Genetics II

Module label: Plant Molecular Biology and Genetics II
Module code: bio396
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 counseling:
- Udo Gowik

Entry requirements:
bio395 Plant molecular biology and genetics I

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

The module serves the in-depth study of state-of-the-art techniques and problems in the field of molecular plant biology and plant genetics.
Specialist competencies: Acquiring basic skill in plant molecular biology, genetics and plant biochemistry
Methodological competencies: molecular biology techniques, conducted independently
General competencies: Presentation of scientific results, presentation techniques, teamwork, problem solving competencies

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

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

Links:
Languages of instruction: German, English
Duration (semesters): 1 Semester
Module frequency: annually
Module capacity: 16
Modullevel: AS (Akzentsetzung / Accentuation)
Modulart: Wahlpflicht / Elective
Lern- / Lehrform / Type of program: exercise

Vorkenntnisse / Previous knowledge:

<table>
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<tr>
<th>Examination</th>
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<th>Type of examination</th>
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</thead>
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<td>Final exam of module</td>
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<td>portfolio (presentation, protocols)</td>
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</table>

Course type:
Exercises

SWS: 4.00
Frequency: WiSe
| Workload attendance | 56 h |
bio405 - Introduction to Neurobiology I

Module label: Introduction to Neurobiology I
Module code: bio405
Credit points: 12.0 KP
Workload: 360 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
- 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.

Reader's advisory:

Links:
- Language of instruction: German
- Duration (semesters): 1 Semester
- Module frequency: annually
- Module capacity: 30
- Reference text: associated with the modules bio415 and bio416 Introduction to Neurobiology II in the winter semester
- Modullevel: AS (Akzentsetzung / Accentuation)
- Modulart: Wahlpflicht / Elective
- Lern-/Lehrform / Type of program: lecture, seminar, exercise
- Vorkenntnisse / Previous knowledge: Basics in physiology and cellular biology

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**

<table>
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<th>Module label</th>
<th>Introduction to Neurobiology II</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>
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</table>

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

**Contact person**
- Module responsibility
  - Georg Martin Klump
- Authorized examiners
  - Georg Martin Klump
  - Christiane Margarete Thiel
  - Christine Köppl
  - Martin Greschner
  - Jannis Hildebrandt
- Module counseling
  - Christiane Margarete Thiel
  - Christine Köppl
  - Martin Greschner
  - Jannis Hildebrandt

**Entry requirements**

**Skills to be acquired in this module**
- ++ deepened biological expertise
- ++ deepened knowledge of biological working methods
- + scientific/mathematical basic knowledge relevant for biology
- + critical and analytical thinking

**Module contents**
The lecture covers the basics of systemic neuroscience with a focus on processing in sensory systems, the plasticity of the nervous system and the mechanisms underlying cognitive processing. In the seminar, topics related to the lectures of the week are covered in more depth.

**Reader’s advisory**

**Links**

**Language of instruction**
- German

**Duration (semesters)**
- 1 Semester

**Module frequency**

**Module capacity**
- 30

**Modullevel**
- AS (Akzentsetzung / Accentuation)

**Modulart**
- Wahlpflicht / Elective

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

**Vorkenntnisse / Previous knowledge**
- Basics in physiology and perception

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<tr>
<th>Examination</th>
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**Course type**

<table>
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<tr>
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**Total time of attendance for the module**
- 56 h
bio416 - Experiments in Neurobiology II

Module label
Experiments in Neurobiology II

Module code
bio416

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
- Georg Martin Klump

Authorized examiners
- Georg Martin Klump
- Christiane Margarete Thiel
- Ulrike Langemann

Module counseling
- Christiane Margarete Thiel
- Ulrike Langemann

Entry requirements
bio415 "Introduction to Neurobiology II"

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

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

Reader's advisory

Links

Language of instruction
German

Duration (semesters)
1 Semester

Module frequency
annually

Module capacity
30

Modullevel
AS (Akzentsetzung / Accentuation)

Modulart
Wahlpflicht / Elective

Type of exam
portfolio (data analysis, presentation)

Vorkenntnisse / Previous knowledge
Neurobiology II

Final exam of module
end of module

Course type
Exercises

SWS
4.00

Frequency
WiSe

Workload attendance
56 h
## bio385 - Specific Microbiology

<table>
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<tr>
<td>Module code</td>
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<td>Workload</td>
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<td>• Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodul</td>
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<tr>
<td>Contact person</td>
<td>Module responsibility</td>
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<tr>
<td></td>
<td>• Ralf Andreas Rabus</td>
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<td></td>
<td>• Daniel Wünsch</td>
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<tr>
<td>Authorized examiners</td>
<td>Ralf Andreas Rabus</td>
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<td></td>
<td>• Daniel Wünsch</td>
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<td>bio233 Basics in microbiology and genetics</td>
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<td>bio265 general microbiology</td>
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<td>Wahlpflicht / Elective</td>
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<td>Lern-/Lehrform / Type of program</td>
<td>lecture, seminar, exercise</td>
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<td>Vorkenntnisse / Previous knowledge</td>
<td>chemistry</td>
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<td>protocol (50%)</td>
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<td>2.00</td>
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bio420 - Biochemistry of the Cell

Module label: Biochemistry of the Cell
Module code: bio420
Credit points: 6.0 KP
Workload: 180 h

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

Contact person:
- Module responsibility: Alexander Scholten
- Authorized examiners: Alexander Scholten

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

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

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

Links:
- Language of instruction: German
- Duration (semesters): 1 Semester
- Module frequency: annually
- Module capacity: 20
- Modullevel: AS (Akzentsetzung / Accentuation)
- Modulart: Wahlpflicht / Elective
- Lern-/Lehrform / Type of program: lecture, seminar, exercise
- Vorkenntnisse / Previous knowledge: Biochemistry

Examination:
- Final exam of module: during the semester, oral presentation
- Course type:
  - Lecture: 1.00 SWS, WISe, 14 h
  - Exercises: 1.00 SWS, WISe, 14 h
  - Seminar: 2.00 SWS, WISe, 28 h
- Total time of attendance for the module: 56 h
bio430 - Analytical Biochemistry

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

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

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

Entry requirements:

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

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

Module contents:
Bioanalytical methods in theory and practice

Reader's advisory:
Bioanalytik, Lottspeich/Engels

Links:

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

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

Vorkenntnisse / Previous knowledge:
Biochemistry and Molecular Biology

Examination:
Type of examination:
oral presentation and protocoll

Final exam of module:
- during semester
- SWS
- Frequency
- Workload attendance

Course type:
Lecture: 1.00
Seminar: 1.00
Exercises: 2.00

Total time of attendance for the module: 56 h
bio440 - Microfauna, Microflora & Protista of limnic and marine habitats

Module label
Microfauna, Microflora & 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 > Akzentsetzungsmodul
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodul

Contact person
Module responsibility
- Wilko Ahlrichs

Authorised examiners
- Wilko Ahlrichs
- Alexander Kienke
- Mona Hoppenrath

Module counseling
- Alexander Kienke
- Mona Hoppenrath

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

The objectives of the module are the teaching and learning of methods in the field of taxonomy, systematics, morphology, ecology, and evolution. Competencies for finding, identifying, preparing, micro-copying, illustrating, describing, and publishing species are taught. It teaches 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 analyses are investigated. The students will create art portraits. The results are communicated in the form of posters, short lectures, and scientific publications.

Reader's advisory
Will be announced in the course.

Links
Language of instruction
German

Duration (semesters)
1 Semester

Module frequency
irregular

Module capacity
12

For more applicants than places, a motivation letter decides on the admission. 
<table>
<thead>
<tr>
<th>Modullevel</th>
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</thead>
<tbody>
<tr>
<td>Modulart</td>
<td>je nach Studiengang Pflicht oder Wahlpflicht</td>
</tr>
<tr>
<td>Lern-/Lehrform / Type of program</td>
<td></td>
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<tr>
<td>Vorkenntnisse / Previous knowledge</td>
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<table>
<thead>
<tr>
<th>Final exam of module</th>
<th>Portfolio</th>
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</thead>
<tbody>
<tr>
<td>Course type</td>
<td>Comment</td>
</tr>
<tr>
<td>Study trip</td>
<td>1.00</td>
</tr>
<tr>
<td>Seminar</td>
<td>1.00</td>
</tr>
<tr>
<td>Exercises</td>
<td>2.00</td>
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</tbody>
</table>

| Total time of attendance for the module | 56 h |

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-Fächer-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 mis-takes.

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

### Reader's advisory
None. The relevant scientific literature will be distributed during the course.

### Links
- Languages of instruction: German, English
- Duration (semesters): 1 Semester
- Module frequency: annually
- Module capacity: 10 (Letter of motivation)
- Modullevel: AS (Akzentsetzung / Accentuation)
- Modulart: Wahlpflicht / Elective
- Lern-/Lehrform / Type of program: exercise
- Vorkenntnisse / Previous knowledge: Experience with the use of Microsoft Excel (or programs with graphing capabilities), Adobe Photoshop, and Microsoft PowerPoint or Keynote (or similar programs).

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<th>Type of examination</th>
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<tr>
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<td>Portfolio (100%)</td>
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<table>
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<td>Exercises</td>
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<td>Frequency</td>
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<tr>
<td>Workload attendance</td>
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## bio460 - Diversity of marine Invertebrates

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<td>Module code</td>
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<td>Credit points</td>
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<tr>
<td></td>
<td>- Fach-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
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<tr>
<td></td>
<td>- Master of Education (Gymnasium) Biologie &gt; Mastermodule</td>
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<td></td>
<td>- Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodul</td>
</tr>
<tr>
<td>Contact person</td>
<td>Thomas Glatzel</td>
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<tr>
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<td></td>
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<tr>
<td></td>
<td>Thomas Glatzel</td>
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<tr>
<td>Entry requirements</td>
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<tr>
<td>Skills to be acquired in this module</td>
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</tr>
<tr>
<td></td>
<td>++ biological knowledge</td>
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<tr>
<td></td>
<td>+ knowledge of biological working methods</td>
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<tr>
<td></td>
<td>+ interdisciplinary knowledge &amp; thinking</td>
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<td></td>
<td>++ deepened expertise in biological specialist field</td>
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<td></td>
<td>++ independent learning and (research-based) working</td>
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<td>+ teamwork</td>
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<td></td>
<td>++ (scientific) communication skills</td>
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<tr>
<td></td>
<td>++ project and time management</td>
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<tr>
<td></td>
<td>+ knowledge of safety and environmental issues</td>
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</tbody>
</table>

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


GRUNER, 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.


WESTHEIDE, W. & R., RIEGER, 2013: Spezielle Zoologie. Band I, II. Gustav Fischer Verlag, Stuttgart, Jena. The textbook absolute! My explicit recommendation! The literature listed above is available in the university library in Weychloy. Further reading will be recommended in the course of the lecture.

Literature inquiry:
- web of science: [http://zbix10.uni-regensburg.de/dbinfo/dbliste.php?bib_id=ubol&colors=7&colors=7&gebiete=5 - Data banks (DBIS) - Biology - TOP Data banks e.g. ASFA, Science Citation Index, Zoological Record](http://www.biodiversitylibrary.org/bibliography/14107)
- [http://scholar.google.de/](http://scholar.google.de/)
- [http://www.vifabio.de](http://www.vifabio.de)
- Open access journals: [http://www.doaj.org/ - www.plosone.org](http://www.doaj.org/)

### Links

<table>
<thead>
<tr>
<th>Language of instruction</th>
<th>German</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration (semesters)</td>
<td>1 Semester</td>
</tr>
<tr>
<td>Module frequency</td>
<td>annually</td>
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<tr>
<td>------------------------</td>
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<tr>
<td>Module capacity</td>
<td>15</td>
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<td>Modullevel</td>
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<tr>
<td>Modulart</td>
<td>Wahlpflicht / Elective</td>
</tr>
<tr>
<td>Lern-/Lehrform / Type of program</td>
<td>seminar, exercise</td>
</tr>
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</table>

**Vorkenntnisse / Previous knowledge**

<table>
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<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 lecture</td>
<td>portfolio</td>
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</tbody>
</table>

**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>
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<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

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

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

Contact person:
Module responsibility
- Wilko Ahirichs

Authorized examiners
- Wilko Ahirichs
- Alexander Kieneke

Module counseling
- Alexander Kieneke

Entry requirements

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

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

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

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

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

Modullevel: AS (Akzentsetzung / Accentuation)
Modulart: Wahlpflicht / Elective
Lern-Lehrform / Type of program: seminar, exercise, excursion

Vorkenntnisse / Previous knowledge

Final exam of module
Time of examination
Type of examination

Course type | Comment | SWS | Frequency | Workload attendance
--- | --- | --- | --- | ---
Seminar | | 2.00 | SuSe | 28 h
Exercises | | 2.00 | SuSe | 28 h
Study trip | | 2.00 | SuSe | 28 h

Total time of attendance for the module: 84 h
bio480 - Functional Morphology of Plants

Module label
Functional Morphology of Plants

Module code
bio480

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 > Akzentsetzungsmodul

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

Modullevel
AS (Akzentsetzung / Accentuation)

Modulart
Wahlpflicht / Elective

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

Vorkenntnisse / Previous knowledge
Ecology, Flora

Examination

<table>
<thead>
<tr>
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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tbody>
<tr>
<td>Lecture</td>
<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
# Ergänzungsmodul

**bio150 - Statistics for Biologists**

<table>
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<tr>
<th>Module label</th>
<th>Statistics for Biologists</th>
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<tbody>
<tr>
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<td>bio150</td>
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<tr>
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<td>Workload</td>
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| Used in course of study | Fach-Bachelor Biologie > Naturwissenschaftliche Grundlagen
|                       | Zwei-Fächer-Bachelor Biologie > Ergänzungsmodul |
| Contact person        | Jutta Kretzberg            |
| Authorized examiners  | Jutta Kretzberg            |

**Entry requirements**

- Knowledge of biological working methods
- Biologically relevant knowledge in the natural sciences and mathematics
- Statistics & scientific programming
- Interdisciplinary knowledge & thinking
- Abstract, logical, analytical thinking
- Independent learning and (research-based) working
- Data presentation and evidence-based discussion (written and spoken)
- Teamwork

**Skills to be acquired in this module**

- 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
- Module level: EB (Ergänzungsbereich / Complementary)
- Modulart: Pflicht / Mandatory
- Lern-/Lehrform / Type of program: lecture, exercises

**Vorkenntnisse / Previous knowledge**

<table>
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<tr>
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<th>Type of examination</th>
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<td>written exam (+15% bonus points from exercises)</td>
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<tr>
<td>Lecture</td>
<td>2.00</td>
<td>--</td>
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<td>Exercises</td>
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**Total time of attendance for the module**

56 h
bio250 - Biochemistry

<table>
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<tr>
<td>Credit points</td>
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<td>Workload</td>
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<td>Used in course of study</td>
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</table>
  - Fach-Bachelor Biologie > Naturwissenschaftliche Grundlagen  
  - Zwei-Fächer-Bachelor Biologie > Ergänzungsmodule |

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

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

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

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

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

**Links**

**Language of instruction**
German

**Duration (semesters)**
1 Semester

**Module frequency**
jährlich

**Module capacity**
unlimited

**Modullevel**
EB (Ergänzungsbereich / Complementary)

**Modulart**
Wahlpflicht / Elective

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

**Vorkenntnisse / Previous knowledge**

**Examination**
- Time of examination
  - Written examination following the end of lectures or end of the semester.
  - 1 written examination signed minutes

**Final exam of module**
- Type of examination
  - Written 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**

<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>
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<tr>
<td>Tutorial</td>
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<td>0.00</td>
<td>WiSe</td>
<td>0 h</td>
</tr>
<tr>
<td>Seminar</td>
<td></td>
<td>1.00</td>
<td></td>
<td>14 h</td>
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<tr>
<td>Practical</td>
<td></td>
<td>2.00</td>
<td></td>
<td>28 h</td>
</tr>
<tr>
<td>Course type</td>
<td>Comment</td>
<td>SWS</td>
<td>Frequency</td>
<td>Workload attendance</td>
</tr>
<tr>
<td>-------------</td>
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<td>Total time of attendance for the module</td>
<td></td>
<td></td>
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<td>70 h</td>
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</table>
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:
- Final exam of module: written exam (100%)
- Type of examination: Seminar

Course type

SWS

Frequency

Workload attendance: 0 h
### Module Details

**Module Code**: che102  
**Module Label**: Basic Chemistry Laboratory  
**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**

**Links**

**Language of Instruction**: German

**Duration (Semesters)**: 1 Semester

**Module Frequency**: jährlich

**Module Capacity**: unlimited

**Module Level**: BC (Basiccurriculum)

**Modulart**: Pflicht/Wahlpflicht *

**Lern-/Lehrform / Type of Program**

**Vorkenntnisse / Previous Knowledge**

**Examination**  
<table>
<thead>
<tr>
<th>Time of Examination</th>
<th>Type of Examination</th>
<th>Final Exam of Module</th>
<th>Type of Examination</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>not graded</td>
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</tbody>
</table>

**Course Type**: Seminar

**SWS**

**Frequency**

**Workload Attendance**: 0 h
### che190 - Basic Organic Chemistry

<table>
<thead>
<tr>
<th><strong>Module label</strong></th>
<th>Basic Organic Chemistry</th>
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</thead>
<tbody>
<tr>
<td><strong>Module code</strong></td>
<td>che190</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>
</tr>
</tbody>
</table>

**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 > Ergänzungsmodul
- Zwei-Fächer-Bachelor Chemie > Aufbaumodule

**Contact person**
- Module responsibility
  - Jens Christoffers
- Authorized examiners
  - Sven Doye
  - Jens Christoffers
  - Gerhard Hilt
- Module counseling
  - Sven Doye
  - Gerhard Hilt
  - 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** | 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** |  | written exam

**Course type** | Lecture
**SWS** | 0.00
**Frequency** | WiSe
**Workload attendance** | 0 h
che290 - Experimental Organic Chemistry

<table>
<thead>
<tr>
<th>Module label</th>
<th>Experimental Organic Chemistry</th>
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</thead>
<tbody>
<tr>
<td>Module code</td>
<td>che290</td>
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<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
</tr>
</tbody>
</table>

**Used in course of study**

- Fach-Bachelor Biologie > Naturwissenschaftliche Grundlagen
- Master of Education (Wirtschaftspädagogik) Chemie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Ergänzungsmodul
- 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: je nach Studiengang Pflicht oder Wahlpflicht

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

- Vorkenntnisse / Previous knowledge:

**Examination**

- Type of examination

**Final exam of module**

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seminar</td>
<td></td>
<td>3.00</td>
<td></td>
<td>42 h</td>
</tr>
<tr>
<td>Practical</td>
<td></td>
<td>3.00</td>
<td></td>
<td>42 h</td>
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**Total time of attendance for the module**

84 h
<table>
<thead>
<tr>
<th>mat980 - Mathematics for the Life Sciences</th>
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<tbody>
<tr>
<td><strong>Module label</strong></td>
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<tr>
<td><strong>Module code</strong></td>
</tr>
<tr>
<td><strong>Credit points</strong></td>
</tr>
<tr>
<td><strong>Workload</strong></td>
</tr>
</tbody>
</table>
| **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 |
| **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                                  | 3.00 | | 42 h |
| Exercises                                | 1.00 | | 14 h |
| **Total time of attendance for the module** | | | 56 h |
phy910 - Physics for Students of Biology and Dual Subject Chemistry

Module label  Physics for Students of Biology and Dual Subject Chemistry
Module code  phy910
Credit points  6.0 KP
Workload  180 h

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

Contact person  Module responsibility
- Manuela Schiek
- Gerd Gülker

Authorized examiners  
- Alle hier genannten

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  BM (Basismodul)
Modulart  Ergänzung/Professionalisierung

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination  Time of examination  Type of examination

Final exam of module  1 written exam or 1 oral exam

Course type  Seminar

SWS

Frequency

Workload attendance  0 h
# bio251 - Exercises in Biochemistry and Molecular Biology

<table>
<thead>
<tr>
<th><strong>Module label</strong></th>
<th>Exercises in Biochemistry and Molecular Biology</th>
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</thead>
<tbody>
<tr>
<td><strong>Module code</strong></td>
<td>bio251</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>
</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

German

## Duration (semesters)

1 Semester

## Module frequency

unlimited

## Module level

EB (Ergänzungsbereich / Complementary)

## Module type

Pflicht / Mandatory

## Vorkenntnisse / Previous knowledge

Biochemistry and Cell Biology

## Examination

<table>
<thead>
<tr>
<th>Course type</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seminar</td>
<td>during semester</td>
<td>written exam; additionally ungraded protocols</td>
</tr>
<tr>
<td>Exercises</td>
<td></td>
<td></td>
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</table>

## Workload

<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>Seminar</td>
<td>1.00</td>
<td></td>
<td>SuSe</td>
<td>14 h</td>
</tr>
<tr>
<td>Exercises</td>
<td>3.00</td>
<td></td>
<td>SuSe</td>
<td>42 h</td>
</tr>
</tbody>
</table>

## 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>
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<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>
</tbody>
</table>
| Skills to be acquired in this module | ++ biological knowledge  
++ knowledge of biological working methods  
+ statistics & scientific programming  
+ 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 |
| Module contents    |                          |
| Reader's advisory  |                          |
| Links              |                          |
| Languages of instruction |                      |
| Duration (semesters) | 1 Semester            |
| Module frequency   |                          |
| Module capacity    | unlimited               |
| Modulart           | je nach Studiengang Pflicht oder Wahlpflicht |
| Lern-/Lehrform / Type of program |                     |
| Vorkenntnisse / Previous knowledge |                  |
| Examination        | Time of examination      |
| Type of examination|                          |
| Final exam of module |                          |
| Course type        | Seminar                  |
| SWS                |                          |
| Frequency          |                          |
| Workload attendance | 0 h                      |
**Frühere Module**

**che100 - Introduction to Chemistry**

<table>
<thead>
<tr>
<th>Module label</th>
<th>Introduction to Chemistry</th>
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<tbody>
<tr>
<td>Module code</td>
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<tr>
<td>Credit points</td>
<td>12.0 KP</td>
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<tr>
<td>Workload</td>
<td>360 h</td>
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**Used in course of study**
- Fach-Bachelor Biologie > Frühere Module
- Fach-Bachelor Chemie > Basismodule
- Zwei-Fächer-Bachelor Biologie > Frühere Module
- Zwei-Fächer-Bachelor Chemie > Basismodule

**Contact person**
- Module responsibility
  - Thomas Müller
  - Rüdiger Beckhaus
- Authorized examiners
  - Rüdiger Beckhaus
  - Thomas Müller
- Module counseling
  - Lena Albers

**Entry requirements**

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Links**

**Language of instruction** | German
**Duration (semesters)**     | 1 Semester
**Module frequency**
**Module capacity**           | unlimited
**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**

<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>
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</tr>
<tr>
<td>Exercises</td>
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<td>14 h</td>
</tr>
<tr>
<td>Practical</td>
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<td>6.00</td>
<td></td>
<td>84 h</td>
</tr>
<tr>
<td>Seminar</td>
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<td>0 h</td>
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</table>

**Total time of attendance for the module** 154 h