## Modules for Biology

### Basismodule

**bio210 - General Biology**

<table>
<thead>
<tr>
<th>Module name</th>
<th>General Biology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio210</td>
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<tr>
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<td>12.0 KP</td>
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<tr>
<td>Workload</td>
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</table>

#### Used in degree programmes

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

#### Contact person

- module responsibility
  - Gabriele Gerlach
- authorized examiners
  - Alle hier genannten
- Module counseling
  - Gerhard Wolfgang Zotz

#### Prerequisites

**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"

#### Recommended reading

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

#### Links

- Language of instruction: German
- Duration (semesters): 2 semester
- Module frequency: jährlich
- Module capacity: unlimited
- Modulart: je nach Studiengang Pflicht oder Wahlpflicht

#### Examination

- Type of examination: written examination either in the final week of the semester or in the first week of the semester vacation
- Examination periods: One written examination in the winter and summer terms (50 % each)

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

#### Course type

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Offer rhythm</th>
<th>Workload attendance</th>
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<td>-------------</td>
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<tr>
<td>Tutorial</td>
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<td></td>
<td>WinSem</td>
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<tr>
<td>Seminar (PFLICHT für Erstsemester!)</td>
<td>Pflichtveranstaltung für alle Studierenden im 1. Semester (Bachelor und Master)</td>
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<td>SumSem and WinSem</td>
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**Total attendance time of module** 112 h
### bio220 - Introductory Zoology-Botany

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<tbody>
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<tr>
<td><strong>ECTS credit points</strong></td>
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<tr>
<td><strong>Workload</strong></td>
<td>270 h</td>
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<tr>
<td><strong>Used in degree programmes</strong></td>
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</table>
  - Fach-Bachelor Biologie > Basismodule  
  - Zwei-Fächer-Bachelor Biologie > Basismodule |
| **Contact person** |  
  - module responsibility  
    - Gerhard Wolfgang Zotz  
    - Olaf Bininda-Emonds  
  - authorized examiners  
    - Alle hier genannten  
  - Module counseling  
    - Wilko Ahlrichs  
    - Thomas Glatzel |

### Prerequisites

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.  

### Recommended reading

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


Language of instruction: German
Duration (semesters): 1 semester
Module frequency: jährlich (yearly)
Module capacity: unlimited
Module level: BC (Basiscurriculum / Base curriculum)
Module art: Pflicht / Mandatory

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

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

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Offer rhythm</th>
<th>Workload attendance</th>
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<tbody>
<tr>
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<tr>
<td>Exercises</td>
<td>4</td>
<td>56 h</td>
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<tr>
<td>Tutorial</td>
<td>WinSem</td>
<td>0 h</td>
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### bio230 - Microbiology and Cell Biology

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<tbody>
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<td>Workload</td>
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<td></td>
<td>Fach-Bachelor Biologie &gt; Basismodule</td>
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<td></td>
<td>Zwei-Fächer-Bachelor Biologie &gt; Basismodule</td>
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<tr>
<td>Contact person</td>
<td>module responsibility</td>
</tr>
<tr>
<td></td>
<td>» Ralf Andreas Rabus</td>
</tr>
<tr>
<td></td>
<td>authorized examiners</td>
</tr>
<tr>
<td></td>
<td>» Alle hier genannten</td>
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<tr>
<td></td>
<td>Module counseling</td>
</tr>
<tr>
<td></td>
<td>» Hans Gerd Nothwang</td>
</tr>
<tr>
<td></td>
<td>» Maike Claußen</td>
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<tr>
<td>Prerequisites</td>
<td>** biological knowledge</td>
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<tr>
<td></td>
<td>++ knowledge of biological working methods</td>
</tr>
<tr>
<td></td>
<td>+ biologically relevant knowledge in the natural sciences and mathematics</td>
</tr>
<tr>
<td></td>
<td>+ abstract, logical, analytical thinking</td>
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<td></td>
<td>+ deepened expertise in biological specialist field</td>
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<td></td>
<td>+ teamwork</td>
</tr>
<tr>
<td>Theory:</td>
<td>Basic knowledge in Biochemistry, Microbiology, Cell Biology and Genetics</td>
</tr>
<tr>
<td>Practice:</td>
<td>Basic methodological skills acquired by performing experiments</td>
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<tr>
<td>Module contents</td>
<td>Fundamentals of Microbiology and Cell Biology:</td>
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<tr>
<td></td>
<td>Molecules of life; energy and enzymes; central metabolism; breathing; photosynthesis; anaerobic metabolism;</td>
</tr>
<tr>
<td></td>
<td>chemolithotrophy; procaryotic and eucaryotic cell structures; microbial diversity; importance of microorganisms for human beings, plants, animals, biotechnology and earth system</td>
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<tr>
<td></td>
<td>cell group; signal transmission and communication between cells; meiosis; mitosis; mendelian inheritance;</td>
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<tr>
<td></td>
<td>chromosomal and molecular basis of inheritance; replication; transcription; translation; genomic organization;</td>
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<tr>
<td></td>
<td>mutation and repair.</td>
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<tr>
<td>Recommended reading</td>
<td>Purves et al., Biologie (Spektrum Verlag), latest edition</td>
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<td></td>
<td>Campbell, Pearson Verlag, latest edition</td>
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<td></td>
<td>Fuchs, Allgemeine Mikrobiologie (Thieme Verlag), latest edition</td>
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<td>Lodisch et al., Molekulare Zeitbiologie (Spektrum Verlag), latest edition</td>
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<tr>
<td>Links</td>
<td>Language of instruction</td>
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<td>German</td>
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<tr>
<td>Duration (semesters)</td>
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<tr>
<td>Module frequency</td>
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<td>Modulart</td>
<td>Pflicht / Mandatory</td>
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<td>Lern-Lehrform / Type of program</td>
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<tr>
<td>Vorkenntnisse / Previous knowledge</td>
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<td></td>
<td>1 written examination (50%) following the part Cell Biology</td>
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<td>Course type</td>
<td>Comment</td>
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<td>Exercises</td>
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Aufbaumodule

bio100 - Introduction into Didactics of Biology

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<tbody>
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<tr>
<td></td>
<td>- Corinna Hößle</td>
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<tr>
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<td>authorized examiners</td>
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<td>- Alle hier genannten</td>
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<td>Module counceling</td>
</tr>
<tr>
<td></td>
<td>- Wiebke Rathje</td>
</tr>
</tbody>
</table>

Prerequisites

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 everydays practice (micro-teaching). During the second half of the module the students will be able to conceive and reflect own concepts of teaching. Furthermore the possibilities of studying in out-of-school-facilities will be fathomed, excursions planned, realized and reflected.

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

Module contents

3. semester: seminar
Introduction to curricular standards, media, methods, social forms, concepts of pupils, instruments of diagnosis, natural scientific methods, culture of exercises in biological classes. Construction of teaching that considers social matters and the environment of the pupils.

4. semester: seminar and excursions
Forms and places for teaching biology, methods and media for teaching biological contents in different spheres of activity (scientific museums, botanical and zoological gardens, regional environmental centers, the Wadden Sea national park).

Recommended reading


Links

Language of instruction: German
Duration (semesters): 2 semester
Module frequency: jährlich
Module capacity: unlimited
Module level: AM (Aufbaumodul)
Modulart: Pflicht

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

<table>
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<th>Examination</th>
<th>examination periods</th>
<th>Type of examination</th>
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<td>Papers have to be presented or handed in: one week after the end of the course</td>
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Course type: Seminar

SWS: 4
Offer rhythm:
Workload attendance: 56 h
bio110 - Practical Biology Experiments for Science Education

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<td>Workload</td>
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<td>Zwei-Fächer-Bachelor Biologie &gt; Aufbaumodule</td>
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<tr>
<td>Contact person</td>
<td>module responsibility</td>
</tr>
<tr>
<td></td>
<td>- Corinna Hößle</td>
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<tr>
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<td>- N. N. authorized examiners</td>
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<td>- Alle hier genannten</td>
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<td>Module counseling</td>
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<td>- Wiebke Rathje</td>
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<td>Prerequisites</td>
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<tr>
<td>Skills to be acquired in this module</td>
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<tr>
<td>Module contents</td>
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<tr>
<td>Recommended reading</td>
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<td>Duration (semesters)</td>
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<td>Module capacity</td>
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<td>Modullevel</td>
<td>MM (Mastermodul)</td>
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<td>Modulart</td>
<td>Ergänzung/Professionalisierung</td>
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<td>Lern-/Lehrform / Type of program</td>
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<tr>
<td>Vorkenntnisse / Previous knowledge</td>
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<td>Examination</td>
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</tr>
<tr>
<td>examination periods</td>
<td></td>
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<tr>
<td>Type of examination</td>
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<tr>
<td>Final exam of module</td>
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<td>Course type</td>
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<tr>
<td>Comment</td>
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<tr>
<td>SWS</td>
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<td>Offer rhythm</td>
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<td>Workload attendance</td>
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<tr>
<td>Seminar</td>
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<tr>
<td>Practical</td>
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<tr>
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bio245 - Flora and Fauna

Module name: Flora and Fauna
Module code: bio245
ECTS credit points: 9.0 KP
Workload: 270 h

Used in degree programmes:
- Master of Education (Sonderpädagogik) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Aufbaumodule

Contact person:
- module responsibility
  - Dirk Carl Albach
  - Thomas Glatzel
- authorized examiners
  - Alle hier genannten
- Module counseling
  - Klaus Bernhard von Hagen

Prerequisites:

Skills to be acquired in this module:
- 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.

Recommended reading:
- 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

Vorkenntnisse / Previous knowledge

Examination examination periods Type of examination
Final exam of module Botany: Written examination before the end of the lecture Zoology: Written examination before the end of the lecture 1 written examination (Botany 50 %) 1 written examination (Zoology 50 %) ungraded minutes

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

Course type Comment SWS Offer rhythm Workload attendance
Lecture 2 28 h
Exercises 4 56 h
Study trip 1 14 h

Total attendance time of module 98 h
# bio265 - General Microbiology

<table>
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<tbody>
<tr>
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<tr>
<td>ECTS credit points</td>
<td>9.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>270 h</td>
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<tr>
<td>Used in degree programmes</td>
<td>Zwei-Fächer-Bachelor Biologie &gt; Aufbaumodule</td>
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</tbody>
</table>

## Contact person
- module responsibility
  - Ralf Andreas Rabus
- authorized examiners
  - Alle hier genannten
- Module counseling
  - Erhard Rhiel
  - Lars Wöhlbrand

## Prerequisites

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

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

### Recommended reading
- 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

### Modulelevel
AC (Aufbaucurriculum)

### Modulart
Wahlpflicht

## Examination

### Vorkenntnisse / Previous knowledge

### Examination

<table>
<thead>
<tr>
<th>Final exam of module</th>
<th>examination periods</th>
<th>Type of examination</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>1 written examination</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>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Offer rhythm</th>
<th>Workload attendance</th>
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<tbody>
<tr>
<td>Lecture</td>
<td>2</td>
<td>28 h</td>
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<tr>
<td>Seminar</td>
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<tr>
<td>Practical</td>
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<td>56 h</td>
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## Total attendance time of module
98 h
bio275 - Basic Concepts in Animal Physiology

Module name: Basic Concepts in Animal Physiology
Module code: bio275
ECTS credit points: 9.0 KP
Workload: 270 h

- Used in degree programmes:
  - Fach-Bachelor Mathematik > Nebenfachmodule
  - Zwei-Fächer-Bachelor Biologie > Aufbaumodule

Contact person:
- module responsibility: Dominik Heyers
- authorized examiners: Alle hier genannten
- Module counseling: Christine Köppl, Karin Dedek

Prerequisites:
++ 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

Skills to be acquired in this module:
- Basic knowledge on physiological processes and their underlying mechanisms with a focus on human physiology. Performing, analysing and documenting physiological experiments.

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

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

Links:

Language of instruction: German
Duration (semesters): 1 semester
Module frequency: jährlich
Module capacity: unlimited

Module level:
---

Lern-/Lehrform / Type of program:
je nach Studiengang Pflicht oder Wahlpflicht

Vorkenntnisse / Previous knowledge:

Examination:
- examination periods: within a few weeks after the winter term lecture period
- Type of examination: written exam (100%)

To qualify for the exam, the following additional requirements need to be met:
- regular participation in the laboratory experiments (no more than 1 day of absence)
- lab protocols for each experiment which have been accepted by the respective supervisors

A cumulative bonus can be obtained with good lab protocols. The decision whether a given protocol
Examination examination periods Type of examination

<table>
<thead>
<tr>
<th>Examination</th>
<th>examination periods</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

The bonus improves the exam mark by maximally two steps (0.7). The bonus is optional, an exam mark of 1.0 is achievable without a bonus. A bonus cannot be applied to pass a failed exam.

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

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Offer rhythm</th>
<th>Workload attendance</th>
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### Module Details

**Module code**: bio285  
**ECTS credit points**: 9.0 KP  
**Workload**: 270 h  

**Used in degree programmes**:  
- Zwei-Fächer-Bachelor Biologie > Aufbaumodule

**Contact person**  
- **module responsibility**: Sascha Laubinger  
- **authorized examiners**: Alle hier genannten  
- **Module counseling**: Gerhard Wolfgang Zotz

### Prerequisites

**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

#### Recommended reading

- German

### Language of instruction

- German

### Duration (semesters)

- 1 semester

### Module frequency

- jährlich

### Module capacity

- unlimited

### Module level

- ---

### Modulart

- je nach Studiengang Pflicht oder Wahlpflicht

### Lern-/Lehrform / Type of program

- ---

### Vorkenntnisse / Previous knowledge

**Exam period / Type of examination**

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<th>Offer rhythm</th>
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</tr>
<tr>
<td>Practical</td>
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### Type of examination

- Final exam of module

---

14 / 47
**bio295 - Genetics**

**Module name**  Genetics

**Module code**  bio295

**ECTS credit points**  9.0 KP

**Workload**  270 h

**Used in degree programmes**
- Master of Education (Sonderpädagogik) Biologie > Frühere Module
- Zwei-Fächer-Bachelor Biologie > Aufbaumodule

**Contact person**

- Module responsibility
  - Maike Claußen
- Authorized examiners
  - Alle hier genannten
- Module counseling
  - Anna-Maria Hartmann
  - Hans Gerd Nothwang

**Prerequisites**

**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

**Recommended reading**


**Links**

**Language of instruction**  German

**Duration (semesters)**  1 semester

**Module frequency**  jährlich

**Module capacity**  unlimited

**Modulart**  je nach Studiengang Pflicht oder Wahlpflicht

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

**Vorkenntnisse / Previous knowledge**

**Examination**

<table>
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<th>Type of examination</th>
<th>Written examination (100%), ungraded presentation</th>
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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>Offer rhythm</th>
<th>Workload attendance</th>
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**Akzentsetzungsmodul**

**bio300 - Evolutionary Biology**

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<th>Module name</th>
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<tr>
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**Used in degree programmes**
- 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

**Prerequisites**

**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.

**Module contents**
The lecture imparts basic knowledge in areas including population biology, phylogenetic systematics, phyloinformatics, behavioral and reproduction ecology.

These fundamentals are extended in the seminar and exercises.

**Recommended reading**

**Links**

**Language of instruction**
- German

**Duration (semesters)**
- 1 semester

**Module frequency**
- jährlich

**Module capacity**
- unlimited

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

**Modulart**
- Wahlpflicht / Elective

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

**Vorkenntnisse / Previous knowledge**

**Examination**

**examination periods**

**Type of examination**

**Final exam of module**

Written examination in the final week of the semester or in the first week following the lecture period.

Written examination (60%)

Portfolio (40%)

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

**Course type**

**Comment**

**SWS**

**Offer rhythm**

**Workload attendance**
<table>
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<td>Seminar</td>
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**Total attendance time of module**

140 h
### bio310 - General Ecology

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<th><strong>Module name</strong></th>
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<td><strong>Workload</strong></td>
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**Used in degree programmes**
- Fach-Bachelor Biologie > Akzentsetzungsmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule

**Contact person**
- module responsibility
  - Helmut Hillebrand
  - authorized examiners
    - Alle hier genannten

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

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

**Module contents**

**Recommended reading**

**Links**

**Language of instruction** | German
---|---

**Duration (semesters)** | 2 semester
**Module frequency** | jährlich
**Module capacity** | unlimited
**Modullevel** | AS (Akzentsetzung / Accentuation)
**Modulart** | Wahlpflicht / Elective

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

**Vorkenntnisse / Previous knowledge**

**Examination**

<table>
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<tr>
<td>Seminar</td>
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**Total attendance time of module** | 84 h
# bio320 - Pollination and Dispersal Biology

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<th>Module name</th>
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<tbody>
<tr>
<td>Module code</td>
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<td>Workload</td>
<td>450 h</td>
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</table>

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

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

**Prerequisites**

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

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

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

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

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

**Examination**

**Type of examination**
- Final exam of module: Four weeks after the end of the exercises at the latest.
- 1 Portfolio

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

**Course type**

<table>
<thead>
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bio330 - Marine Ecology

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<td>Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
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</table>

Contact person

- module responsibility
  - Helmut Hillebrand

- authorized examiners
  - Alle hier genannten

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 properties of the water, waves, tides, global distribution of water masses and currents. Pelagic communities, plankton (phyto-, 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.

Recommended reading

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)
Type of program: Wahlpflicht / Elective
### Vorkenntnisse / Previous knowledge

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

<table>
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<td>Exercises</td>
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bio340 - Morphology, Phylogeny, and Evolution of Metazoa

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<td>Used in degree programmes</td>
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<td>• Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodul</td>
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<td>module responsibility</td>
</tr>
<tr>
<td></td>
<td>• Olaf Bininda-Emonds</td>
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<td>• Alle hier genannten</td>
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<td></td>
<td>• Wilko Ahlrichs</td>
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<td>+ knowledge of biological working methods</td>
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<td>+ biologically relevant knowledge in the natural sciences and mathematics</td>
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<td>+ statistics &amp; scientific programming</td>
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<td>+ interdisciplinary knowledge &amp; thinking</td>
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<td>+ deepened expertise in biological specialist field</td>
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<td></td>
<td>+ teamwork</td>
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<tr>
<td></td>
<td>+ (scientific) communication skills</td>
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<tr>
<td></td>
<td>+ project and time management</td>
</tr>
<tr>
<td>Skills to be acquired in this module</td>
<td>** Upon successful completion of the module the students will gain: 1. a survey of topical subjects relating to the morphology and phylogeny of animals, 2. a thorough knowledge of the development of morphological characteristics, 3. technical skills in studying morphological structures, and 4. knowledge into recent hypotheses on the phylogeny of animals.</td>
</tr>
<tr>
<td>Module contents</td>
<td>Lecture: Details regarding the morphology and evolution of Metazoa from an explicit phylogenetic framework</td>
</tr>
<tr>
<td></td>
<td>Seminar: Presentation and discussion of recent subjects and issues relating to the evolution of Metazoa; presentation of individual metazoan taxa</td>
</tr>
<tr>
<td></td>
<td>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)</td>
</tr>
<tr>
<td>Recommended reading</td>
<td>Relevant literature will be announced during the first seminar and is contingent on the latest developments in the research field.</td>
</tr>
<tr>
<td>Links</td>
<td>Language of instruction</td>
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<td>Modulart</td>
<td>Wahlpflicht / Elective</td>
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</table>

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

<table>
<thead>
<tr>
<th>Examination</th>
<th>examination periods</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final exam of module</td>
<td>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.</td>
<td>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.</td>
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Course type

<table>
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<th>Offer rhythm</th>
<th>Workload attendance</th>
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<tr>
<td>Lecture</td>
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<tr>
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<tr>
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</table>

**Total attendance time of module**

126 h
bio350 - Organismic Microanatomy

Module name: Organismic Microanatomy
Module code: bio350
ECTS credit points: 15.0 KP
Workload: 450 h

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

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

Prerequisites:
- ++ 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:

Recommended reading:

Links:

Language of instruction: German
Duration (semesters): 1 semester
Module frequency: jährlich
Module capacity: unlimited

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

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination

<table>
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<th>Type of examination</th>
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<tbody>
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<td></td>
<td></td>
<td>Master of Education: 1 oral exam</td>
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</table>

<table>
<thead>
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<th>Comment</th>
<th>SWS</th>
<th>Offer rhythm</th>
<th>Workload attendance</th>
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<tbody>
<tr>
<td>Lecture</td>
<td>3</td>
<td>42 h</td>
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<td>Exercises</td>
<td>5</td>
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Total attendance time of module: 126 h
bio360 - Marine Biodiversity

Module name: Marine Biodiversity
Module code: bio360
ECTS credit points: 15.0 KP
Workload: 450 h

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

Contact person:
- Thomas Glatzel
- Alle hier genannten

Module counseling:
- Pedro-Miguel Martinez-Arbizu
- Mona Hoppenrath

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

Skills to be acquired in this module:

By active participation the students acquire the following knowledge/abilities/qualification:
* Preparation and organization of sampling
* Keeping organisms – field study
* Marine deposits, development of marine sediments and their effects on the fauna
* Methods of meiofauna and macrofauna sampling, also plankton sampling
* Methods of quantitative community analysis
* Diversity comparison of various sites applying statistical methods
* Multivariate statistics for correlation of biocenoses and environmental variables
* Biocenoses of marine habitats
* Biology, morphology, systematics, behaviour and ecology of selected taxa in marine water systems
* Formulation and definition of scientific questions and selection of methods
* Habitat and biocenoses, interstitial, littoral (lotic, lenitic), diversity
* Planning behavioural experiments
* Presentation and discussion of scientific results
* Independent scientific work in groups and presentation of results

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

Recommended reading:
RUNDLE, S.D., ROBERTSON, A.L. & J.M. SCHMID-ARAYA, 2002: Freshwater meiofauna: Biology and

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

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

Links
Language of instruction
German
Duration (semesters)
1 semester
Module frequency
jährlich
Module capacity
unlimited
Module level
AS (Akzentsetzung / Accentuation)
Module art
Wahlpflicht / Elective

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

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

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

Course type
Comment
SWS
Offer rhythm
Workload attendance
Lecture
2
28 h
Exercises
9
126 h
Seminar
2
28 h
Total attendance time of module
182 h
bio370 - Flora Advanced Plant Biodiversity

Module name  Flora Advanced Plant Biodiversity
Module code  bio370
ECTS credit points  15.0 KP
Workload  450 h
Used in degree programmes  • Fach-Bachelor Biologie > Akzentsetzungsmodule
• Master of Education (Gymnasium) Biologie > Mastermodule
• Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodul
Contact person
  module responsibility
  • Dirk Carl Albach
  authorized examiners
  • Alle hier genannten
Module counseling
  • Klaus Bernhard von Hagen
Prerequisites  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.

Recommended reading
Rothmaler - Exkursionsflora von Deutschland. Gefäßpflanzen: Grundband

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

Moduleart  je nach Studiengang Pflicht oder Wahlpflicht

Lern-/Lehrform / Type of program
Vorkenntnisse / Previous knowledge
Examination
  examination periods
  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
  Lecture  2  28 h
  Exercises  5  70 h
  Seminar  3  42 h
Total attendance time of module  140 h
bio380 - Specific Microbiology

**Module name**: Specific Microbiology

**Module code**: bio380

**ECTS credit points**: 15.0 KP

**Workload**: 450 h

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

**Contact person**
- module responsibility
  - Ralf Andreas Rabus
- authorized examiners
  - Alle hier genannten
- Module counseling
  - Kathleen Trautwein

**Prerequisites**

**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

**Recommended reading**
- 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**

**examination periods**

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

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

**Course type**

**Comment**

**SWS**

**Offer rhythm**

**Workload attendance**

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<th>Offer rhythm</th>
<th>Workload attendance</th>
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<td>Exercises</td>
<td></td>
<td>6</td>
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<td>84 h</td>
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<td>0 h</td>
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<td>Workload attendance</td>
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<td></td>
<td></td>
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<td>140 h</td>
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### bio390 - Plant molecular biology and genetics

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<tr>
<td><strong>ECTS credit points</strong></td>
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</tr>
<tr>
<td><strong>Workload</strong></td>
<td>450 h</td>
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</table>
| **Used in degree programmes** | - Fach-Bachelor Biologie > Akzentsetzungsmodule  
- Master of Education (Gymnasium) Biologie > Mastermodule  
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodul |
| **Contact person** | module responsibility  
- Sascha Laubinger |

#### Prerequisites

#### Skills to be acquired in this module

#### Module contents

#### Recommended reading

#### Links

<table>
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<tr>
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<td><strong>Duration (semesters)</strong></td>
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<td><strong>Module frequency</strong></td>
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<td><strong>Module capacity</strong></td>
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<td><strong>Modulart</strong></td>
<td>je nach Studiengang Pflicht oder Wahlpflicht</td>
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#### Lern-/Lehrform / Type of program

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<th><strong>SWS</strong></th>
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<th><strong>Workload attendance</strong></th>
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<tbody>
<tr>
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<td>Practical</td>
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<td>4</td>
<td>WinSem</td>
<td>56 h</td>
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</table>

| **Total attendance time of module** | 140 h |

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bio400 - Basic Concepts in Neurobiology I

Module name
Basic Concepts in Neurobiology I

Module code
bio400

ECTS credit points
15.0 KP

Workload
450 h

Used in degree programmes
- Fach-Bachelor Biologie > Akzentsetzungsmodule
- Fach-Bachelor Mathematik > Nebenfachmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule

Contact person
module responsibility
- Martin Grieschner
- Karl-Wilhelm Koch
authorized examiners
- Alle hier genannten
Module counseling
- Ulrike Janssen-Bienhold
- Christiane Richter-Landsberg
- Olaf Goldbaum

Prerequisites

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.

Recommended reading

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

examination periods
Type of examination

Final exam of module
1 written examination,
signed minutes

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

Course type
Comment
SWS
Offer rhythm
Workload attendance
Lecture
4
56 h
Exercises
6
84 h
Tutorial
2
28 h
Seminar
1
14 h
<table>
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<th>Offer rhythm</th>
<th>Workload attendance</th>
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<td>182 h</td>
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</table>
bio410 - Basic Concepts in Neurobiology II

Module name  Basic Concepts in Neurobiology II
Module code  bio410
ECTS credit points  15.0 KP
Workload  450 h

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

Contact person
module responsibility
- Georg Martin Klump
authorized examiners
- Alle hier genannten
Module counseling
- Ulrike Langemann
- Christiane Margarete Thiel
- Christine Köppl

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

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

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

Recommended reading

Links

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

Vorkenntnisse / Previous knowledge

Examination  examination periods  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  Offer rhythm  Workload attendance
Lecture  4  56 h
Exercises  5  70 h
Seminar  1  14 h
Total attendance time of module  140 h
**Ergänzungsmodul**

**bio150 - Mathematical Methods for Biologists**

<table>
<thead>
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<th>Module name</th>
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<tbody>
<tr>
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<td>bio150</td>
</tr>
<tr>
<td>ECTS credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
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</table>
| Used in degree programmes       | • Fach-Bachelor Biologie > Naturwissenschaftliche Grundlagen  
• Zwei-Fächer-Bachelor Biologie > Ergänzungsmodule |
| Contact person                  | module responsibility                       |
|                                  | • Jutta Kretzberg                            |
| Prerequisites                    |                                              |
| Skills to be acquired in this module | + knowledge of biological working methods  
++ biologically relevant knowledge in the natural sciences and mathematics  
++ statistics & scientific programming  
++ interdisciplinary knowledge & thinking  
++ abstract, logical, analytical thinking  
++ independent learning and (research-based) working  
++ data presentation and evidence-based discussion (written and spoken)  
++ teamwork |
| Module contents                  | Learning and applying mathematical methods to analyse biological data, extending school knowledge of mathematics, acquiring fundamental programming skills |
|                                  | The course aims at Biology students who want to extend their school knowledge of mathematics and to practise it. The course is guided by practical examples of data analysis in Biology, the respective mathematical basis of which is explained and applied. Subjects are: Matrix algebra, function designator, sequences and series, distributions, descriptive statistics, concept of statistical tests among others. In the exercises, the students are introduced to the programming language R and learn to solve problems of data analysis independently, e.g. while keeping the minutes in a laboratory course. |
| Recommended reading              |                                              |
| 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                      | examination periods                         |
| Final exam of module             | Written test towards the end of a term       |
|                                  | Written test (of max. 120 minutes)           |
|                                  | PLEASE NOTE: Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply. |

<table>
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<th>Comment</th>
<th>SWS</th>
<th>Offer rhythm</th>
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<tbody>
<tr>
<td>Lecture</td>
<td>2</td>
<td></td>
<td></td>
<td>28 h</td>
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<tr>
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<td>2</td>
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<tr>
<td>Total attendance time of module</td>
<td></td>
<td></td>
<td></td>
<td>56 h</td>
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</table>
bio250 - Biochemistry

Module name: Biochemistry
Module code: bio250
ECTS credit points: 6.0 KP
Workload: 180 h

Used in degree programmes:
- Fach-Bachelor Biologie > Naturwissenschaftliche Grundlagen
- Zwei-Fächer-Bachelor Biologie > Ergänzungsmodule

Contact person:
- module responsibility: Karl-Wilhelm Koch
- authorized examiners: Alle hier genannten
- Module counseling: Michael Müller, Alexander Scholten

Prerequisites:
++ 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.

Recommended reading:
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:
- examination periods: Written examination following the end of lectures or end of the semester.
- Type of examination: 1 written examination signed minutes

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

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Offer rhythm</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>2</td>
<td></td>
<td>28 h</td>
</tr>
<tr>
<td>Tutorial</td>
<td></td>
<td></td>
<td>WinSem</td>
<td>0 h</td>
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<tr>
<td>Seminar</td>
<td></td>
<td>1</td>
<td></td>
<td>14 h</td>
</tr>
<tr>
<td>Practical</td>
<td></td>
<td>2</td>
<td></td>
<td>28 h</td>
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<tr>
<td>Course type</td>
<td>Comment</td>
<td>SWS</td>
<td>Offer rhythm</td>
<td>Workload attendance</td>
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<td></td>
<td></td>
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<td>70 h</td>
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che101 - Basic Chemistry

<table>
<thead>
<tr>
<th>Field</th>
<th>Details</th>
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<tbody>
<tr>
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<td>Basic Chemistry</td>
</tr>
<tr>
<td>Module code</td>
<td>che101</td>
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<tr>
<td>ECTS credit points</td>
<td>6.0 KP</td>
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<td>180 h</td>
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<td>Used in degree programmes</td>
<td>Fach-Bachelor Biologie &gt; Naturwissenschaftliche Grundlagen</td>
</tr>
<tr>
<td></td>
<td>Fach-Bachelor Mathematik &gt; Nebenfachmodule</td>
</tr>
<tr>
<td></td>
<td>Zwei-Fächer-Bachelor Biologie &gt; Ergänzungsmodule</td>
</tr>
<tr>
<td>Contact person</td>
<td>module responsibility</td>
</tr>
<tr>
<td></td>
<td>Oliver Janka</td>
</tr>
<tr>
<td></td>
<td>Thomas Müller</td>
</tr>
<tr>
<td></td>
<td>Rüdiger Beckhaus</td>
</tr>
<tr>
<td>Prerequisites</td>
<td></td>
</tr>
<tr>
<td>Skills to be acquired in this module</td>
<td></td>
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<tr>
<td>Module contents</td>
<td></td>
</tr>
<tr>
<td>Recommended reading</td>
<td></td>
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<td>Links</td>
<td></td>
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<td>Language of instruction</td>
<td>German</td>
</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>
<td>unlimited</td>
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<td>Modullevel</td>
<td>BC (Basiscurriculum)</td>
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<td>Modulart</td>
<td>Pflicht/Wahlpflicht *</td>
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<td>Lern-/Lehrform / Type of program</td>
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<td>Vorkenntnisse / Previous knowledge</td>
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<td>examination periods</td>
</tr>
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<td>Final exam of module</td>
<td>written exam (100%)</td>
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<tr>
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<td>Seminar</td>
</tr>
<tr>
<td>SWS</td>
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<tr>
<td>Offer rhythm</td>
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</table>
## che102 - Basic Chemistry Laboratory

<table>
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<tr>
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<tbody>
<tr>
<td><strong>Module code</strong></td>
<td>che102</td>
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<tr>
<td><strong>ECTS 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 degree programmes** | - Fach-Bachelor Biologie > Naturwissenschaftliche Grundlagen  
- Fach-Bachelor Mathematik > Nebentachmodule  
- Zwei-Fächer-Bachelor Biologie > Ergänzungsmodule |
| **Contact person** | module responsibility  
- Oliver Janka  
- Rainer Koch |

### Prerequisites
- **Skills to be acquired in this module**
- **Module contents**
- **Recommended reading**
- **Links**
- **Language of instruction** | German |
- **Duration (semesters)** | 1 semester |
- **Module frequency** | jährlich |
- **Module capacity** | unlimited |
- **Modullevel** | BC (Basiscurriculum) |
- **Modulart** | Pflicht/Wahlpflicht * |

### Vorkenntnisse / Previous knowledge

<table>
<thead>
<tr>
<th><strong>Examination</strong></th>
<th>examination periods</th>
<th><strong>Type of examination</strong></th>
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### Course type
- **Seminar**

### SWS
- **Offer rhythm**

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che190 - Basic Organic Chemistry

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<tbody>
<tr>
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<td>ECTS credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
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**Used in degree programmes**
- Fach-Bachelor Biologie > Naturwissenschaftliche Grundlagen
- Fach-Bachelor Chemie > Aufbaumodule
- Master of Education (Sonderpädagogik) Chemie > Mastermodule
- Master of Education (Wirtschaftspädagogik) Chemie > Mastermodule
- Zwei-Fäch-Bachelor Biologie > Ergänzungsmodul
- Zwei-Fäch-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

**Prerequisites**

**Skills to be acquired in this module**

**Module contents**

**Recommended reading**

**Links**

**Language of instruction**
- German

**Duration (semesters)**
- 1 semester

**Module frequency**
- jährlich

**Module capacity**
- unlimited

**Modulelevel**
- AC (Aufbaucurriculum)

**Modulart**
- Pflicht

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

**Vorkenntnisse / Previous knowledge**

**Examination**

<table>
<thead>
<tr>
<th>examination periods</th>
<th>Type of examination</th>
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<td>written exam</td>
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**Course type**
- Lecture

**SWS**

<table>
<thead>
<tr>
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<th>Workload attendance</th>
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che290 - Experimental Organic Chemistry

<table>
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<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>ECTS 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 degree programmes**
- 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

**Prerequisites**

**Skills to be acquired in this module**

**Module contents**

**Recommended reading**

**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**

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Offer rhythm</th>
<th>Workload attendance</th>
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<tbody>
<tr>
<td>Seminar</td>
<td></td>
<td>3</td>
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<td>KL</td>
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<tr>
<td>Practical</td>
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<td>3</td>
<td></td>
<td>KL</td>
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**Total attendance time of module** 84 h
mat980 - Mathematische Methoden in den Biowissenschaften

<table>
<thead>
<tr>
<th>Module name</th>
<th>Mathematische Methoden in den Biowissenschaften</th>
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<tbody>
<tr>
<td>Module code</td>
<td>mat980</td>
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<tr>
<td>ECTS 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 degree programmes            | • Fach-Bachelor Biologie > Naturwissenschaftliche Grundlagen  
• Zwei-Fächer-Bachelor Biologie > Ergänzungs module |
| Contact person                       | module responsibility                           |
|                                      | • Peter Harmand                                 |
|                                      | authorized examiners                            |
|                                      | • Peter Harmand                                 |
| Prerequisites                        |                                               |
| Skills to be acquired in this module | Aufbauend auf einem mittleren Abiturwissen werden Teile des Schulstoffes wiederholt (Ableitung und Integral), ergänzt (allgemeiner Abbildungsbegriff, Folgen und Reihen) und weiterentwickelt (Taylorreihe, Differentialgleichungen). Die Mathematik wird dabei im wesentlichen ohne Beweise als Handwerkszeug präsentiert. Die Ideen hinter den Begriffen und die Bedeutung der Ergebnisse werden jedoch ausführlich erklärt. Die Studierenden sollen  
• ihr Schulwissen wiederholen und festigen,  
• die Anwendung von Mathematik in der Biologie mit zahlreichen praktischen Übungsaufgaben lernen,  
• ihr allgemeines Wissen mathematischer Methoden und Modelle verbreitern und üben,  
• die grundlegenden Formen von diskreten und kontinuierlichen, ungebremsten und gebremsten Wachstumsprozessen kennenlernen,  
• erfahren, wie analytisches und abstraktes Denken bei dem Studium realer Probleme helfen kann. |
Reelle Funktionen: Grenzwert und Stetigkeit, Exponential- und trigonometrische Funktionen, Koordinatentransformationen.  
| Recommended reading                  | Ein Vorlesungsskript wird elektronisch bereitgestellt. |
| Links                                |                                               |
| Language of instruction              | German                                         |
| Duration (semesters)                 | 1 semester                                     |
| Module frequency                     | jährlich                                        |
| Module capacity                      | unlimited                                      |
| Information                          | 6 KP | 1 V: 981, 1 Ü: 982 | 1. FS | Harmand |
| Modulelevel                          | BC (Basiscurriculum / Base curriculum)         |
| Modulart                             | Wahlpflicht / Elective                         |
| Lern-/Lehrform / Type of program     | Vorlesung + Übung                              |
| Vorkenntnisse / Previous knowledge   |                                               |
| Examination                          | examination periods                            | Type of examination | |
| Final exam of module                 | Vorlesungsde                                      | Klausur; in Ausnahmefällen mündliche Prüfung | |
| Course type                          | Comment  | SWS  | Offer rhythm | Workload attendance |
| Lecture                              | 3                                      | 42 h                                         |
| Exercises                            | 1                                      | 14 h                                         |
| Total attendance time of module      | 56 h                                         |
phy910 - Physics for Students of Biology and Dual Subject Chemistry

<table>
<thead>
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<th>Physics for Students of Biology and Dual Subject Chemistry</th>
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<tbody>
<tr>
<td>Module code</td>
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<tr>
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<td>Workload</td>
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<tr>
<td>Used in degree programmes</td>
<td>Fach-Bachelor Biologie &gt; Naturwissenschaftliche Grundlagen</td>
</tr>
<tr>
<td></td>
<td>Zwei-Fächer-Bachelor Biologie &gt; Ergänzungsmodule</td>
</tr>
<tr>
<td></td>
<td>Zwei-Fächer-Bachelor Chemie &gt; Aufbaumodule</td>
</tr>
<tr>
<td>Contact person</td>
<td>module responsibility</td>
</tr>
<tr>
<td></td>
<td>○ Manuela Schiek</td>
</tr>
<tr>
<td></td>
<td>○ Gerd Gülker</td>
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</table>

Prerequisites

Skills to be acquired in this module

Module contents

Recommended reading

Links

Language of instruction | German
Duration (semesters) | 1 semester
Module frequency | jährlich
Module capacity | unlimited
Module level | BM (Basismodul)
Modulart | Ergänzung/Professionalisierung

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination | examination periods | Type of examination
Final exam of module | 1 written exam or 1 oral exam
Course type | Seminar

SWS

Offer rhythm

Workload attendance | 0 h
Abschlussmodul

bam - Bachelor´s Thesis Module

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

Module contents

Recommended reading

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 examination periods Type of examination

Final exam of module G

Course type Seminar

SWS

Offer rhythm

Workload attendance 0 h
## Frühere Module

**che100 - Introduction to Chemistry**

<table>
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<tbody>
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<td><strong>Used in degree programmes</strong></td>
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</tr>
<tr>
<td>Fach-Bachelor Biologie &gt; Frühere Module</td>
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</tr>
<tr>
<td>Fach-Bachelor Chemie &gt; Basismodule</td>
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<tr>
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</tr>
<tr>
<td>Zwei-Fächer-Bachelor Chemie &gt; Basismodule</td>
<td></td>
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**Contact person**

- module responsibility
- Oliver Janka

- authorized examiners
- Rüdiger Beckhaus
- Oliver Janka
- Thomas Müller

- Module counseling
  - Lena Albers

**Prerequisites**

**Skills to be acquired in this module**

**Module contents**

**Recommended reading**

**Links**

**Language of instruction**

German

**Duration (semesters)**

1 semester

**Module frequency**

--

**Module capacity**

unlimited

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

**Vorkenntnisse / Previous knowledge**

**Examination**

<table>
<thead>
<tr>
<th>examination periods</th>
<th>Type of examination</th>
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**Course type**

<table>
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<tr>
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<tr>
<td>Seminar</td>
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**Total attendance time of module**

154 h