## Modules for Biology

### Mastermodule

#### 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>
</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             | 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 counseling                   |                                                     |
| - 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     |                                                     |
| Vorkenntnisse / Previous knowledge  |                                                     |
| Examination                         | Time of examination | Type of examination |
| Final exam of module                |                                                     |
| Course type                         | Comment     | SWS | Frequency | Workload attendance |
| Seminar                             |             | 2.00|          | 28 h                |
| Practical                           |             | 3.00|          | 42 h                |
| Total time of attendance for the module |             |     |          | 70 h                |
### bio120 - Science-Teaching and Learning in School-Labs

**Module label**: Science-Teaching and Learning in School-Labs  
**Module code**: bio120  
**Credit points**: 3.0 KP  
**Workload**: 90 h  

#### Used in course of study
- Master of Education (Gymnasium) Biologie > Mastermodule
- Master of Education (Haupt- und Realschule) Biologie > Mastermodule
- Master of Education (Sonderpädagogik) Biologie > Mastermodule

#### Contact person

- **Module responsibility**
  - Corinna Hößle
- **Authorized examiners**
  - Corinna Hößle
  - Birgit Weusmann
  - Holger Winkler
  - Anja Wübben
  - Bianca Kuhlemann
- **Module counseling**
  - Birgit Weusmann
  - Holger Winkler
  - Anja Wübben

#### 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**: halbjährlich  
**Module capacity**: unlimited  
**Modullevel**: MM (Mastermodul)  
**Modulart**: Pflicht  

#### Lern-/Lehrform / Type of program

**Vorkenntnisse / Previous knowledge**

#### Examination

- **Time of examination**:  
- **Type of examination**: 1 unbenotetes Portfolio (Entwicklung eines Kurzentwurfs samt Arbeitsblättern/Forschertagebuch und eines Diagnosebogens, Durchführung und Reflektion eines Lernarrangements)

#### 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>Seminar</td>
<td></td>
<td>2.00</td>
<td>SuSe and WiSe</td>
<td>28 h</td>
</tr>
<tr>
<td>Study trip</td>
<td></td>
<td>0.00</td>
<td>SuSe</td>
<td>0 h</td>
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**Total time of attendance for the module**: 28 h
### bio130 - Human Biology Experiments for Science Education

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<thead>
<tr>
<th><strong>Module label</strong></th>
<th>Human Biology Experiments for Science Education</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module code</strong></td>
<td>bio130</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>
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**Used in course of study**
- Master of Education (Gymnasium) Biologie > Mastermodule
- Master of Education (Haupt- und Realschule) Biologie > Mastermodule
- Master of Education (Sonderpädagogik) Biologie > Mastermodule

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

**Entry requirements**

**Skills to be acquired in this module**

**Module contents**

**Reader's advisory**

**Links**

**Language of instruction**
- German

**Duration (semesters)**
- 1 Semester

**Module frequency**
- jährlich

**Module capacity**
- unlimited

**Modullevel**
- MM (Mastermodul)

**Modulart**
- Pflicht

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

**Vorkenntnisse / Previous knowledge**

**Examination**

<table>
<thead>
<tr>
<th>Course type</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final exam of module</td>
<td>1 portfolio</td>
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**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>1.00</td>
<td></td>
<td>14 h</td>
</tr>
<tr>
<td>Practical</td>
<td></td>
<td>4.00</td>
<td></td>
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**Total time of attendance for the module**
- 70 h
bio300 - Evolutionary Biology

<table>
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<tr>
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<tbody>
<tr>
<td>Module code</td>
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</tr>
<tr>
<td>Credit points</td>
<td>15.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>450 h</td>
</tr>
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**Used in course of study**
- Fach-Bachelor Biologie > Akzentsetzungsmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule

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

- Authorized examiners
  - Olaf Bininda-Emonds
  - Wilko Ahlrichs
  - Dirk Carl Albach
  - Gabriele Gerlach
  - Arne Nolte

**Entry requirements**

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

Introduction to both microevolution (speciation and species concepts, adaptation and selection, behavioural ecology, reproduction systems) and macroevolution.

Introduction to phylogenetics (phyloinformatics, molecular systematics, phylogeography).

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

**Reader's advisory**

**Links**

**Language of instruction**
German

**Duration (semesters)**
1 Semester

**Module frequency**
jährlich

**Module capacity**
unlimited

**Modullevel**
AS (Akzentsetzung / Accentuation)

**Modulart**
Wahlpflicht / Elective

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

**Vorkenntnisse / Previous knowledge**

**Examination**

<table>
<thead>
<tr>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written examination in the final week of the semester or in the first week following the lecture period.</td>
<td>Written examination (60%) Portfolio (40%)</td>
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PLEASE NOTE:
Additional conditions regarding attendance and ungraded activities as determined by the persons
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<th>Time of examination</th>
<th>Type of examination</th>
<th>Frequency</th>
<th>Workload attendance</th>
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</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>SWS 2.00</td>
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<td>28 h</td>
</tr>
<tr>
<td>Exercises</td>
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<td>SWS 6.00</td>
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<td>84 h</td>
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<tr>
<td>Seminar</td>
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<td>SWS 2.00</td>
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<td>28 h</td>
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**Total time of attendance for the module** 140 h
## bio310 - General Ecology

<table>
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<tr>
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<tr>
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<tr>
<td>Credit points</td>
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<tr>
<td>Workload</td>
<td>450 h</td>
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<td>Used in course of study</td>
<td>• Fach-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
</tr>
<tr>
<td></td>
<td>• Master of Education (Gymnasium) Biologie &gt; Mastermodule</td>
</tr>
<tr>
<td></td>
<td>• Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
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<tr>
<td>Contact person</td>
<td></td>
</tr>
<tr>
<td>Module responsibility</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Helmut Hillebrand</td>
</tr>
<tr>
<td>Authorized examiners</td>
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<tr>
<td></td>
<td>• Helmut Hillebrand</td>
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<tr>
<td></td>
<td>• Rolf Niedringhaus</td>
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<tr>
<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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<tr>
<td></td>
<td>• Sven Rohde</td>
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<td>• Maren Striebel</td>
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<td></td>
<td>• Rolf Niedringhaus</td>
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<td>• Rainer Buchwald</td>
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<td></td>
<td>• Sven Rohde</td>
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<tr>
<td></td>
<td>• Maren Striebel</td>
</tr>
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<td>Entry requirements</td>
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<tr>
<td>Skills to be acquired in this module</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>
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<tr>
<td></td>
<td>+ statistics &amp; scientific programming</td>
</tr>
<tr>
<td></td>
<td>+ interdisciplinary knowledge &amp; thinking</td>
</tr>
<tr>
<td></td>
<td>+ abstract, logical, analytical thinking</td>
</tr>
<tr>
<td></td>
<td>+ deepened expertise in biological specialist field</td>
</tr>
<tr>
<td></td>
<td>+ independent learning and (research-based) working</td>
</tr>
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<td></td>
<td>+ data presentation and evidence-based discussion (written and spoken)</td>
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<tr>
<td></td>
<td>+ (scientific) communication skills</td>
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</tbody>
</table>

## Module contents

**Reader's advisory**

**Links**

**Language of instruction**

German

**Duration (semesters)**

2 Semester

**Module frequency**

jährlich

**Module capacity**

unlimited

**Modullevel**

AS (Akzentsetzung / Accentuation)

**Modularität**

Wahlpflicht / Elective

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

**Vorkenntnisse / Previous knowledge**

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
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</table>

## 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>2.00</td>
<td></td>
<td>28 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>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

Module label: Pollination and Dispersal Biology
Module code: bio320
Credit points: 15.0 KP
Workload: 450 h

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

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

Entry requirements:
- Skills to be acquired in this module:
  - biological knowledge
  - knowledge of biological working methods
  - abstract, logical, analytical thinking
  - deepened expertise in biological specialist field
  - independent learning and (research-based) working
  - data presentation and evidence-based discussion (written and spoken)
  - teamwork
  - (scientific) communication skills
  - project and time management
  - knowledge of safety and environmental issues
  - Extended knowledge of biodiversity and evolution of plants focusing on reproduction, dispersal, germination and establishment of plants

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

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

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:
- Time of examination:
  - 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>
<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></td>
<td>28 h</td>
</tr>
<tr>
<td>Seminar</td>
<td>1.00</td>
<td></td>
<td>14 h</td>
</tr>
<tr>
<td>Practical</td>
<td>5.00</td>
<td></td>
<td>70 h</td>
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Total time of attendance for the module: 112 h
bio330 - Marine Ecology

Module label: Marine Ecology
Module code: bio330
Credit points: 15.0 KP
Workload: 450 h

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

Contact person:
Module responsibility: Helmut Hillebrand
Authorized examiners:
- Helmut Hillebrand
- Stefanie Moorthi
Module counseling:
- Stefanie Moorthi

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

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

Module contents:

- Lecture Biological Oceanography
  2 SWS = 3 CP. Presence time 24 h, additional study time 66h, winter-term
  Abiotic environmental conditions in marine systems (light, temperature, chemical and physical 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.

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

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

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

<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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<tr>
<td>Exercises</td>
<td></td>
<td>6.00</td>
<td></td>
<td>84 h</td>
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**Total time of attendance for the module**

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

Module label: Morphology, Phylogeny, and Evolution of Metazoa
Module code: bio340
Credit points: 15.0 KP
Workload: 450 h

Used in course of study:
- Fach-Bachelor Biologie > Akzentsetzungsmodul
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zweifach-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:
++ biological knowledge
+ knowledge of biological working methods
++ biologically relevant knowledge in the natural sciences and mathematics
+ statistics & scientific programming
+ interdisciplinary knowledge & thinking
+ abstract, logical, analytical thinking
++ deepened expertise in biological specialist field
+ independent learning and (research-based) working
++ data presentation and evidence-based discussion (written and spoken)
+ teamwork
++ (scientific) communication skills
+ project and time management

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

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

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

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

Lern-/Lehrform / Type of program:
Vorkenntnisse / Previous knowledge:
Examination:
Time of examination:
Type of examination:
Final exam of module:
Portfolio during the course of the seminar; written examination in the final week of the course or in the first week following the lecture period.
1 Written examination (50%),
1 Portfolio (50%),

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

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<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>2.00</td>
<td></td>
<td>28 h</td>
</tr>
<tr>
<td>Exercises</td>
<td></td>
<td>5.00</td>
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<td>70 h</td>
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<td>2.00</td>
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**Total time of attendance for the module** 126 h
**bio350 - Organismic Microanatomy**

<table>
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<th>Organismic Microanatomy</th>
</tr>
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<tbody>
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<tr>
<td>Credit points</td>
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<tr>
<td>Workload</td>
<td>450 h</td>
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<tr>
<td>Used in course of study</td>
<td>- Fach-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
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<td></td>
<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>
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<td>- Wilko Ahirichs</td>
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<td>- Mona Hoppenrath</td>
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<td>- Alexander Kieneke</td>
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<td>- Mona Hoppenrath</td>
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<td>- Alexander Kieneke</td>
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<td>Entry requirements</td>
<td>Skills to be acquired in this module</td>
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<tr>
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<td>- ++ biological knowledge</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>- ++ interdisciplinary knowledge &amp; thinking</td>
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<td>- ++ abstract, logical, analytical thinking</td>
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<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>- ++ data presentation and evidence-based discussion (written and spoken)</td>
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<td>- teamwork</td>
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<td>- ++ (scientific) communication skills</td>
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<td>- + project and time management</td>
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<td>- + knowledge of safety and environmental issues</td>
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<td>Module contents</td>
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<td>Reader's advisory</td>
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bio360 - Marine Biodiversity

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

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

Contact person
Module responsibility
• Thomas Glatzel

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

Module counseling
• Pedro Miguel Martinez Arbizu
• Mona Hoppenrath

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

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

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

Reader's advisory
Literature:
HIGGINS, R.P. & H., THIEL, 1988: Introduction to the Study of Meiofauna. Smithsonian Institution Press,

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

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

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

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

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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>
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<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tr>
<td>Lecture</td>
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<td>2.00</td>
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<td>28 h</td>
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<td>Exercises</td>
<td></td>
<td>9.00</td>
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<td>126 h</td>
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<td>Seminar</td>
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<td>2.00</td>
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Total time of attendance for the module 182 h
bio370 - Flora Advanced Plant Biodiversity

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

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

Contact person:
Module responsibility
- Dirk Carl Albach

Authorized examiners
- Dirk Carl Albach
- Klaus Bernhard von Hagen

Module counseling
- Klaus Bernhard von Hagen

Entry requirements:
- passed module Flora/Fauna

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

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

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

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

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

Modul level: ---
Modulart: je nach Studiengang Pflicht oder Wahlpflicht

Lern- / Lehrform / Type of program:

Vorkenntnisse / Previous knowledge:

Examination:
- Time of examination
- Type of examination

Final exam of module:
- Portfolio

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

Course type:
- Lecture
- Exercises
- Seminar

Comment:
- 2.00
- 5.00
- 3.00

SWS:
- 28 h
- 70 h
- 42 h

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

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<td>bio380</td>
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<tr>
<td>Credit points</td>
<td>15.0 KP</td>
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<tr>
<td>Workload</td>
<td>450 h</td>
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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**

<table>
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<tr>
<th>Module responsibility</th>
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<tbody>
<tr>
<td>Ralf Andreas Rabus</td>
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</table>

**Authorized examiners**

<table>
<thead>
<tr>
<th>Kathleen Trautwein</th>
</tr>
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**Entry requirements**

**Skills to be acquired in this module**

- ++ biological knowledge
- ++ knowledge of biological working methods
- ++ biologically relevant knowledge in the natural sciences and mathematics
- + 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

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

Wahlpflicht / Elective

**Vorkenntnisse / Previous knowledge**

<table>
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<tr>
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<td>1 record (50%)</td>
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**PLEASE NOTE:**

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

**Course type**

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**Total time of attendance for the module**
bio400 - Basic Concepts in Neurobiology I

Module label: Basic Concepts in Neurobiology I

Module code: bio400

Credit points: 15.0 KP

Workload: 450 h

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

Contact person:
- Module responsibility: Martin Greschner, Karl-Wilhelm Koch
- Authorized examiners: Martin Greschner, Karl-Wilhelm Koch, Ulrike Janssen-Bienhold
- Module counseling: Ulrike Janssen-Bienhold, Christiane Richter-Landsberg, Olaf Goldbaum

Entry requirements:

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

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

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

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

Reader's advisory:

Links:

Language of instruction: German

Duration (semesters): 1 Semester

Module frequency: jährlich

Module capacity: unlimited

Module level: AS (Akzentsetzung / Accentuation)

Module art: Wahlpflicht / Elective

Lern- / Lehreform / Type of program

Vorkenntnisse / Previous knowledge

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:
- Lecture: 4.00 SWS, 56 h workload
- Exercises: 6.00 SWS, 84 h workload

Comment:
Frequency:
<table>
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**Total time of attendance for the module** 182 h
bio410 - Basic Concepts in Neurobiology II

Module label  Basic Concepts in Neurobiology II

Module code  bio410

Credit points  15.0 KP

Workload  450 h

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

Contact person
Module responsibility
- Georg Martin Klump

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

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

Entry requirements

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

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

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

Reader's advisory

Links

Language of instruction  German

Duration (semesters)  1 Semester

Module frequency  jährlich

Module capacity  unlimited

Modullevel  AS (Akzentsetzung / Accentuation)

Modulart  Wahlpflicht / Elective

Lern-Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination
Time of examination

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

Type of examination
1 written examination

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

Course type  Comment  SWS  Frequency  Workload attendance

Lecture  4.00  56 h
Exercises  5.00  70 h
Seminar  1.00  14 h

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

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<td><strong>Credit points</strong></td>
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<td><strong>Workload</strong></td>
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<td>• Fach-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
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**Contact person**

- Module responsibility
  - Sascha Laubinger

- Authorized examiners
  - Sascha Laubinger

**Entry requirements**

**Skills to be acquired in this module**

**Reader's advisory**

**Module contents**

**Languages of instruction**

- German, English

**Duration (semesters)**

- 1 Semester

**Module frequency**

**Module capacity**

- 12 (16)

**Modullevel**

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**Modular**

- je nach Studiengang Pflicht oder Wahlpflicht

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

**Vorkenntnisse / Previous knowledge**

**Examination**

<table>
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**Course type**

<table>
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<th>Frequency</th>
<th>Workload attendance</th>
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<td>3.00</td>
<td>WiSe</td>
<td>42 h</td>
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<td>Practical</td>
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<td>4.00</td>
<td>WiSe</td>
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**Total time of attendance for the module**

- 140 h
bio325 - Pollination and Dispersal - Concepts

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

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

Contact person:
- Dirk Carl Albach
- 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)
Moduleart: Wahlpflicht / Elective
Lern-/Lehrform / Type of program: lecture, seminar

Vorkenntnisse / Previous knowledge:

Examination:
- Time of examination
- Type of examination

Final exam of module:
- Comment
- SWS
- Frequency
- Workload attendance

<table>
<thead>
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<td>2.00</td>
<td>SuSe</td>
<td>28 h</td>
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<tr>
<td>Seminar</td>
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<td>2.00</td>
<td>SuSe</td>
<td>28 h</td>
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Total time of attendance for the module: 56 h
### bio327 - Pollination and Dispersal - Methods not just for Schools

**Module label**
Pollination and Dispersal - Methods not just for Schools

**Module code**
bio327

**Credit points**
9.0 KP

**Workload**
270 h

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

**Contact person**

- Module responsibility
  - Dirk Carl Albach

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

- Module counseling
  - Klaus Bernhard von Hagen
  - Maria Will

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

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

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

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

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

**Links**

**Language of instruction**
German

**Duration (semesters)**
1 Semester

**Module frequency**

**Module capacity**
12

**Modullevel**
AS (Akzentsetzung / Accentuation)

**Modulart**
Wahlpflicht / Elective

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

**Vorkenntnisse / Previous knowledge**

**Examination**
Time of examination
Type of examination
Final exam of module
portfolio

**Course type**
Exercises

**SWS**
6.00

**Frequency**
SuSe

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

Module label: Microscopical Anatomy

Module code: bio355

Credit points: 9.0 KP

Workload: 270 h

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

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

Entry requirements:

Skills to be acquired in this module:

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

This course is designed for students to learn about the basic light and electron optical methods. Students will be able to work with preparative techniques for scanning electron microscopy, transmission electron microscopy, and light microscopy, and confocal scanning laser microscopy. Students completing this course will have learned basic principles for fixing and embedding biological materials for electron microscopy. Students will have learned how to operate a transmission electron microscope, a scanning electron microscope, several ultramicrotomes, a vacuum evaporator, a critical point dryer, and a sputter coater. Digital imaging techniques that will be learned will include print making, design and assembly of materials for publication, PowerPoint presentations, and poster design. Students will be introduced to the principles of light microscopy utilizing different optical systems 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 project that exposes them to some of the challenges and problems encountered by microscopical anatomy - and some of the techniques that are used to solve these problems. Students have to present a scientific poster, a short oral presentation and a scientific paper.

Reader's advisory:

Will be announced in the course.

Links:

Language of instruction: German

Duration (semesters): 1 Semester

Module frequency: annually

Module capacity: 8

Modullevel: AS (Akzentsetzung / Accentuation)

Modulart: Wahlpflicht / Elective

Lern-/Lehrform / Type of program:

lecture/seminar, exercise

Vorkenntnisse / Previous knowledge:

Examination

Time of examination

Type of examination
<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>end of module</td>
<td>portfolio</td>
</tr>
<tr>
<td>Course type</td>
<td>Comment</td>
<td>SWS</td>
</tr>
<tr>
<td>Vorlesung und Seminar</td>
<td>2.00</td>
<td>WiSe</td>
</tr>
<tr>
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<td>3.50</td>
<td>WiSe</td>
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<td><strong>Total time of attendance for the module</strong></td>
<td></td>
<td></td>
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</table>
bio375 - Flora - Advanced Concepts

Module label: Flora - Advanced Concepts
Module code: bio375
Credit points: 6.0 KP
Workload: 180 h

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

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

Entry requirements: bio256 Flora and Fauna

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

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

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

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

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

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>portfolio</td>
<td></td>
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</table>

Course type | Comment | SWS | Frequency | Workload attendance |
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>2.00</td>
<td>SuSe</td>
<td>28 h</td>
</tr>
<tr>
<td>Seminar</td>
<td></td>
<td>2.00</td>
<td>SuSe</td>
<td>28 h</td>
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Total time of attendance for the module: 56 h
## bio377 - Flora - Advanced Methods not just for schools

<table>
<thead>
<tr>
<th>Module label</th>
<th>Flora - Advanced Methods not just for schools</th>
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</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio377</td>
</tr>
<tr>
<td>Credit points</td>
<td>9.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>270 h</td>
</tr>
<tr>
<td>Used in course of study</td>
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</tr>
<tr>
<td></td>
<td>Fach-Bachelor Mathematik &gt; Nebenfachmodule</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>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>
</tr>
<tr>
<td>Module counseling</td>
<td>Klaus Bernhard von Hagen</td>
</tr>
<tr>
<td></td>
<td>Maria Will</td>
</tr>
<tr>
<td>Entry requirements</td>
<td>bio375 Flora - Advanced Concepts</td>
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<td></td>
<td>bio256 Flora and Fauna</td>
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<tr>
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<td>biological knowledge</td>
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<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>
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<tr>
<td></td>
<td>(scientific) communication skills</td>
</tr>
<tr>
<td></td>
<td>knowledge of safety and environmental issues</td>
</tr>
</tbody>
</table>

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

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

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

### Links
- Language of instruction: German
- Duration (semesters): 1 Semester
- Module frequency: The module will be offered every other year
- Module capacity: 12
- Modulelevel: AS (Akzentsetzung / Accentuation)
- Modulart: Wahlpflicht / Elective
- Lern-/Lehrform / Type of program: exercise
- Vorkenntnisse / Previous knowledge

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

### Course type
- Exercises

### SWS
- 6.00

### Frequency
- SuSe

### Workload attendance
- 84 h
### 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"
<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>2.00</td>
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<td>28 h</td>
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**Total time of attendance for the module** 56 h
bio396 - Plant Molecular Biology and Genetics II

<table>
<thead>
<tr>
<th>Module label</th>
<th>Plant Molecular Biology and Genetics II</th>
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</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio396</td>
</tr>
<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
</tr>
</tbody>
</table>

**Used in course of study**
- Fach-Bachelor Biologie > Akzentsetzungsmodule
- Fach-Bachelor Mathematik > Nebenfachmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fäch-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
- Examination: Time of examination, Type of examination
- Final exam of module: portfolio (presentation, protocols)
- Course type: Exercises
- SWS: 4.00
- Frequency: WiSe
| Workload attendance | 56 h |
bio405 - Introduction to Neurobiology I

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:
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

Module level: AS (Akzentsetzung / Accentuation)
Modulart: Wahlpflicht / Elective
Lern-/Lehrform / Type of program: lecture, seminar, exercise

Vorkenntnisse / Previous knowledge:
Basics in physiology and cellular biology

Examination:
<table>
<thead>
<tr>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>end of semester</td>
<td>exam and protocol</td>
</tr>
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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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<td>3.00</td>
<td>SuSe</td>
<td>42 h</td>
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<tr>
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<td>14 h</td>
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<td>4.00</td>
<td>SuSe</td>
<td>56 h</td>
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<td>Tutorial</td>
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Total time of attendance for the module: 112 h
bio415 - Introduction to Neurobiology II

<table>
<thead>
<tr>
<th>Module label</th>
<th>Introduction to Neurobiology II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio415</td>
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<tr>
<td>Credit points</td>
<td>6.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>180 h</td>
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</tbody>
</table>
| Used in course of study    | • Fach-Bachelor Biologie > Akzentsetzungsmodule  
• Fach-Bachelor Mathematik > Nebenfachmodule  
• Master of Education (Gymnasium) Biologie > Mastermodule  
• Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule |
| Contact person             | Module responsibility                         |
|                            | Georg Martin Klump                            |
| Authorized examiners       | Georg Martin Klump                            |
|                            | Christiane Margarete Thiel                   |
|                            | 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

Examination

Time of examination: end of semester  
Type of examination: written exam

Final exam of module

Course type

<table>
<thead>
<tr>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>3.00</td>
<td>WiSe</td>
<td>42 h</td>
</tr>
<tr>
<td>Seminar</td>
<td>1.00</td>
<td>WiSe</td>
<td>14 h</td>
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Total time of attendance for the module: 56 h
### bio416 - Experiments in Neurobiology II

<table>
<thead>
<tr>
<th>Module label</th>
<th>Experiments in Neurobiology II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio416</td>
</tr>
<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
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<tr>
<td>Used in course of study</td>
<td></td>
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</tbody>
</table>
  - 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. |
| Links | 
  - Language of instruction: German  
  - Duration (semesters): 1 Semester  
  - Module frequency: annually  
  - Module capacity: 30  
  - Modullevel: AS (Akzentsetzung / Accentuation)  
  - Modulart: Wahlpflicht / Elective  
  - Lern-/Lehrform / Type of program: exercise  
  - Vorkenntnisse / Previous knowledge: Neurobiology II  
  - Examination: Time of examination  
    - Type of examination: portfolio (data analysis, presentation)  
  - Final exam of module: end of module  
  - Course type: Exercises  
  - SWS: 4.00  
  - Frequency: WiSe  
  - Workload attendance: 56 h |
### Module Details:

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

### Entry Requirements:

- bio233 Basics in microbiology and genetics  
- bio265 General microbiology

### Skills to be acquired in this module:

### Module Contents:

### Reader's Advisory:

### Links:

**Language of instruction:** German  
**Duration (semesters):** 1 Semester  
**Module frequency:** 8  
**Module capacity:** 8  
**Modullevel:** AS (Akzentsetzung / Accentuation)  
**Modulart:** Wahl / Elective  
**Lern-/Lehrform / Type of program:** lecture, seminar, exercise  
**Vorkenntnisse / Previous knowledge:** chemistry

### Examination:

<table>
<thead>
<tr>
<th>Type of examination</th>
<th>Time of examination</th>
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<tr>
<td>exam (50%)</td>
<td></td>
</tr>
<tr>
<td>protocol (50%)</td>
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### 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>2.00</td>
<td></td>
<td>WiSe</td>
<td>28 h</td>
</tr>
<tr>
<td>Seminar</td>
<td>2.00</td>
<td></td>
<td>WiSe</td>
<td>28 h</td>
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<tr>
<td>Practical</td>
<td>6.00</td>
<td></td>
<td>WiSe</td>
<td>84 h</td>
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### Total time of attendance for the module:

140 h
bio420 - Biochemistry of the Cell

<table>
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<tbody>
<tr>
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<td>Credit points</td>
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<td>Workload</td>
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<td>Alexander Scholten</td>
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<td>+ biologically relevant knowledge in the natural sciences and mathematics</td>
</tr>
<tr>
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<td>+ abstract, logical, analytical thinking</td>
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<td>+ data presentation and evidence-based discussion (written and spoken)</td>
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<td>++ (scientific) communication skills</td>
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<td>Biochemie, Müller-Esterl</td>
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<td>Biochemie, Lubert Stryer</td>
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<td></td>
<td>Lehninger Prinzipien der Biochemie, David L. Nelson und Michael M. Cox</td>
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<td>Principles of Biochemistry, Horton et al.</td>
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<td>56 h</td>
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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 > Akzentsetzungsmodul
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodul

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

Modulelevel
PB (Professionalisierungsbereich / Professionalization)

Modulart
Ergänzung/Professionalisierung

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

Vorkenntnisse / Previous knowledge
Biochemistry and Molecular Biology

Examination

<table>
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Course type

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<td>SuSe</td>
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<td>Exercises</td>
<td>2.00</td>
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<td>28 h</td>
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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 > Akzentsetzungsmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule

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

Entry requirements

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

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

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

Reader's advisory
Will be announced in the course.

Links
Language of instruction German
Duration (semesters) 1 Semester
Module frequency irregular
Module capacity 12
For more applicants than places, a motivation letter decides on the admission.


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### Lern-/Lehrform / Type of program

### Vorkenntnisse / Previous knowledge

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<tr>
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<td>Seminar</td>
<td>1.00</td>
<td>SuSe</td>
<td>14 h</td>
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<tr>
<td>Exercises</td>
<td>2.00</td>
<td>SuSe</td>
<td>28 h</td>
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**Total time of attendance for the module** 56 h
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 > Akzentsetzungsmodule
- 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).
- Examination Time of examination Type of examination
  - Final exam of module
    - Time of examination: Portfolio (100%)
    - Type of examination: Portfolio (100%)
- Course type: Exercises
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<tr>
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<td>SuSe</td>
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<td><strong>Workload attendance</strong></td>
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**bio460 - Diversity of marine Invertebrates**

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<td>Credit points</td>
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<td>Fach-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
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</tr>
<tr>
<td></td>
<td>Thomas Glatzel</td>
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<tr>
<td>Authorized examiners</td>
<td>Thomas Glatzel</td>
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**Entry requirements**

Skills to be acquired in this module:

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

By actively participating in this module the students acquire qualifications in the fields stated below:

- Survey of recent subjects concerning the biology and morphology of aquatic organisms
- Extended knowledge of how morphological characteristics have developed
- Technical skills in preparing and documenting morphological structures
- Knowledge of organizational principles of these structures

**Module contents**

The module serves an extended examination of selected aquatic animals from a function 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.


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

**Literature inquiry:**

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

**Links**

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

<table>
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<td>1.00</td>
<td>WiSe</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 Ahlrichs
- Authorized examiners
  - Wilko Ahlrichs
  - Alexander Kieneke
- Module counseling
  - Alexander Kieneke

### 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

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.

### Language of instruction
German

### Duration (semesters)
1 Semester

### 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

### Examination
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<td>2.00</td>
<td>SuSe</td>
<td>28 h</td>
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<td>2.00</td>
<td>SuSe</td>
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### 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 > Akzentsetzungsmodul
- 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
- Module level: AS (Akzentsetzung / Accentuation)
- Modulart: Wahlpflicht / Elective
- Lern-/Lehrform / Type of program: lecture, seminar, exercise
- Vorkenntnisse / Previous knowledge: Ecology, Flora

Examination:
- Time of examination: 1 Portfolio (oral presentation and 1 report)
- Type of examination: 1 Portfolio (oral presentation and 1 report)

Course type:
<table>
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<td>Seminar</td>
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<td>14 h</td>
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<tr>
<td>Exercises</td>
<td>2.00</td>
<td>SuSe</td>
<td>28 h</td>
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Total time of attendance for the module: 56 h
### bio490 - Experimental Methods in Biology

**Module label**  
Experimental Methods in Biology

**Module code**  
bio490

**Credit points**  
3.0 KP

**Workload**  
90 h

**Used in course of study**  
- Master of Education (Gymnasium) Biologie > Mastermodule

**Contact person**  
Module responsibility
- Gerhard Wolfgang Zotz

**Entry requirements**

**Skills to be acquired in this module**  
Students become acquainted with important methods in diverse areas of biology (e.g. biochemistry, plant physiology, animal physiology, genetics, population biology, functional ecology). Practical and theoretical skills will enrich the methodology portfolio of the teachers-to-be. At least some of the methods will be directly applicable in real-life teaching situations.

**Module contents**  
E. Methods (2 SWS)

**Reader's advisory**

**Language of instruction**  
German

**Duration (semesters)**  
1 Semester

**Module frequency**  
annually

**Module capacity**  
10

**Modulart**  
Wahlpflicht / Elective

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

**Vorkenntnisse / Previous knowledge**

**Examination**  
Time of examination  
Type of examination

**Final exam of module**  
1 report

**Course type**  
Exercises

**SWS**  
2.00

**Frequency**  
SuSe

**Workload attendance**  
28 h
Abschlussmodul

mam - Master´s Thesis Module

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<td>Credit points</td>
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<tr>
<td>Workload</td>
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<tr>
<td>Used in course of study</td>
<td>Master of Education (Gymnasium) Biologie &gt; Abschlussmodul</td>
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<td>Contact person</td>
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<td>Entry requirements</td>
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<td>Skills to be acquired in this module</td>
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<tr>
<td>Module contents</td>
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<td>Reader's advisory</td>
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<td>Links</td>
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Languages of instruction

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

Vorkenntnisse / Previous knowledge

Examination

<table>
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Course type

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SWS

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Workload attendance

| 0 h |