# 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>
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</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

**Modullevel**
- MM (Mastermodul)

**Modulart**
- Ergänzung/Professionalisierung

**Lern-Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

**Examination**

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
</tr>
</thead>
</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>Seminar</td>
<td></td>
<td>2.00</td>
<td></td>
<td>28 h</td>
</tr>
<tr>
<td>Practical</td>
<td></td>
<td>3.00</td>
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<td>42 h</td>
</tr>
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</table>

**Total time of attendance for the module**
- 70 h
**bio120 - Science-Teaching and Learning in School-Labs**

<table>
<thead>
<tr>
<th>Module label</th>
<th>Science-Teaching and Learning in School-Labs</th>
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</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio120</td>
</tr>
<tr>
<td>Credit points</td>
<td>3.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>90 h</td>
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</table>

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

**Course type**
- Seminar: 2.00 SWS
- Study trip: 0.00 SWS

**Workload attendance**
- Seminar: 28 h
- Study trip: 0 h

**Total time of attendance for the module**: 28 h
**bio130 - Human Biology Experiments for Science Education**

<table>
<thead>
<tr>
<th>Module label</th>
<th>Human Biology Experiments for Science Education</th>
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</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio130</td>
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<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
</tr>
</tbody>
</table>
| Used in course of study                     | • 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          |                                                 |

<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>1 portfolio</td>
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<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
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<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practical</td>
<td></td>
<td>4.00</td>
<td></td>
<td></td>
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| Total time of attendance for the module | 70 h |

<table>
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<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
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</table>
bio300 - Evolutionary Biology

Module label: Evolutionary Biology
Module code: bio300
Credit points: 15.0 KP
Workload: 450 h
Used in course of study:
- Fach-Bachelor Biologie > Akzentsetzungsmodulle
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodulle

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 Time of examination Type of examination
Final exam of module Written examination in the final week of the semester or in the first week following the lecture period.
- Written examination (60%)
- Portfolio (40%)

PLEASE NOTE:
Additional conditions regarding attendance and ungraded activities as determined by the persons
<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>Comment</td>
<td>2.00</td>
<td></td>
<td></td>
<td>28 h</td>
</tr>
<tr>
<td>Exercises</td>
<td></td>
<td>6.00</td>
<td></td>
<td></td>
<td>84 h</td>
</tr>
<tr>
<td>Seminar</td>
<td></td>
<td>2.00</td>
<td></td>
<td></td>
<td>28 h</td>
</tr>
</tbody>
</table>

**Total time of attendance for the module**

140 h
### Module Information

**Module label**: General Ecology  
**Module code**: bio310  
**Credit points**: 15.0 KP  
**Workload**: 450 h  
**Used in course of study**  
- Fach-Bachelor Biologie > Akzentsetzungsmodul  
- Master of Education (Gymnasium) Biologie > Mastermodule  
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodul  
**Contact person**  
- **Module responsibility**: Helmut Hillebrand  
- **Authorized examiners**:  
  - Helmut Hillebrand  
  - Rolf Niedringhaus  
  - Rainer Buchwald  
  - Gerhard Wolfgang Zotz  
  - Peter Schupp  
  - Sven Rohde  
  - Maren Striebel  
- **Module counseling**:  
  - Rolf Niedringhaus  
  - Rainer Buchwald  
  - Gerhard Wolfgang Zotz  
  - Peter Schupp  
  - Sven Rohde  
  - Maren Striebel  
**Entry requirements**  
**Skills to be acquired in this module**  
++ biological knowledge  
++ knowledge of biological working methods  
++ biologically relevant knowledge in the natural sciences and mathematics  
+ statistics & scientific programming  
+ interdisciplinary knowledge & thinking  
++ abstract, logical, analytical thinking  
+ deepened expertise in biological specialist field  
+ independent learning and (research-based) working  
+ data presentation and evidence-based discussion (written and spoken)  
+ (scientific) communication skills  
**Module contents**  
**Reader's advisory**  
**Links**  
**Language of instruction**: German  
**Duration (semesters)**: 2 Semester  
**Module frequency**: jährlich  
**Module capacity**: unlimited  
**Modullevel**: AS (Akzentsetzung / Accentuation)  
**Modulart**: Wahlpflicht / Elective  
**Lern-/Lehrform / Type of program**  
**Vorkenntnisse / Previous knowledge**  
**Final exam of module**  
**Course type**  
- Lecture: 2.00  
- Seminar: 1.00  
- Practical: 3.00  
**Comment**  
-  
**SWS**  
- 28 h  
- 14 h  
- 42 h  
**Frequency**  
-  
**Workload attendance**  
- 84 h  
**Total time of attendance for the module**  
- 84 h
bio320 - Pollination and Dispersal Biology

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

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

Contact person:
Module responsibility:
- Dirk Carl Albach

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

Module counseling:
- Klaus Bernhard von Hagen

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

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

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

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

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

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

Examination:
Time of examination: Four weeks after the end of the exercises at the latest.
Type of examination: 1 Portfolio

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

Course type:
Comment | SWS | Frequency | Workload attendance
--- | --- | --- | ---
Lecture | 2.00 | | 28 h
Seminar | 1.00 | | 14 h
Practical | 5.00 | | 70 h

Total time of attendance for the module: 112 h
bio330 - Marine Ecology

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

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

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

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

Basic knowledge and practical experience in biological oceanography
Apply theoretical concepts from different fields in marine ecology
Analyze, 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

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

Module contents:
Lecture Biological Oceanography
2 SWS = 3 CP. Presence time 24 h, additional study time 66h, winter-term
Abiotic environmental conditions in marine systems (light, temperature, chemical and physical proper-ties of the water, waves, tides, global distribution of water masses and currents. Pelagic communities, plankton (phyt-, zoo-, bacterio-, viroplankton), microbial loop, sedimentation, C-and N cycling, Nekton, Fisheries, El Nino, Benthic communities, estuaries.

Exercise Concepts in marine ecology
6 SWS = 9 CP. Presence time 70 h, additional study time 200h, winter-term
Practical and theoretical exercises on marine ecology, including field studies, experiments and working with case studies from the literature. The focus is on concepts here, pinpointing at general ecological frameworks.

Lecture Marine Ecology
2 SWS = 3 CP. Presence time 24 h, additional study time 66h, winter-term
Ecology of marine systems: estuaries, rocky and sediment coasts, pelagial, shelves, mangroves, seagrass meadows, coral reefs, deep sea, polar regions. The focus is on ecological specifics and interactions in the biotic communities of these systems. The second half of the lecture will focus on importance and consequences of overfishing, habitat destruction, pollution, climate change and bioinvasion on marine systems.

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

Links:
- Language of instruction: German
- Duration (semesters): 2 Semester
- Module frequency: jährlich
- Module capacity: unlimited
- Modullevel: AS (Akzentsetzung / Accentuation)
- Modulart: Wahlpflicht / Elective
**Lern-/Lehrform / Type of program**

**Vorkenntnisse / Previous knowledge**

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

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

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<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>
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<td>6.00</td>
<td></td>
<td>84 h</td>
</tr>
</tbody>
</table>

**Total time of attendance for the module**

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

<table>
<thead>
<tr>
<th>Module label</th>
<th>Morphology, Phylogeny, and Evolution of Metazoa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio340</td>
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<tr>
<td>Credit points</td>
<td>15.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>450 h</td>
</tr>
</tbody>
</table>

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

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

**Entry requirements**

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

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

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

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

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

**Examination**
- Type of examination: 1 Written examination (50%), 1 Portfolio (50%),

**PLEASE NOTE:** Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.
<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>2.00</td>
<td></td>
<td>28 h</td>
</tr>
<tr>
<td>Exercises</td>
<td></td>
<td>5.00</td>
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<td>70 h</td>
</tr>
<tr>
<td>Seminar</td>
<td></td>
<td>2.00</td>
<td></td>
<td>28 h</td>
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**Total time of attendance for the module**

126 h
bio350 - Organismic Microanatomy

Module label: Organismic Microanatomy
Module code: bio350
Credit points: 15.0 KP
Workload: 450 h

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

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

Entry requirements:
+ ++ 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

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

Module contents:

Reader's advisory:

Links:

Language of instruction: German

Duration (semesters):
1 Semester

Module frequency: jährlich

Module capacity: unlimited

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>
</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>3.00</td>
<td></td>
<td>42 h</td>
</tr>
<tr>
<td>Exercises</td>
<td></td>
<td>5.00</td>
<td></td>
<td>70 h</td>
</tr>
<tr>
<td>Study trip</td>
<td></td>
<td>1.00</td>
<td></td>
<td>14 h</td>
</tr>
</tbody>
</table>

Total time of attendance for the module: 126 h
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 > Akzentsetzungsmodul
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodul

Contact person
Module responsibility
- Thomas Glatzel

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

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

Entry requirements

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

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

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

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

Reader's advisory

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

Links

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

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

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

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

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

Total time of attendance for the module: 182 h
bio370 - Flora Advanced Plant Biodiversity

<table>
<thead>
<tr>
<th>Module label</th>
<th>Flora Advanced Plant Biodiversity</th>
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</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio370</td>
</tr>
<tr>
<td>Credit points</td>
<td>15.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>450 h</td>
</tr>
</tbody>
</table>
| Used in course of study | • Fach-Bachelor Biologie > Akzentsetzungsmodule  
                          | • Master of Education (Gymnasium) Biologie > Mastermodule  
                          | • Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodule |
| Contact person        | Module responsibility              |
|                       | • 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                 | German                             |
| Language of instruction | English                          |
| Duration (semesters)  | 1 Semester                        |
| Module frequency      | im 2-Jahres-Zyklus                |
| Module capacity       | unlimited                         |
| Reference text        | The module will be offered biennially. |
| Modulart              | je nach Studiengang Pflicht oder Wahlpflicht |
| Lern-/Lehrform / Type of program | ---                                |
| Vorkenntnisse / Previous knowledge | ---                                |
| Examination           | Time of examination               |
| Final exam of module  | Portfolio                         |
|                       | Time of examination               |
| Course type           | Comment                           |
| Lecture               | 2.00                              |
| Exercises             | 5.00                              |
| Seminar               | 3.00                              |
| Total time of attendance for the module | 140 h                             |
bio380 - Specific Microbiology

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<th>Module label</th>
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<tr>
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<td>bio380</td>
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<td>Workload</td>
<td>450 h</td>
</tr>
<tr>
<td>Used in course of study</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fach-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
</tr>
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<td></td>
<td>Master of Education (Gymnasium) Biologie &gt; Mastermodule</td>
</tr>
<tr>
<td></td>
<td>Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
</tr>
<tr>
<td>Contact person</td>
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<td></td>
<td>Module responsibility</td>
</tr>
<tr>
<td></td>
<td>Ralf Andreas Rabus</td>
</tr>
<tr>
<td>Authorized examiners</td>
<td></td>
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<td></td>
<td>Ralf Andreas Rabus</td>
</tr>
<tr>
<td></td>
<td>Kathleen Trautwein</td>
</tr>
<tr>
<td>Module counseling</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kathleen Trautwein</td>
</tr>
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</table>

Entry requirements

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

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

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

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

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

Language of instruction
German

Duration (semesters)
1 Semester

Module frequency
jährlich

Module capacity
unlimited

Modullevel
AS (Akzentsetzung / Accentuation)

Modulart
Wahlpflicht / Elective

Lern-Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination Time of examination Type of examination
Final exam of module
1 written examination (50%)
1 record (50%)

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

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

Module label: Basic Concepts in Neurobiology I

Module code: bio400

Credit points: 15.0 KP

Workload: 450 h

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

Contact person:

Module responsibility:
- Martin Greschner
- Karl-Wilhelm Koch

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

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

Entry requirements:

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

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

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

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

Reader's advisory:

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

Lern-Lehrform / Type of program:

Vorkenntnisse / Previous knowledge:

Examination:
- Time of examination
- Type of examination

Final exam of module:

1 written examination, signed minutes

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

Course type:
- Lecture: 4.00 SWS, 56 h workload
- Exercises: 6.00 SWS, 84 h workload
<table>
<thead>
<tr>
<th>Course type</th>
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<th>SWS</th>
<th>Frequency</th>
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<tr>
<td>Tutorial</td>
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<td>2.00</td>
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**Total time of attendance for the module**

182 h
**bio410 - Basic Concepts in Neurobiology II**

**Module label**
Basic Concepts in Neurobiology II

**Module code**
bio410

**Credit points**
15.0 KP

**Workload**
450 h

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

**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**

<table>
<thead>
<tr>
<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
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<tbody>
<tr>
<td>Final exam of module</td>
<td>Written examination in the course of the semester vacation (usually in March)</td>
<td>1 written examination</td>
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**PLEASE NOTE:**
Additional conditions regarding attendance and ungraded activities as determined by the persons responsible for the module will apply.

**Course type**

<table>
<thead>
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<tbody>
<tr>
<td>Lecture</td>
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<td>Exercises</td>
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<td>5.00</td>
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| Total time of attendance for the module | 140 h |

21 / 51
bio390 - Plant molecular biology and genetics

Module label: Plant molecular biology and genetics
Module code: bio390
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: 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: ---

Modulart: je nach Studiengang Pflicht oder Wahlpflicht

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

<table>
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<tr>
<th>Examination</th>
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<th>KL</th>
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<table>
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<th>Frequency</th>
<th>Workload attendance</th>
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<tbody>
<tr>
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<td>3.00</td>
<td>WiSe</td>
<td>42 h</td>
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<tr>
<td>Seminar</td>
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<td>3.00</td>
<td>WiSe</td>
<td>42 h</td>
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<tr>
<td>Practical</td>
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<td>4.00</td>
<td>WiSe</td>
<td>56 h</td>
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Total time of attendance for the module: 140 h

Languages of instruction: German, English

Duration (semesters): 1 Semester

Modullevel: ---

Modulart: je nach Studiengang Pflicht oder Wahlpflicht

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

<table>
<thead>
<tr>
<th>Examination</th>
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<tbody>
<tr>
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<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
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<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>3.00</td>
<td>WiSe</td>
<td>42 h</td>
</tr>
<tr>
<td>Seminar</td>
<td></td>
<td>3.00</td>
<td>WiSe</td>
<td>42 h</td>
</tr>
<tr>
<td>Practical</td>
<td></td>
<td>4.00</td>
<td>WiSe</td>
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Total time of attendance for the module: 140 h

Languages of instruction: German, English

Duration (semesters): 1 Semester

Modullevel: ---

Modulart: je nach Studiengang Pflicht oder Wahlpflicht

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

<table>
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<th>Workload attendance</th>
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<td>Lecture</td>
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<td>3.00</td>
<td>WiSe</td>
<td>42 h</td>
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<tr>
<td>Seminar</td>
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<td>3.00</td>
<td>WiSe</td>
<td>42 h</td>
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<tr>
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Total time of attendance for the module: 140 h
**bio325 - Pollination and Dispersal - Concepts**

<table>
<thead>
<tr>
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<tbody>
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<td></td>
<td>Fach-Bachelor Mathematik &gt; Nebenfachmodule</td>
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<td>Master of Education (Gymnasium) Biologie &gt; Mastermodule</td>
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<td></td>
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<tr>
<td>Contact person</td>
<td>Module responsibility</td>
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<tr>
<td></td>
<td>Dirk Carl Albach</td>
</tr>
<tr>
<td>Authorized examiners</td>
<td></td>
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<td></td>
<td>Dirk Carl Albach</td>
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<tr>
<td></td>
<td>Klaus Bernhard von Hagen</td>
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<td></td>
<td>Maria Will</td>
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<td>Module counceling</td>
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<td></td>
<td>Klaus Bernhard von Hagen</td>
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<td>Maria Will</td>
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<td>Entry requirements</td>
<td>bio256 Flora and Fauna</td>
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<tr>
<td>Skills to be acquired in this module</td>
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<tr>
<td></td>
<td>biological knowledge</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></td>
<td>knowledge of safety and environmental issues</td>
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<tr>
<td>Module contents</td>
<td>L: Pollination, dispersal, germination of plants, plant breeding</td>
</tr>
<tr>
<td></td>
<td>S: Pollination and dispersal biology of plants in a systematic context</td>
</tr>
<tr>
<td>Reader's advisory</td>
<td>The course does not follow a special textbook. The following German literature is recommended to students interested in the course: Dieter Heß – Die Blüte, Eugen Ulmer Verlag as well as Leins &amp; Erbar -Blüte und Frucht, Schweizerbart'sche Verlagsbuchhandlung.</td>
</tr>
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<td>Links</td>
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<tr>
<td>Language of instruction</td>
<td>German</td>
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<tr>
<td>Duration (semesters)</td>
<td>1 Semester</td>
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<tr>
<td>Module frequency</td>
<td>The module will be offered every other year</td>
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<tr>
<td>Module capacity</td>
<td>12</td>
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<td>Modulart</td>
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<td>Lern-/Lehrform / Type of program</td>
<td>lecture, seminar</td>
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**Vorkenntnisse / Previous knowledge**

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<th>Type of examination</th>
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<table>
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<tbody>
<tr>
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<td>Lecture</td>
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<td>Total time of attendance for the module</td>
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## bio327 - Pollination and Dispersal - Methods not just for Schools

<table>
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<th>Module label</th>
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<tbody>
<tr>
<td>Module code</td>
<td>bio327</td>
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<tr>
<td>Credit points</td>
<td>9.0 KP</td>
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<td>Workload</td>
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<td>Master of Education (Gymnasium) Biologie &gt; Mastermodule</td>
</tr>
<tr>
<td></td>
<td>Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodul</td>
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</tbody>
</table>

### 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
- Type of examination: portfolio
- Final exam of module: portfolio

### Course type
Exercises

### SWS
6.00

### Frequency
SuSe

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

<table>
<thead>
<tr>
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<th>Microscopical Anatomy</th>
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<tr>
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<tr>
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<td>Master of Education (Gymnasium) Biologie &gt; Mastermodule</td>
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<td></td>
<td>Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodulle</td>
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</table>

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

#### Entry requirements

Skills to be acquired in this module:

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

This course is designed for students to learn about the basic light and electron optical methods. Students will be able to work with preparative techniques for scanning electron microscopy, transmission electron microscopy, and light microscopy, and confocal scanning laser microscopy. Students completing this course will have learned basic principles for fixing and embedding biological materials for electron microscopy. Students will have learned how to operate a transmission electron microscope, a scanning electron microscope, several ultramicrotomes, a vacuum evaporator, a critical point dryer, and a sputter coater. Digital imaging techniques that will be learned include print making, design and assembly of materials for publication, PowerPoint presentations, and poster design. Students will be introduced to the principles of light microscopy utilizing different optical 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 (For more applicants than places, a motivation letter decides on the admission.)
- Modullevel: AS (Akzentsetzung / Accentuation)
- Modulart: Wahlpflicht / Elective
- Lern-/Lehrform / Type of program: lecture/seminar, exercise

<table>
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<tr>
<th>Vorkenntnisse / Previous knowledge</th>
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<th>Time of examination</th>
<th>Type of examination</th>
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<th>Frequency</th>
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<td>end of module</td>
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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 > Akzentsetzungsmodul
- Fach-Bachelor Mathematik > Nebenfachmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodul

Contact person
Module responsibility
- Dirk Carl Albach

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

Module counseling
- Klaus Bernhard von Hagen
- Maria Will

Entry requirements            bio256 Flora and Fauna

Skills to be acquired in this module
- biological knowledge
- knowledge of biological working methods
- 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
Modulelevel                      AS (Akzentsetzung / Accentuation)
Modulart                         Wahlpflicht / Elective
Lern-/Lehrform / Type of program  lecture, seminar
Vorkenntnisse / Previous knowledge

Examination                        | Time of examination | Type of examination
------------------------------------|---------------------|-------------------
Final exam of module                | portfolio

Course type | Comment | SWS | Frequency | Workload attendance
Lecture     |         | 2.00| SuSe      | 28 h
Seminar     |         | 2.00| SuSe      | 28 h

Total time of attendance for the module            56 h
bio377 - Flora - Advanced Methods not just for schools

Module label Flora - Advanced Methods not just for schools
Module code bio377
Credit points 9.0 KP
Workload 270 h

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

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

Entry requirements
bio375 Flora - Advanced Concepts
bio256 Flora and Fauna

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

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

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

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

Links

Language of instruction German
Duration (semesters) 1 Semester
Module frequency The module will be offered every other year
Module capacity 12
Modulelevel AS (Akzentsetzung / Accentuation)
Modulart Wahlpflicht / Elective

Lern-Lehrform / Type of program exercise

Vorkenntnisse / Previous knowledge

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

Course type Exercises

SWS 6.00
Frequency SuSe
Workload attendance 84 h
bio395 - Plant Molecular Biology and Genetics I

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

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

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

Entry requirements:

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

The module serves the in-depth study of state-of-the-art techniques and problems in the field of molecular plant biology and plant genetics.
Specialist competencies: basic knowledge in plant genetics, plant developmental genetics, plant/environment interactions and molecular basis of gene regulation
General competencies: Presentation of scientific papers, presentation techniques, teamwork, problem solving competencies

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

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

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

Module frequency: 16

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

Modullevel: AS (Akzentsetzung / Accentuation)

Modulart: Wahlpflicht / Elective

Lern-Lehrform / Type of program: lecture, seminar

Vorkenntnisse / Previous knowledge:

Examination:
- Time of examination
- Type of examination

Final exam of module:
- Written examination (good seminar presentations improve the grade)
- Course type: Lecture
- Comment: 2.00
- SWS: WISer
- Frequency: 28 h
- Workload attendance: 28 h
<table>
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<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tbody>
<tr>
<td>Seminar</td>
<td></td>
<td>2.00</td>
<td>WiSe</td>
<td>28 h</td>
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**Total time of attendance for the module**

56 h
bio396 - Plant Molecular Biology and Genetics II

Module label: Plant Molecular Biology and Genetics II
Module code: bio396
Credit points: 6.0 KP
Workload: 180 h

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

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

Entry requirements:
- bio395 Plant molecular biology and genetics I

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

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

Specialist competencies: Acquiring basic skill in plant molecular biology, genetics and plant biochemistry
Methodological competencies: molecular biology techniques, conducted independently
General competencies: Presentation of scientific results, presentation techniques, teamwork, problem solving competencies

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

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

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

Vorkenntnisse / Previous knowledge:

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 > Akzentsetzungsmodul
- Fach-Bachelor Mathematik > Nebenfachmodule
- Master of Education (Gymnasium) Biologie > Mastermodule
- Zwei-Fächer-Bachelor Biologie > Akzentsetzungsmodul

Contact person

Module responsibility
- Martin Greschner

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

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

Entry requirements

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

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

Reader's advisory

Links

Language of instruction  German

Duration (semesters)  1 Semester

Module frequency  annually

Module capacity  30

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

Modulelevel  AS (Akzentsetzung / Accentuation)

Modulart  Wahlpflicht / Elective

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

Vorkenntnisse / Previous knowledge  Basics in physiology and cellular biology

Examination  Time of examination  Type of examination
Final exam of module  end of semester  exam and protocol

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Total time of attendance for the module  112 h
bio415 - Introduction to Neurobiology II

Module label
Introduction to Neurobiology II

Module code
bio415

Credit points
6.0 KP

Workload
180 h

Used in course of study
- Fach-Bachelor Biologie > 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
Type of examination
Final exam of module
end of semester
written exam

Course type
Comment
SWS
Frequency
Workload attendance
Lecture
3.00
WiSe
42 h
Seminar
1.00
WiSe
14 h

Total time of attendance for the module
56 h
bio416 - Experiments in Neurobiology II

<table>
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<tr>
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<tr>
<td>Module code</td>
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  - 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 |
  - Final exam of module | end of module | portfolio (data analysis, presentation) |
  - Course type | Exercises |
  - SWS | 4.00 |
  - Frequency | WiSe |
  - Workload attendance | 56 h |
bio385 - Specific Microbiology

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<tr>
<td></td>
<td>Ralf Andreas Rabus</td>
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<tr>
<td>bio233 Basics in microbiology and genetics</td>
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<td>bio265 general microbiology</td>
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<tr>
<td>Lecture</td>
<td>2.00</td>
</tr>
<tr>
<td>Seminar</td>
<td>2.00</td>
</tr>
<tr>
<td>Practical</td>
<td>6.00</td>
</tr>
<tr>
<td>Total time of attendance for the module</td>
<td></td>
</tr>
<tr>
<td></td>
<td>140 h</td>
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bio420 - Biochemistry of the Cell

<table>
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<tr>
<th>Module label</th>
<th>Biochemistry of the Cell</th>
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<tbody>
<tr>
<td>Module code</td>
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<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
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<tr>
<td></td>
<td>Fach-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
</tr>
<tr>
<td></td>
<td>Master of Education (Gymnasium) Biologie &gt; Mastermodule</td>
</tr>
<tr>
<td></td>
<td>Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodul</td>
</tr>
</tbody>
</table>

Contact person

- Module responsibility
  - Alexander Scholten

Authorized examiners

- Alexander Scholten

Entry requirements

Skills to be acquired in this module

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

Module contents

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

Reader's advisory

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

Links

Language of instruction

German

Duration (semesters)

1 Semester

Module frequency

annually

Module capacity

20

Module level

AS (Akzentsetzungs / Accentuation)

Moduleart

Wahlpflicht / Elective

Lern-/Lehrform / Type of program

lecture, seminar, exercise

Vorkenntnisse / Previous knowledge

Biochemistry

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>during the semester</td>
<td>oral presentation</td>
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Course type

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>1.00</td>
<td>Wise</td>
<td>14 h</td>
</tr>
<tr>
<td>Exercises</td>
<td></td>
<td>1.00</td>
<td>Wise</td>
<td>14 h</td>
</tr>
<tr>
<td>Seminar</td>
<td></td>
<td>2.00</td>
<td>Wise</td>
<td>28 h</td>
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</table>

Total time of attendance for the module

56 h

38 / 51
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

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

Module frequency: annually
Module capacity: 20

Module level: PB (Professionalisierungsbereich / Professionalization)
Modulart: Ergänzung/Professionalisierung

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

Vorkenntnisse / Previous knowledge:
Biochemistry and Molecular Biology

Examination:
Type of examination:
oral presentation and protocol

Final exam of module:
during semester

Course type:
Comment | SWS | Frequency | Workload attendance
---|---|---|---
Lecture | 1.00 | SuSe | 14 h
Seminar | 1.00 | SuSe | 14 h
Exercises | 2.00 | SuSe | 28 h

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

Module label
Microfauna, Microflora & Protista of limnic and marine habitats

Module code
bio440

Credit points
6.0 KP

Workload
180 h

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

Contact person
Module responsibility
- Wilko Ahirichs

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

Reader's advisory
Will be announced in the course.

Links
Language of instruction
- German

Duration (semesters)
- 1 Semester

Module frequency
- irregular

Module capacity
- 12
  - For more applicants than places, a motivation letter decides on the admission.
<table>
<thead>
<tr>
<th>Lern-/Lehrform / Type of program</th>
<th>Modulart</th>
<th>je nach Studiengang Pflicht oder Wahlpflicht</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vorkenntnisse / Previous knowledge</td>
<td>Examination</td>
<td>Time of examination</td>
</tr>
<tr>
<td>Final exam of module</td>
<td>Portfolio</td>
<td></td>
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<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tr>
<td>Study trip</td>
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<td>1.00</td>
<td>SuSe</td>
<td>14 h</td>
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<tr>
<td>Seminar</td>
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<td>1.00</td>
<td>SuSe</td>
<td>14 h</td>
</tr>
<tr>
<td>Exercises</td>
<td></td>
<td>2.00</td>
<td>SuSe</td>
<td>28 h</td>
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**Total time of attendance for the module**: 56 h
bio450 - Posters, Pictures, Presentations and Papers

<table>
<thead>
<tr>
<th>Module label</th>
<th>Posters, Pictures, Presentations and Papers</th>
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</thead>
<tbody>
<tr>
<td>Module code</td>
<td>bio450</td>
</tr>
<tr>
<td>Credit points</td>
<td>9.0 KP</td>
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<tr>
<td>Workload</td>
<td>270 h</td>
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<tr>
<td>Used in course of study</td>
<td>• Fach-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
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<tr>
<td></td>
<td>• Master of Education (Gymnasium) Biologie &gt; Mastermodule</td>
</tr>
<tr>
<td></td>
<td>• Zwei-Fächer-Bachelor Biologie &gt; Akzentsetzungsmodule</td>
</tr>
<tr>
<td>Contact person</td>
<td>Module responsibility</td>
</tr>
<tr>
<td></td>
<td>• Olaf Bininda-Emonds</td>
</tr>
<tr>
<td></td>
<td>Authorized examiners</td>
</tr>
<tr>
<td></td>
<td>• Olaf Bininda-Emonds</td>
</tr>
<tr>
<td></td>
<td>• Wilko Ahlrichs</td>
</tr>
<tr>
<td></td>
<td>Module counseling</td>
</tr>
<tr>
<td></td>
<td>• Wilko Ahlrichs</td>
</tr>
<tr>
<td>Entry requirements</td>
<td></td>
</tr>
<tr>
<td>Skills to be acquired in this module</td>
<td>+ interdisciplinary knowledge &amp; thinking</td>
</tr>
<tr>
<td></td>
<td>+ abstract, logical, analytical thinking</td>
</tr>
<tr>
<td></td>
<td>+ deepened expertise in biological specialist field</td>
</tr>
<tr>
<td></td>
<td>+ independent learning and (research-based) working</td>
</tr>
<tr>
<td></td>
<td>+ data presentation and evidence-based discussion (written and spoken)</td>
</tr>
<tr>
<td></td>
<td>+ (scientific) communication skills</td>
</tr>
<tr>
<td></td>
<td>+ project and time management</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>Module contents</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>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).</td>
</tr>
<tr>
<td>Reader’s advisory</td>
<td>None. The relevant scientific literature will be distributed during the course.</td>
</tr>
<tr>
<td>Links</td>
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<td>Languages of instruction</td>
<td>German, English</td>
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<td>Duration (semesters)</td>
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<tr>
<td>Module frequency</td>
<td>annually</td>
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<td>Module capacity</td>
<td>10 (Letter of motivation)</td>
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<td>Modullevel</td>
<td>AS (Akzentsetzung / Accentuation)</td>
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<tr>
<td>Modulart</td>
<td>Wahlpflicht / Elective</td>
</tr>
<tr>
<td>Lern-/Lehrform / Type of program</td>
<td>exercise</td>
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<tr>
<td>Vorkenntnisse / Previous knowledge</td>
<td>Experience with the use of Microsoft Excel (or programs with graphing capabilities), Adobe Photoshop, and Microsoft PowerPoint or Keynote (or similar programs).</td>
</tr>
<tr>
<td>Examination</td>
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</tr>
<tr>
<td>Time of examination</td>
<td></td>
</tr>
<tr>
<td>Type of examination</td>
<td></td>
</tr>
<tr>
<td>Final exam of module</td>
<td>Portfolio (100%)</td>
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<tr>
<td>Course type</td>
<td>Exercises</td>
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<td>SWS</td>
<td>6.00</td>
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<tr>
<td>-------------</td>
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</tr>
<tr>
<td>Frequency</td>
<td>SuSe</td>
</tr>
<tr>
<td>Workload attendance</td>
<td>84 h</td>
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</table>
bio460 - Diversity of marine Invertebrates

Module label: Diversity of marine Invertebrates
Module code: bio460
Credit points: 6.0 KP
Workload: 180 h

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

Contact person:
- Module responsibility:
  - Thomas Glatzel
- Authorized examiners:
  - Thomas Glatzel

Entry requirements:

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

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

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

Reader's advisory:

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&colorz=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:

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

### Previous knowledge

<table>
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<th>Examination</th>
<th>Time of examination</th>
<th>Type of examination</th>
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<tr>
<td>Final exam of module</td>
<td>During the lecture</td>
<td>portfolio</td>
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</table>

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

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

**Total time of attendance for the module**

56 h
bio470 - Marine Biology Field Trip

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

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

Contact person:
- Module responsibility: Wilko Ahirichs
- Authorized examiners:
  - Wilko Ahirichs
  - Alexander Kieneke
- Module counseling: Alexander Kieneke

Entry requirements:

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

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

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

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

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

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

Vorkenntnisse / Previous knowledge:

Examination | Time of examination | Type of examination | Final exam of module | Comment | SWS | Frequency | Workload attendance |
---|---|---|---|---|---|---|---|
Course type | | | portfolio | |
Seminar | 2.00 | SuSe | 28 h |
Exercises | 2.00 | SuSe | 28 h |
Study trip | 2.00 | SuSe | 28 h |
Total time of attendance for the module | | | | 84 h |
bio480 - Functional Morphology of Plants

Module label: Functional Morphology of Plants
Module code: bio480
Credit points: 6.0 KP
Workload: 180 h

Used in course of study:
- Fach-Bachelor Biologie > 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
Modullevel: AS (Akzentsetzung / Accentuation)
Modulart: Wahlpflicht / Elective
Lern-/Lehrform / Type of program: lecture, seminar, exercise
Vorkenntnisse / Previous knowledge: Ecology, Flora

Examination

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

<table>
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<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td>1.00</td>
<td>SuSe</td>
<td>14 h</td>
</tr>
<tr>
<td>Seminar</td>
<td></td>
<td>1.00</td>
<td>SuSe</td>
<td>14 h</td>
</tr>
<tr>
<td>Exercises</td>
<td></td>
<td>2.00</td>
<td>SuSe</td>
<td>28 h</td>
</tr>
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Total time of attendance for the module: 56 h
### bio490 - Experimental Methods in Biology

<table>
<thead>
<tr>
<th><strong>Module label</strong></th>
<th>Experimental Methods in Biology</th>
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<tbody>
<tr>
<td><strong>Module code</strong></td>
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<tr>
<td><strong>Credit points</strong></td>
<td>3.0 KP</td>
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<td><strong>Workload</strong></td>
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<tr>
<td><strong>Used in course of study</strong></td>
<td>Master of Education (Gymnasium) Biologie &gt; Mastermodule</td>
</tr>
</tbody>
</table>

#### Contact person
- **Module responsibility**
  - Gerhard Wolfgang Zotz
- **Authorized examiners**
  - 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
- **German**

#### Links
- **E. Methods (2 SWS)**

#### Language of instruction
- German

#### Duration (semesters)
- 1 Semester

#### Module frequency
- annually

#### Module capacity
- 10

#### Modulart
- Wahlpflicht / Elective

#### Vorkenntnisse / Previous knowledge
- **exercise**

#### 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></td>
<td>1 report</td>
</tr>
</tbody>
</table>

#### Course type
- **Exercises**

#### SWS
- 2.00

#### Frequency
- SuSe

#### Workload attendance
- 28 h
Abschlussmodul

mam - Master´s Thesis Module

<table>
<thead>
<tr>
<th>Module label</th>
<th>Master´s Thesis Module</th>
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</thead>
<tbody>
<tr>
<td>Module code</td>
<td>mam</td>
</tr>
<tr>
<td>Credit points</td>
<td>27.0 KP</td>
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<tr>
<td>Workload</td>
<td>810 h</td>
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</tbody>
</table>

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

Contact person

Entry requirements

Skills to be acquired in this module

Module contents

Reader's advisory

Links

Languages of instruction

Duration (semesters) 1 Semester

Module frequency

Module capacity unlimited

Modullevel ---

Modulart je nach Studiengang Pflicht oder Wahlpflicht

Lern-/Lehrform / Type of program

Vorkenntnisse / Previous knowledge

Examination

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

Course type Seminar

SWS

Frequency

Workload attendance 0 h