Subdivided Module Catalogue
for the Subject

Biochemistry

as a Bachelor’s with 1 major
with the degree "Bachelor of Science"
(180 ECTS credits)

Examination regulations version: 2013
Responsible: Faculty of Chemistry and Pharmacy
Course of Studies - Contents and Objectives

No translation available.
Abbreviations used

Course types: E = field trip, K = colloquium, O = conversatorium, P = placement/lab course, R = project, S = seminar, T = tutorial, Ü = exercise, V = lecture

Term: SS = summer semester, WS = winter semester

Methods of grading: NUM = numerical grade, B/NB = (not) successfully completed

Regulations: (L)ASPO = general academic and examination regulations (for teaching-degree programmes), FSB = subject-specific provisions, SFB = list of modules

Other: A = thesis, LV = course(s), PL = assessment(s), TN = participants, VL = prerequisite(s)

Conventions

Unless otherwise stated, courses and assessments will be held in German, assessments will be offered every semester and modules are not creditable for bonus.

Notes

Should there be the option to choose between several methods of assessment, the lecturer will agree with the module coordinator on the method of assessment to be used in the current semester by two weeks after the start of the course at the latest and will communicate this in the customary manner.

Should the module comprise more than one graded assessment, all assessments will be equally weighted, unless otherwise stated below.

Should the assessment comprise several individual assessments, successful completion of the module will require successful completion of all individual assessments.

In accordance with

the general regulations governing the degree subject described in this module catalogue:

ASPO2009

associated official publications (FSB (subject-specific provisions)/SFB (list of modules)):

23-Sep-2013 (2013-110) except for mandatory electives added in Fast Track procedure at a later time

9-Dec-2014 (2014-81)

This module handbook seeks to render, as accurately as possible, the data that is of statutory relevance according to the examination regulations of the degree subject. However, only the FSB (subject-specific provisions) and SFB (list of modules) in their officially published versions shall be legally binding. In the case of doubt, the provisions on, in particular, module assessments specified in the FSB/SFB shall prevail.
The subject is divided into

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<td>03-4S1VIR-BC-132-m01</td>
<td>Virology for students of biochemistry</td>
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<td>Current Methods of Protein Chromatography</td>
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<td>General Biology for students of biochemistry</td>
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<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
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<tbody>
<tr>
<td>holder of the Chair of Biochemistry</td>
<td>Chair of Biochemistry</td>
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<th>Only after succ. compl. of module(s)</th>
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<tr>
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<th>Other prerequisites</th>
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<tr>
<td>2 semester</td>
<td>undergraduate</td>
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### Contents

Presentation of current research results in the Biocentre colloquium and discussion of recent literature.

### Intended learning outcomes

Students are introduced to the topics of current research in the life sciences.

### Courses (type, number of weekly contact hours, language — if other than German)

V + S (no information on SWS (weekly contact hours) and course language available)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

attendance of 80% of talks

### Allocation of places

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### Additional information

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### Referred to in LPO I (examination regulations for teaching-degree programmes)

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**Contents**

In the course of the module current results of local, national or international research groups are presented in a lecture series. The methods are described and the results are integrated into the context of current literature.

**Intended learning outcomes**

After attending the module events, students have knowledge of the current progress of biochemical research. They can understand the discussed issues and summarize and reflect the contents in a short talk.

**Courses**

(type, number of weekly contact hours, language — if other than German)

V + S (no information on SWS (weekly contact hours) and course language available)

**Method of assessment**

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

presentation (approx. 10 minutes)
Language of assessment: German or English

**Allocation of places**

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**Additional information**

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**Referred to in LPO I**
(examination regulations for teaching-degree programmes)

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<tbody>
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**Contents**

In the course of the module current results of local, national or international research groups are presented in a lecture series. The methods are described and the results are integrated into the context of current literature.

**Intended learning outcomes**

After attending the module events, students have knowledge of the current progress of biochemical research. They can understand the discussed issues and summarize and reflect the contents in a short talk.

**Courses** (type, number of weekly contact hours, language — if other than German)

V + S (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

presentation (approx. 10 minutes)
Language of assessment: German or English

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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# Contemporary Research in Biochemistry 3

**Module title:** Contemporary Research in Biochemistry 3  
**Abbreviation:** 08-AFBC3-111-m01

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**Module coordinator:** holder of the Chair of Biochemistry  
**Module offered by:** Chair of Biochemistry  
**ECTS:** 3  
**Method of grading:** numerical grade  
**Duration:** 2 semester  
**Module level:** undergraduate  
**Other prerequisites:** --

## Contents

In the course of the module current results of local, national or international research groups are presented in a lecture series. The methods are described and the results are integrated into the context of current literature.

## Intended learning outcomes

After attending the module events, students have knowledge of the current progress of biochemical research. They can understand the discussed issues and summarize and reflect the contents in a short talk.

## Courses

<table>
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<th>Type, number of weekly contact hours, language — if other than German</th>
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## Method of assessment

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<tbody>
<tr>
<td>presentation (approx. 10 minutes) Language of assessment: German or English</td>
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## Allocation of places

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## Additional information

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## Referred to in LPO I (examination regulations for teaching-degree programmes)

--
## Module title
Current Methods of Protein Chromatography

### Abbreviation
08-BC-AMP-141-m01

### Module coordinator
holder of the Chair of Biochemistry

### Module offered by
Chair of Biochemistry

### ECTS
5

### Method of grading
numerical grade

### Only after succ. compl. of module(s)
--

### Duration
1 semester

### Module level
undergraduate

### Other prerequisites
--

### Contents
In practical experiments the module provides the theoretical foundations and methodological skills in the purification of various proteins by modern chromatographic methods.

### Intended learning outcomes
After attending the module, the students know the equipment necessary for chromatographic protein purifications. They know the various relevant parameters and are able to transfer their knowledge to other questions. They are able to evaluate the results and to document and discuss them in a protocol.

### Courses
(-type, number of weekly contact hours, language — if other than German)
Ü (no information on SWS (weekly contact hours) and course language available)

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 60 to 90 minutes) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes). Students will be informed about the method and length of the assessment prior to the course.

Assessment offered: once a year, winter semester

Language of assessment: German or English

### Allocation of places
Biochemie (Biochemistry) Bachelor's: 24 places. Selection process Biochemie (Biochemistry) Bachelor's: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places) number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

### Additional information
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### Referred to in LPO I
(examination regulations for teaching-degree programmes)
--
Subdivided Module Catalogue for the Subject Biochemistry
Bachelor’s with 1 major, 180 ECTS credits

Module title | Abbreviation
--- | ---
General Biology for students of biochemistry | 07-1A1ZO-BC-132-m01

Module coordinator | Module offered by
Dean of Studies Biologie (Biology) | Faculty of Biology

ECTS | Method of grading | Only after succ. compl. of module(s)
--- | --- | ---
5 | numerical grade | --

Duration | Module level | Other prerequisites
--- | --- | ---
1 semester | undergraduate | --

Contents
The first part of the course will acquaint students with the elementary building blocks of life as well as biological categories. Building on this knowledge, the course will then discuss the cell, the smallest unit of life, starting with its macroscopic structure before moving on to its microscopic structure. The course will point out differences and similarities between prokaryotic cells (bacteria, archaebacteria) and eukaryotic cells (animals, plants). The second part will address one of the central issues of biology: evolution. Fundamental mechanisms and hypotheses will be discussed and students will be introduced to major phylogenetic reconstruction methods. Using the examples of plants and animals, the subsequent module components will introduce students to the phylogenetic diversity of eukaryotes. At the level of groups in the plant and animal kingdoms, students will acquire the fundamental knowledge necessary to understand the forms and functions of animal and plant organisms, with morphology and cytology being discussed in an evolutionary and ecological context. The contents of the module are relevant for biological disciplines at all levels of biological organisation.

Intended learning outcomes
- Knowledge of the structures of prokaryotic and eukaryotic cells and their (biological) macromolecules.
- Knowledge of the specific characteristics of the intracellular and extracellular structures of prokaryotes as well as animal and plant cells.
- Ability to recognise evolution as the driving force behind the phylogeny of species.
- Familiarity with the concepts of phylogenetic relationships between plants/animals.
- Familiarity with the distinguishing characteristics and major representatives of groups in the plant and animal kingdoms.
- Ability to select those plant and animal organisms that are most suitable for particular scientific issues.
- Familiarity with the components and functioning of microscopes.

Courses (type, number of weekly contact hours, language — if other than German)
V + V + V + V (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
4 written examinations (including multiple choice questions): 3 examinations: 60 minutes each (graded); 1 examination: 30 minutes (ungraded); weighted 1:1:1:1

Allocation of places
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Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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**Contents**
Delved practice in a specific research topic; presentation of the results in a written protocol.

**Intended learning outcomes**
The student is able to deeply acquaint himself/herself with a specific research topic, and to present the results in a written protocol.

**Courses** (type, number of weekly contact hours, language — if other than German)
Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
log (approx. 30 pages)
Language of assessment: German or English

**Allocation of places**
--

**Additional information**
Additional information on module duration: 6 weeks.

**Referred to in LPO I** (examination regulations for teaching-degree programmes)
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## Module title
Advanced lab (abridged)

### Abbreviation
08-AVP5-BC-132-m01

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### ECTS
5

### Method of grading
numerical grade

### Only after succ. compl. of module(s)
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### Duration
1 semester

### Module level
undergraduate

### Other prerequisites
--

### Contents
Delved practice in a specific research topic; presentation of the results in a written protocol.

### Intended learning outcomes
The student is able to deeply acquaint himself/herself with a specific research topic, and to present the results in a written protocol.

### Courses
( type, number of weekly contact hours, language — if other than German)

Ü (no information on SWS (weekly contact hours) and course language available)

### Method of assessment
( type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

log (approx. 20 pages)

Language of assessment: German or English

### Allocation of places
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### Additional information
Additional information on module duration: 3 weeks.

### Referred to in LPO I
(examination regulations for teaching-degree programmes)

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**Contents**

The module offers the possibility to learn the organization, training and responsible leadership of scientific experiments by assisting undergraduate students in a practical course.

**Intended learning outcomes**

The student is able to train and to supervise undergraduate students in basic experimental procedures.

**Courses** (type, number of weekly contact hours, language — if other than German)

S (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

preparing and supervising student lab courses: assessment to be successfully completed (type and length of assessment to be specified at the beginning of the course)

Language of assessment: German or English

**Allocation of places**

--

**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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Module title: Inorganic Chemistry 1
Abbreviation: 08-AC1-BC-111-m01

Module coordinator: lecturer of lecture "Experimentalchemie" (Experimental Chemistry)
Module offered by: Institute of Inorganic Chemistry

ECTS: 16
Method of grading: numerical grade
Only after succ. compl. of module(s): --

Duration: 1 semester
Module level: undergraduate
Other prerequisites: By way of exception, additional prerequisites are listed in the section on assessments.

Contents
This module provides students with an overview of the fundamental principles of chemistry. It focuses on particles, metals, acid-base reactions, the periodic table, chemical equilibrium and complexometry. In addition, the module introduces fundamental models of chemistry and principles of inorganic chemistry. It includes practical exercises based on the lecture on experimental chemistry and its extension. After a safety briefing, the students autonomously conduct experiments in the laboratory. The course focuses on laboratory safety, simple lab techniques, the synthesis of simple substances and analyses of unknown substances. In addition, students have the opportunity to advance their laboratory knowledge.

Intended learning outcomes
Students are able to explain the principles of the periodic table and to extract information from it. They are able to explain basic models of the structure of matter. They have developed the ability to use the language of chemical formulas to describe chemical reactions and to interpret them by identifying the type of reaction. Students are able to describe the main quantitative and qualitative analytical methods and their application areas. They are able to identify fundamental problems in chemistry and perform experiments to solve them. They have developed the ability to perform the necessary stoichiometric calculations and describe the chemical processes in an appropriate manner, both in written and oral form.

Courses (type, number of weekly contact hours, language — if other than German)
This module comprises 3 module components. Information on courses will be listed separately for each module component.

- 08-AC1-BC-2-092: P (no information on SWS (weekly contact hours) and course language available)
- 08-AC1-BC-3-092: V (no information on SWS (weekly contact hours) and course language available)
- 08-AC1-1-102: V + V + Ü (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

Assessment in module component 08-AC1-BC-2-092: Practical course of Inorganic Chemistry 1 for Biochemistry Majors
- 4 ECTS, Method of grading: (not) successfully completed
- Vortestate (pre-experiment exams, approx. 15 minutes each), Nachtestate (post-experiment exams, approx. 15 minutes each)
- Assessment offered: once a year, winter semester

Assessment in module component 08-AC1-BC-3-092: Accompanying lecture to the practical course of Inorganic Chemistry 1 for Biochemistry Majors
- 2 ECTS, Method of grading: numerical grade
- 2 written examinations (approx. 45 minutes each), weighted 1:1

- 10 ECTS, Method of grading: numerical grade
• a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: 60 or 90 minutes each; 3 written examinations: 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
• Language of assessment: German or English
• Other prerequisites: Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).

### Allocation of places
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### Additional information
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### Referred to in LPO I (examination regulations for teaching-degree programmes)

§ 42 (1) 1. Chemie "Allgemeine und Anorganische Chemie" und "Physikalische und Analytische Chemie"
§ 62 (1) 1. Chemie "Allgemeine und Anorganische Chemie"; "Physikalische und Analytische Chemie"
Module title | Abbreviation
--- | ---
Inorganic Chemistry 3 for Biochemistry Majors | 08-AC3-BC-131-m01

Module coordinator | Module offered by
--- | ---
Lecturer of lecture "Elementorganische Chemie" (Elemental Organic Chemistry) | Institute of Inorganic Chemistry

ECTS | Method of grading | Only after succ. compl. of module(s)
--- | --- | ---
9 | numerical grade | 08-OC3P

Duration | Module level | Other prerequisites
--- | --- | ---
1 semester | undergraduate | By way of exception, additional prerequisites are listed in the section on assessments.

Contents
This module equips students with an advanced knowledge of organometallics. It focuses on their structures and properties, special material classes, reactivity and technical processes. The module gives students the opportunity to do some autonomous research and plan and conduct complex syntheses. The course focuses on the handling of organometallic compounds, their synthesis and working with protective atmospheres. Spectroscopy is used for the exact determination of products.

Intended learning outcomes
Students are able to describe the structure and properties of organometallics in an appropriate manner. They are able to systemise them and characterise their structure and reactivity. In addition, they are able to develop and explain principles for the synthesis of elementary organic compounds. Students are able to conduct autonomous research and perform experiments to solve complex problems. They are able to describe the technical principles in oral and written form using appropriate scientific terminology. They are able to independently plan and carry out the synthesis of a substance using advanced lab techniques.

Courses (type, number of weekly contact hours, language — if other than German)
This module comprises 2 module components. Information on courses will be listed separately for each module component.

- 08-AC3-BC-2-131: P (no information on SWS (weekly contact hours) and course language available)
- 08-AC3-1-102: V + Ü (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

Assessment in module component 08-AC3-BC-2-131: Inorganic Chemistry 2 (lab) for Biochemistry Majors
- 5 ECTS, Method of grading: (not) successfully completed
- pre/post-experiment examination talks (Vor-/Nachtestate, approx. 15 minutes each), log (approx. 5 to 10 pages)
- Language of assessment: German or English

Assessment in module component 08-AC3-1-102: Elemental Organic Chemistry
- 4 ECTS, Method of grading: numerical grade
- a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English
- Other prerequisites: Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).

Allocation of places
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### Additional information

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Module title | Abbreviation
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Chemistry of the Elements and Analytical Chemistry for Biochemistry Majors | 08-AS1-BC-132-m01

Module coordinator | Module offered by
---|---
lecturer of lecture "Chemie der Hauptgruppenelemente" (Chemistry of Main-group Elements) | Institute of Inorganic Chemistry

| ECTS | Method of grading | Only after succ. compl. of module(s) |
---|---|---
11 | numerical grade | 08-AC1 (module component 08-AC1-4 only) and 08-OC3 (module component 08-OC3-2 only) |

| Duration | Module level | Other prerequisites |
---|---|---
1 semester | undergraduate | -- |

Contents

This module equips students with an advanced knowledge of the periodic table and selected elements. It focuses on bonding conditions, trends in the periodic table and the description and structure of elements. In addition, it introduces students to elementary organic chemistry, coordination chemistry and complex chemistry. The module gives students the opportunity to apply in practice the knowledge they have gained through the related lecture(s). After a safety briefing, the students autonomously conduct experiments in the laboratory. These experiments focus on different methods for the analysis of unknown substances.

Intended learning outcomes

Students are able to characterise main group elements and transition metal elements in terms of their structure, reactivity and fabrication. They are able to identify the coordination of the atoms. In addition, they have learned how to use the periodic table, an essential tool for chemists. Students are able to use different methods to analyse unknown substances. In addition, they are able to separate and analyse mixtures.

Courses (type, number of weekly contact hours, language — if other than German)

This module comprises 2 module components. Information on courses will be listed separately for each module component.

- 08-AN1-BC-2-132: P (no information on SWS (weekly contact hours) and course language available)
- 08-AS1-1-102: V + V (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

Assessment in module component 08-AN1-BC-2-132: Analytical Chemistry (lab) for Biochemistry Majors

- 5 ECTS, Method of grading: (not) successfully completed
- pre/post-experiment examination talks (Vor-/Nachtestate, approx. 15 minutes each), log (approx. 5 to 10 pages)
- Assessment offered: once a year, summer semester
- Language of assessment: German or English

Assessment in module component 08-AS1-1-102: Chemistry of the Elements (Chemistry of the elements)

- 6 ECTS, Method of grading: numerical grade
- a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German or English

Allocation of places

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Additional information

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Module title: Information Literacy for Students of the Natural Sciences (Advanced Level)
Abbreviation: 41-IK-NW2-101-m01

Module coordinator: head of University Library
Module offered by: University Library

ECTS: 2
Method of grading: Only after succ. compl. of module(s)

Duration: 1 semester
Module level: undergraduate
Other prerequisites: Knowledge and skills equivalent to those achieved in the basic module desirable.

Contents
Information literacy in an academic context:
- More in-depth discussion of selected topics that were covered in the level one module, e.g. searching subject-specific databases.
- Publishing and information practices in the natural sciences.
- Subject-specific information retrieval tools, e.g. classifications and thesauri.
- New web-based information and communication technologies.
- Searching for subject-specific facts (e.g. substances and physical data).
- Information search skills for the workplace.
- Copyright and citations.
- Electronic publishing. Some sessions will focus on particular disciplines (wherever possible, on disciplines in the natural sciences).

Intended learning outcomes
Students have developed a differentiated understanding of the publishing and information practices in their discipline and are familiar with the possibilities offered by electronic publishing. They are able to use electronic tools to locate subject-specific facts in a variety of resources. Students are able to work with subject-specific information retrieval tools as well as to use new web-based technologies to share information. They have developed an understanding of the legal framework surrounding publications, information, and communication in an academic context and are able to use information responsibly.

Courses (type, number of weekly contact hours, language — if other than German)
Ü (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
a) written examination (approx. 60 minutes) or b) preparing and delivering a presentation with slides (approx. 10 minutes or approx. 5 minutes and approx. 1 page) or c) completing exercises (approx. 10 exercises) or d) presentation without slides (approx. 20 to 30 minutes) or e) preparing and delivering a presentation with slides (approx. 5 minutes) and completing exercises (approx. 5 exercises) or f) presentation without slides (approx. 10 to 15 minutes) and completing exercises (approx. 5 exercises)

Allocation of places
Number of places: 10 to 50. There is a restricted number of places. If necessary, places will be allocated as follows: Students of the degree programmes of the respective subject-specific focuses will be given preferential consideration. The remaining places, if and when any become available, will be allocated to students of the other natural sciences degree programmes. In each of the above-mentioned groups, 30% of places will be allocated according to the number of subject semesters. Among applicants with the same number of subject semesters, places will be allocated by lot. The remaining 70% of places will each be allocated by lot.

Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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### Module title
Practical Course - abroad

### Abbreviation
08-AP-132-m01

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<td>chairperson of examination committee Biochemistry</td>
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### Contents
The internship is carried out at universities abroad and can be embedded within offered study programs (e.g. Erasmus). The content requirements should comply with those of the electives of the Biochemistry Bachelor program at the University of Würzburg (what has to be ascertained in advance under discussion with the module coordinator).

### Intended learning outcomes
The students are familiar with working methods at universities abroad. Besides professional competences they have also acquired language and social skills.

### Courses
(type, number of weekly contact hours, language — if other than German)

P (no information on SWS (weekly contact hours) and course language available)

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

log (approx. 30 pages) or talk (approx. 20 minutes)
Language of assessment: German or English

### Allocation of places
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### Additional information
Additional information on module duration: 6 weeks.

### Referred to in LPO I
(examination regulations for teaching-degree programmes)

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**Contents**

The internship is carried out at universities abroad and can be embedded within offered study programs (e.g., Erasmus). The content requirements should comply with those of the electives of the Biochemistry Bachelor program at the University of Würzburg (what has to be ascertained in advance under discussion with the module coordinator).

**Intended learning outcomes**

The students are familiar with working methods at universities abroad. Besides professional competences they have also acquired language and social skills.

**Courses** (type, number of weekly contact hours, language — if other than German)

P (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

log (approx. 20 pages) or talk (approx. 15 minutes)

Language of assessment: German or English

**Allocation of places**

--

**Additional information**

Additional information on module duration: 3 weeks.

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--
Module title: Bachelor Thesis in Biochemistry
Abbreviation: 08-BA-BC-132-m01

Module coordinator:
Chairperson of examination committee Biochemistry (Biochemistry)

Module offered by:
Chair of Biochemistry

ECTS: 12
Method of grading: numerical grade
Only after succ. compl. of module(s): --

Duration: 1 semester
Module level: undergraduate
Other prerequisites: --

Contents:
The module enables the processing of a defined problem within a specified period by applying the scientific methods learned in the course of study.

Intended learning outcomes:
The student has the ability to deal with a defined problem/issue using scientific methods and to document the results.

Courses (type, number of weekly contact hours, language — if other than German):
No courses assigned

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus):
Written thesis (50 to 70 pages)
Language of assessment: German or English

Allocation of places:
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Additional information:
Additional information on module duration: 10 weeks.

Referred to in LPO I (examination regulations for teaching-degree programmes):
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**Module title**  
Information Literacy for Students of the Natural Sciences (Basic Level)

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**Contents**

- Information literacy in an academic context:
  - Search strategies and tools.
  - Using the library's electronic resources.
  - Resources for natural sciences: databases and journals.
  - Online searches and search engines.
  - Overview of additional resources (eLearning etc.).
  - Reference management. Some sections of the module will focus on particular disciplines (wherever possible, on disciplines in the natural sciences).

**Intended learning outcomes**

Students know what information is needed for what purpose. They are able to locate information that is relevant within their discipline and beyond in a variety of resources and to evaluate this information. They recognise the difference in quality between information they have retrieved from specific, restricted access resources (databases) and information they have found on the free web. Students are able to manage and process the information they have found, using reference management software and eLearning tools. The module aims to equip students with the skills needed to find information and literature that is relevant to the topics of their Bachelor's theses.

**Method of assessment**

a) written examination (approx. 60 minutes) or b) preparing and delivering a presentation with slides (approx. 10 minutes or approx. 5 minutes and approx. 1 page) or c) completing exercises (approx. 10 exercises) or d) presentation without slides (approx. 20 to 30 minutes) or e) preparing and delivering a presentation with slides (approx. 5 minutes) and completing exercises (approx. 5 exercises) or f) presentation without slides (approx. 10 to 15 minutes) and completing exercises (approx. 5 exercises)

**Allocation of places**

Number of places: 5-50. There is a restricted number of places. If necessary, places will be allocated as follows: Students of the degree programmes of the respective subject-specific focuses will be given preferential consideration. The remaining places, if and when any become available, will be allocated to students of the other natural sciences degree programmes. In each of the above-mentioned groups, 30% of places will be allocated according to the number of subject semesters. Among applicants with the same number of subject semesters, places will be allocated by lot. The remaining 70% of places will each be allocated by lot.
### Module title

Bioanalytics

### Abbreviation

08-BAN-092-m01

### Module coordinator

holder of the Chair of Biochemistry

### Module offered by

Chair of Biochemistry

### ECTS

8

### Method of grading

numerical grade

### Only after succ. compl. of module(s)

--

### Duration

1 semester

### Module level

undergraduate

### Other prerequisites

--

## Contents

The module imparts the theoretical and practical fundamentals of bioanalysis by lectures and both theoretical and practical exercises.

## Intended learning outcomes

After attending the module events the student has basic knowledge of bioanalysis and is able to apply the contents in practical experiments.

## Courses

This module comprises 2 module components. Information on courses will be listed separately for each module component.

- 08-BAN-1-092: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 08-BAN-2-092: Ü (no information on SWS (weekly contact hours) and course language available)

## Method of assessment

Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

**Assessment in module component 08-BAN-1-092**: Principles of Bioanalytics

- 3 ECTS, Method of grading: numerical grade
- a) written examination (approx. 60 to 90 minutes) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes). Students will be informed about the method and length of the assessment prior to the course.
- Language of assessment: German or English

**Assessment in module component 08-BAN-2-092**: Bioanalytics (practical course)

- 5 ECTS, Method of grading: (not) successfully completed
- a) log (approx. 20 pages) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes) Students will be informed about the method and length of the assessment prior to the course.
- Assessment offered: once a year, summer semester
- Language of assessment: German or English

## Allocation of places

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## Additional information

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## Referred to in LPO I (examination regulations for teaching-degree programmes)

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### Contents

In this module the basics of scientific biochemical experimentation shall be practiced in practical exercises.

### Intended learning outcomes

After participating in the practical exercises the students master basic biochemical methods and are able to purposefully apply them.

### Courses (type, number of weekly contact hours, language — if other than German)

| Ü (no information on SWS (weekly contact hours) and course language available) |

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) log (approx. 20 pages) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes) Students will be informed about the method and length of the assessment prior to the course.

Assessment offered: once a year, summer semester

### Allocation of places

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### Additional information

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### Referred to in LPO I (examination regulations for teaching-degree programmes)

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**Contents**

The student attends a biochemistry-related project pre-agreed by the module responsible, subsequently reporting about the outcome.

**Intended learning outcomes**

The student acquires specific biochemistry-related skills and is able to reflect about the project in a final report.

**Courses** (type, number of weekly contact hours, language — if other than German)

S (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

Short log (approx. 1 page)
Language of assessment: German or English

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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**Contents**

The student attends a biochemistry-related project pre-agreed by the module responsible, subsequently reporting about the outcome.

**Intended learning outcomes**

The student acquires specific biochemistry-related skills and is able to reflect about the project in a final report.

**Courses** (type, number of weekly contact hours, language — if other than German)

S (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

short log (approx. 1 page)  
Language of assessment: German or English

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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**Contents**
The student attends a biochemistry-related project pre-agreed by the module responsible, subsequently reporting about the outcome.

**Intended learning outcomes**
The student acquires specific biochemistry-related skills and is able to reflect about the project in a final report.

**Courses** (type, number of weekly contact hours, language — if other than German)
S (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
short log (approx. 1 page)
Language of assessment: German or English

**Allocation of places**
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**Additional information**
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**Contents**

Fundamental principles of bioinformatics.

**Intended learning outcomes**

Students are proficient in methods for the analysis of DNA and protein databases.

**Courses** (type, number of weekly contact hours, language — if other than German)

V + S (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 20 minutes)

**Allocation of places**

--

**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--
### Module title

**Bioinformatics for Advanced Students in Biochemistry**

### Abbreviation

07-4BFMZ4-BC-132-m01

### Module coordinator

holder of the Chair of Bioinformatics

### Module offered by

Faculty of Biology

### ECTS

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### Duration

1 semester

### Module level

undergraduate

### Other prerequisites

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### Contents

The module will introduce students to the practice of bioinformatics and will cover the following topics: sequence analysis, structure analysis, genome analysis, cellular and metabolic networks as well as gene regulation.

### Intended learning outcomes

Students are able to use appropriate bioinformatic algorithms to address simple problems as well as to interpret their results.

### Courses

V + Ü (no information on SWS (weekly contact hours) and course language available)

### Method of assessment

log (approx. 10 to 20 pages)

Language of assessment: German or English

### Allocation of places

Biochemie (Biochemistry) Bachelor’s: 4 places. Selection process Biochemie (Biochemistry) Bachelor’s: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places) number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

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### Contents
Mechanics, vibration theory, thermodynamics, optics, science of electricity, Atomic and Nuclear Physics.

### Intended learning outcomes
The students have knowledge of the principles of Physics.

### Courses (type, number of weekly contact hours, language — if other than German)
V + V (no information on SWS (weekly contact hours) and course language available)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
written examination (approx. 120 minutes)

### Allocation of places
Only as part of pool of general key skills (ASQ): 10 places. Places will be allocated by lot.

### Additional information
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### Referred to in LPO I (examination regulations for teaching-degree programmes)
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**Contents**

Extracurricular event dealing with a life-science issue, which represents a special subject-related expansion of scientific knowledge. This may be a module offered internally or externally of the University of Würzburg. Recognition as academic achievement is conducted in an individual assessment by the examination board.

**Intended learning outcomes**

The student has improved scientific knowledge, which contributes to the sharpening of specific qualifications. In particular, he/she gained additional expertise that contributes to individual specialization.

**Courses (type, number of weekly contact hours, language — if other than German)**

V (no information on SWS (weekly contact hours) and course language available)

**Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)**

a) written examination (approx. 60 to 90 minutes) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes) or f) successful completion as certified by lecturer. Students will be informed about the method and length of the assessment prior to the course.

Language of assessment: German or English

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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Module title
Complective Qualification in Natural Sciences 5

Abbreviation
08-BC-EQN5-141-m01

Module coordinator
Chairperson of examination committee Biochemie (Biochemistry)

Module offered by
Chair of Biochemistry

ECTS
5

Method of grading
Numerical grade

Only after succ. compl. of module(s)

Duration
1 semester

Module level
Undergraduate

Other prerequisites
Please consult with academic advisory service in advance.

Contents
Extracurricular event dealing with a life-science issue, which represents a special subject-related expansion of scientific knowledge. This may be a module offered internally or externally of the University of Würzburg. Recognition as academic achievement is conducted in an individual assessment by the examination board.

Intended learning outcomes
The student has improved scientific knowledge, which contributes to the sharpening of specific qualifications. In particular, he/she gained additional expertise that contributes to individual specialization.

Courses (type, number of weekly contact hours, language — if other than German)
V (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
a) written examination (approx. 60 to 90 minutes) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2; approx. 30 minutes, groups of 3; approx. 40 minutes) or d) presentation (approx. 30 minutes) or f) successful completion as certified by lecturer. Students will be informed about the method and length of the assessment prior to the course.

Language of assessment: German or English

Allocation of places
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Additional information
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**Contents**

Students complete a placement at a non-university research/diagnostic institution or a business. Contents to be determined by the host institution. The contents of the placement should correspond to the contents of a lab course offered in the context of the Bachelor’s programme in Biochemistry (180 ECTS credits); please consult with the competent coordinator in advance.

**Intended learning outcomes**

Students are acquainted with the structures of non-university institutions and possess specific professional skills.

**Courses** (type, number of weekly contact hours, language — if other than German)

P (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

log (approx. 30 pages) or talk (approx. 20 minutes)

Language of assessment: German or English

**Allocation of places**

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**Additional information**

Additional information on module duration: 6 weeks.

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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**Contents**

Students complete a placement at a non-university research/diagnostic institution or a business. Contents to be determined by the host institution. The contents of the placement should correspond to the contents of a lab course offered in the context of the Bachelor’s programme in Biochemistry (180 ECTS credits); please consult with the competent coordinator in advance.

**Intended learning outcomes**

Students are acquainted with the structures of non-university institutions and possess specific professional skills.

**Courses**

(type, number of weekly contact hours, language — if other than German)

P (no information on SWS (weekly contact hours) and course language available)

**Method of assessment**

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

log (approx. 20 pages) or talk (approx. 15 minutes)

Language of assessment: German or English

**Allocation of places**

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**Additional information**

Additional information on module duration: 3 weeks.

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--
### Module title
**Principles of Biochemistry**

### Abbreviation
08-BC-132-m01

### Module coordinator
holder of the Chair of Biochemistry

### Module offered by
Chair of Biochemistry

### ECTS
6

### Method of grading
numerical grade

### Only after succ. compl. of module(s)
--

### Duration
1 semester

### Module level
undergraduate

### Other prerequisites
--

## Contents
The module imparts the basic knowledge of biochemistry by lectures and in-depth tutorials.

## Intended learning outcomes
Students have become familiar with the fundamental principles of biochemistry. They are able to describe the key biochemical processes in cellular systems.

## Courses (type, number of weekly contact hours, language — if other than German)
This module comprises 2 module components. Information on courses will be listed separately for each module component.

- **08-BC-1-132**: V + Ü (no information on SWS (weekly contact hours) and course language available)
- **08-BC-2-132**: V + Ü (no information on SWS (weekly contact hours) and course language available)

## Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

### Assessment in module component 08-BC-1-132: Principles of Biochemistry 1
- **Principles of Biochemistry 1**
  - 3 ECTS, Method of grading: numerical grade
  - written examination (approx. 60 to 90 minutes)

### Assessment in module component 08-BC-2-132: Principles of Biochemistry 2
- **Principles of Biochemistry 2**
  - 3 ECTS, Method of grading: numerical grade
  - written examination (approx. 60 to 90 minutes)

## Allocation of places
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## Additional information
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## Referred to in LPO I (examination regulations for teaching-degree programmes)
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<th><strong>Other prerequisites</strong></th>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>Admission prerequisite to assessment: regular attendance of courses (lectures excluded) as specified at the beginning of the course.</td>
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</table>

**Contents**

General fundamentals of neuroanatomy, important methods in neurobiology, diseases of the nervous system: symptoms, diagnosis, therapeutic options, discussion of novel research results.

**Intended learning outcomes**

Students who successfully completed this module have acquired a fundamental knowledge about the structure and function of the nervous system. Giving oral presentations, they have developed the ability to critically reflect and discuss current scientific research results in the context of the field of neurobiology.

**Courses** (type, number of weekly contact hours, language — if other than German)

V + S + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

methods of assessment: a) written examination (45 to 60 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or e) presentation (20 to 30 minutes)

**Allocation of places**

--

**Additional information**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--
**Module title**

Human genetics for students of biochemistry

**Abbreviation**

03-4S1HUG-BC-132-m01

**Module coordinator**

holder of the Chair of Human Genetics

**Module offered by**

Faculty of Medicine

**ECTS**

5

**Method of grading**

Numerical grade

**Duration**

1 semester

**Module level**

Undergraduate

**Other prerequisites**

--

**Contents**

Fundamentals of and analytical methods in human and vertebrate cytogenetics. Characterisation of the normal human karyotype and chromosome aberrations. Introduction to chromosome evolution.

**Intended learning outcomes**

Students who complete this module will acquire the theoretical basis of and practical experience in human cytogenetics. They will learn how to prepare and identify human chromosomes and critically interpret cytogenetic findings.

**Courses**

V + Ü + S (no information on SWS (weekly contact hours) and course language available)

**Method of assessment**

Written examination (approx. 30 minutes)

**Allocation of places**

Biochemie (Biochemistry) Bachelor’s: 5 places. Selection process Biochemie (Biochemistry) Bachelor’s: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places) number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

**Additional information**

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**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

--
Module title
Immunology for students of biochemistry

Abbreviation
03-4S1IMM-BC-132-m01

Module coordinator
holder of the Professorship of Immunogenetics

Module offered by
Faculty of Medicine

ECTS
5

Method of grading
numerical grade

Only after succ. compl. of module(s)

Duration
1 semester

Module level
undergraduate

Other prerequisites

Contents
This module gives an introduction to immunology. The following questions will be addressed: How does the body recognise and eliminate pathogens and tumour cells? How can the immune system damage its own body (allergies, autoimmunity)? Organs, cells and molecules of the immune system will be presented with an emphasis on genetic and molecular mechanisms of recognition and elimination of foreign substances by the immune system. The most important immunological techniques will be introduced and applied.

Intended learning outcomes
The students acquire a practical knowledge of cellular and molecular techniques for the analysis of the immune system. They are familiar with the mechanisms of self and non-self discrimination by the adaptive and innate immune systems. They acquire a fundamental knowledge of lymphocyte development as well as major immune effector cell functions and molecules.

Courses (type, number of weekly contact hours, language — if other than German)
V + Ü + P (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
written examination (approx. 45 minutes)
Assessment offered: once a year, summer semester
Language of assessment: German or English

Allocation of places
Biochemie (Biochemistry) Bachelor’s: 16 places. Selection process Biochemie (Biochemistry) Bachelor’s: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places) number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

Additional information

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**Contents**

The lab course is carried out in a working group with biochemical and / or molecular biology research orientation at the University of Würzburg. The contents of the lab course have to be defined in advance in consultation with the module responsible. The lab course allows intensive training in biochemistry, molecular biology and / or bioinformatics research methods. The experiments and their results are documented in a written protocol.

**Intended learning outcomes**

After attending the lab course, the student has advanced methodological knowledge. He/She is able to transfer the methods used in this course on other issues and to assess their applicability. He/She is trained in scientifically correct documentation and discussion of experimentation and results.

**Courses** (type, number of weekly contact hours, language — if other than German)

P (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

log (approx. 30 pages) or talk (approx. 20 minutes)

Language of assessment: German or English

**Allocation of places**

--

**Additional information**

Additional information on module duration: 6 weeks.

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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**Contents**

The lab course is carried out in a working group with biochemical and / or molecular biology research orientation at the University of Würzburg. The contents of the lab course have to be defined in advance in consultation with the module responsible. The lab course allows intensive training in biochemistry, molecular biology and / or bioinformatics research methods. The experiments and their results are documented in a written protocol.

**Intended learning outcomes**

After attending the lab course, the student has advanced methodological knowledge. He/She is able to transfer the methods used in this course on other issues and to assess their applicability. He/She is trained in scientifically correct documentation and discussion of experimentation and results.

**Courses** (type, number of weekly contact hours, language — if other than German)

P (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

log (approx. 20 pages) or talk (approx. 15 minutes)  
Language of assessment: German or English

**Allocation of places**

- -

**Additional information**

Additional information on module duration: 3 weeks.

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

- -
Module title  
Mathematics for students in Chemistry and Biology

Abbreviation  
10-M-MCB-132-m01

Module coordinator  
Dean of Studies Mathematik (Mathematics)

Module offered by  
Institute of Mathematics

ECTS  Method of grading  Only after succ. compl. of module(s)
5  numerical grade  --

Duration  Module level  Other prerequisites
1 semester  undergraduate  Admission prerequisite to assessment: successful completion of exercises (approx. 25 to 30 hours).

Contents
Functional relations, differentiation and integration of functions in one variable, curve sketching, differentiation of functions in several variables, power series, ordinary differential equations, systems of linear equations, basic notions in statistics.

Intended learning outcomes
The student is able to recognise and phrase simple questions from natural sciences as mathematical problems, apply basic mathematical methods to them and interpret the results.

Courses (type, number of weekly contact hours, language — if other than German)
V + Ü (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
written examination (approx. 90 to 120 minutes)

Allocation of places
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Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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<td>holder of the Chair of Bioinformatics</td>
<td>Faculty of Biology</td>
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<td>1 semester</td>
<td>undergraduate</td>
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</table>

**Contents**

Fundamental principles of the most important mathematical and statistical methods in biology.

**Intended learning outcomes**

Students will have acquired fundamental skills in the evaluation of experiments, the interpretation of readings and numbers as well as the mathematical description of biological processes.

**Courses** (type, number of weekly contact hours, language — if other than German)

V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 minutes)

**Allocation of places**

--

**Additional information**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--
Module title | Abbreviation
---|---
Molecular Biology for Biochemistry students | 08-BC-MOL-122-m01

Module coordinator | Module offered by
holder of the Chair of Biochemistry | Chair of Biochemistry

ECTS | Method of grading | Only after succ. compl. of module(s)
6 | numerical grade | 08-BC (module component 08-BC-1 only)

Duration | Module level | Other prerequisites
1 semester | undergraduate | --

Contents
The module covers specific topics of molecular physiology and functional biochemistry in lectures and exercises. An additional lecture conveys the subject field of genetic engineering andbiosafety.

Intended learning outcomes
After attending the module events, students have sound knowledge in molecular biology. The students know the necessary infrastructure and usage rules for the different security levels of genetic engineering facilities. They have mastered the basics of genetic engineering in theory and are able to describe relevant examples of the use of gene technology and to explain the associated safety issues.

Courses (type, number of weekly contact hours, language — if other than German)
This module comprises 2 module components. Information on courses will be listed separately for each module component.
- 03-GTBS-1-092: V (no information on SWS (weekly contact hours) and course language available)
- 08-BC-MOL-1-122: V + Ü (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

Assessment in module component 03-GTBS-1-092: Genetic Engineering and Biosafety
- 1 ECTS, Method of grading: (not) successfully completed
- written examination (approx. 30 minutes)

Assessment in module component 08-BC-MOL-1-122: Molecular Biology Molecular Biology
- 5 ECTS, Method of grading: numerical grade
- a) written examination (approx. 60 to 90 minutes) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes). Students will be informed about the method and length of the assessment prior to the course.
- Language of assessment: German or English

Allocation of places
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Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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<td>1 semester</td>
<td>undergraduate</td>
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</table>

Contents

The module provides practical skills in the fields of recombinant engineering and characterization of macromolecular complexes, current biomolecular techniques, analysis of biochemical processes in vivo, and up-to-date imaging techniques.

Intended learning outcomes

The student has knowledge of molecular biology and is able to apply the contents in practical experiments.

Courses

Ü (no information on SWS (weekly contact hours) and course language available)

Method of assessment

a) written examination (approx. 60 to 90 minutes) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes). Students will be informed about the method and length of the assessment prior to the course.

Assessment offered: once a year, winter semester

Language of assessment: German or English

Allocation of places

Biochemie (Biochemistry) Bachelor’s: 24 places. Chemie (Chemistry) Master’s: 6 places. Selection process Biochemie (Biochemistry) Bachelor’s: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places) number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available. Selection process Chemie (Chemistry) Master’s: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): grade of module 08-BC; among applicants with the same grade, places will be allocated by lot. Quota 2 (one third of places) number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

Additional information

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Referred to in LPO I (examination regulations for teaching-degree programmes)

--
Molecular Tumor Biology

Abbreviation: 03-MTUB-132-m01

Module coordinator: holder of the Chair of Physiological Chemistry

Module offered by: Faculty of Medicine

ECTS: 5

Method of grading: numerical grade

Only after succ. compl. of module(s): 08-BC (module component 08-BC-1 only)

Duration: 1 semester

Module level: undergraduate

Other prerequisites: --

Contents

Practical introduction to model systems (cell culture, animal models) and experimental methods of molecular tumour research. Reading and presentation of original research articles.

Intended learning outcomes

Students are familiar with tumour models and experimental techniques in molecular cancer research, and they are able to apply this knowledge in practice.

Courses

 Ü (no information on SWS (weekly contact hours) and course language available)

Method of assessment

a) written examination (approx. 60 to 90 minutes) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes). Students will be informed about the method and length of the assessment prior to the course.

Assessment offered: once a year, winter semester

Language of assessment: German or English

Allocation of places

Biochemie (Biochemistry) Bachelor’s: 12 places. Selection process Biochemie (Biochemistry) Bachelor’s: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places) number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

Additional information

Referred to in LPO I (examination regulations for teaching-degree programmes)
### Module title

**Organic Chemistry - laboratory course for students of biochemistry**

**Abbreviation**: 08-OC3P-112-m01

### Module coordinator

holder of the Chair of Organic Chemistry II

### Module offered by

Institute of Organic Chemistry

### ECTS

7

### Method of grading

Only after succ. compl. of module(s)

### (not) successfully completed

08-OC1 and 08-AC1-BC (module component 08-AC1-BC-2 only)

### Duration

1 semester

### Module level

undergraduate

### Other prerequisites

--

### Contents

This module gives students the opportunity to apply in practice the knowledge they have gained through the related lecture(s). After a safety briefing, the students autonomously conduct experiments in the laboratory. In addition to those experiments, students will be expected to take oral tests and write lab reports to demonstrate their knowledge. The course focuses on the safe handling of hazardous substances, simple experimental unit operations of organic chemistry, simple to multi-level syntheses and the analysis of the products.

### Intended learning outcomes

Students know how to safely handle hazardous substances. They are able to conduct simple experimental operations of organic chemistry. They are able to analyse the yield and purity of the products and identify possible error sources. They are able to connect the theoretical aspects covered in the lecture with practical experiments in the laboratory.

### Courses

(type, number of weekly contact hours, language — if other than German)

P (no information on SWS (weekly contact hours) and course language available)

### Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

Vortestate (pre-experiment exams, approx. 15 minutes each), assessment of practical performance (log approx. 5 to 10 pages), Nachtestate (post-experiment exams, approx. 15 minutes each)

Assessment offered: once a year, summer semester

### Allocation of places

--

### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

--
Module title | Organic Chemistry 1
---|---
Abbreviation | 08-OC1-092-m01

Module coordinator | holder of the Professorship of Organic Chemistry
Module offered by | Institute of Organic Chemistry

ECTS | 5
Method of grading | numerical grade
Only after succ. compl. of module(s) | --

Duration | 1 semester
Module level | undergraduate
Other prerequisites | Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).

Contents
This module provides students with an overview of the fundamental principles of organic chemistry. It examines the bonding situation of carbon and introduces students to the nomenclature of simple and moderately complex organic compounds. The module also discusses the fundamental principles of stereochemistry, substitution, addition and elimination reactions as well as synthesis planning.

Intended learning outcomes
Students know important categories of substances in organic chemistry. They are able to use different systems of nomenclature to determine simple substance names. Students are able to analyse the stereochemistry of molecules. They are able to describe and formulate some of the most important reactions in organic chemistry. For that purpose, they can analyse and categorise the characteristic reaction conditions and can use them for simple syntheses.

Courses (type, number of weekly contact hours, language — if other than German)
V + Ü (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: 60 or 90 minutes each; 3 written examinations: 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)

Allocation of places
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Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
§ 62 (1) 2. Chemie "Organische und Bioorganische Chemie"
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<td>Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).</td>
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**Contents**

This module introduces students to the rules of aromaticity and discusses specific reactions of aromatics. Using the example of carbonyl compounds, it extends the students’ knowledge of substitution, elimination and addition reactions to complex reaction mechanisms. The course also focuses on oxidation and reduction reactions as well as rearrangement. In addition, it introduces students to the spectroscopic methods of infrared spectrometry, mass spectrometry and NMR spectroscopy.

**Intended learning outcomes**

Students have become familiar with the criteria for aromaticity. They can analyse the varying reactivity of carbonyl compounds. They are able to describe specific reactions of carbonyls and aromatics. For that purpose, they can plan and formulate multi-stage syntheses with complex reaction mechanisms and can transfer them to unknown reactions. Students are able to describe important spectroscopic methods, to evaluate a spectrum and to draw conclusions regarding the molecular structure.

**Courses** (type, number of weekly contact hours, language — if other than German)

V + V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)

Language of assessment: German, English

**Allocation of places**

--

**Additional information**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--
Organic Chemistry 4

**Abbreviation**
08-OC4-102-m01

**Module coordinator**
holder of the Chair of Organic Chemistry II

**Module offered by**
Institute of Organic Chemistry

**ECTS**
10

**Method of grading**
numerical grade

**Only after succ. compl. of module(s)**
--

**Duration**
1 semester

**Module level**
undergraduate

**Other prerequisites**
By way of exception, additional prerequisites are listed in the section on assessments.

**Contents**
This module focuses on heterocyclic compounds, dyes, naturally occurring substances, biopolymers and protecting group techniques. Students enhance their experimental skills by working with special hazardous substances, using complicated working and synthesis techniques as well as extensive purification methods and performing elaborate product analyses.

**Intended learning outcomes**
Students are able to name important heteroaromatics and to formulate their reactions and syntheses. They are able to characterise and categorise dyes. Students are able to describe the structure and selective synthesis of proteins. In addition, they are able to describe the structure of the DNA, carbohydrates, fats, terpenes and steroids. Students know how to safely and responsibly handle special hazardous substances. They are able to perform complex syntheses, purification methods and product analyses. They are able to use specialist literature to plan experiments.

**Courses**
This module comprises 2 module components. Information on courses will be listed separately for each module component.

- 08-OC4-1-102: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 08-OC4-2-102: P (no information on SWS (weekly contact hours) and course language available)

**Method of assessment**
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

**Assessment in module component 08-OC4-1-102:** Organic Chemistry 4

- 5 ECTS, Method of grading: numerical grade
- a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German or English
- Only after successful completion of module components: 08-OC1 or 08-OC1-GHR
- Other prerequisites: Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).

**Assessment in module component 08-OC4-2-102:** Organic Chemistry - advanced laboratory course for students of chemistry

- 5 ECTS, Method of grading: (not) successfully completed
- pre/post-experiment examination talks (Vor-/Nachtestate, approx. 15 minutes each), log (approx. 5 to 10 pages)
- Assessment offered: once a year, winter semester
- Language of assessment: German, English
- Only after successful completion of module components: 08-OC3 (module component 08-OC3-2 only) or 08-OC3P
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§ 62 (1) 2. Chemie "Organische und Bioorganische Chemie"
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<thead>
<tr>
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<td>Organic Chemistry 4 - lecture</td>
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<tr>
<td>holder of the Chair of Organic Chemistry II</td>
<td>Institute of Organic Chemistry</td>
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</table>

**Contents**

This module discusses biologically important bonding classes, their reactions and syntheses, working with special hazardous substances, complicated working and synthesis techniques, purification methods and product analysis.

**Intended learning outcomes**

Students are able to name important heteroaromatics and to formulate their reactions and syntheses. They are able to characterise and categorise dyes. Students are able to describe the structure and selective synthesis of proteins. In addition, they are able to describe the structure of the DNA, carbohydrates, fats, terpenes and steroids.

**Courses** (type, number of weekly contact hours, language — if other than German)

V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course.

Language of assessment: German or English

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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### Subdivided Module Catalogue for the Subject Biochemistry

**Bachelor’s with 1 major, 180 ECTS credits**

<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>Pathobiochemistry</td>
<td>03-PBC-132-m01</td>
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<tbody>
<tr>
<td>holder of the Chair of Clinical Biochemistry and Pathobiochemistry</td>
<td>Faculty of Medicine</td>
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<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</table>

**Contents**

Fundamentals of selected topics in pathobiochemistry and pathophysiology.

**Intended learning outcomes**

Students are familiar with the fundamentals of pathobiochemistry and pathophysiology.

**Courses** *(type, number of weekly contact hours, language — if other than German)*

This module comprises 2 module components. Information on courses will be listed separately for each module component.

- 03-PBC-1-092: V + Ü *(no information on SWS (weekly contact hours) and course language available)*
- 03-PBC-2-132: P *(no information on SWS (weekly contact hours) and course language available)*

**Method of assessment** *(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)*

Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.

**Assessment in module component 03-PBC-1-092: Basics in Pathobiochemistry**

- 2 ECTS, Method of grading: numerical grade
- written examination *(approx. 90 minutes)*
- Language of assessment: German or English

**Assessment in module component 03-PBC-2-132: Pathobiochemistry Practical Course**

- 3 ECTS, Method of grading: *(not) successfully completed*
- assessment of practical performance, Nachtestate *(post-experiment exams: examination talks, approx. 15 minutes each), logs *(approx. 20 pages)*
- Assessment offered: once a year, summer semester
- Language of assessment: German or English

**Allocation of places**

Information on the allocation of places will be listed separately for each module component.

- 03-PBC-2-132: Biochemie *(Biochemistry)* Bachelor’s: 6 places. Selection process Biochemie *(Biochemistry)* Bachelor’s: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 *(two thirds of places)*: current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 *(one third of places)* number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

- 03-PBC-1-092: --

**Additional information**

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**Referred to in LPO I** *(examination regulations for teaching-degree programmes)*

--
Module title: Philosophy 2

Abbreviation: 06-B-P2TF2-102-m01

Module coordinator: holder of the Chair of Theoretical Philosophy

Module offered by: Institute of Philosophy

ECTS: 5

Method of grading: numerical grade

Only after succ. compl. of module(s)

Duration: 1 semester

Module level: undergraduate

Other prerequisites: Admission prerequisite to assessment: regular attendance of seminar (a maximum of 2 incidents of unexcused absence).

Contents:

Introduction to the theory of intellectual disciplines; philosophical bases of the humanities and the social sciences.

Intended learning outcomes:

Content-related outcomes:
- insight into the relationship of philosophy to individual intellectual disciplines
- ability to reflect on the historical and intellectual origins of our knowledge culture
- ability to organise topics into overarching historical, social, and political schemata
- insight into the scope and limits of various intellectual disciplines
- knowledge of, and ability to criticise, basic assumptions in systems of thought, culture, and knowledge

Formal outcomes (skills to be tested in the assessment):
- ability to analyse philosophical texts and issues
- ability to organise concepts and philosophical positions into overarching intellectual schemata
- ability to present philosophical positions in a structured and linguistically appropriate manner

Courses (type, number of weekly contact hours, language — if other than German):

V + S (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus):

written examination (approx. 90 minutes)

Allocation of places:

Only as part of pool of general key skills (ASQ): maximum 20 places. Places will be allocated according to the number of subject semesters. Among applicants with the same number of subject semesters, places will be allocated by lot.

Additional information:

Referred to in LPO I (examination regulations for teaching-degree programmes):

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Module title
Physical Chemistry 1

Abbreviation
08-PC1-092-m01

Module coordinator
Lecturer of lecture "Grundlagen der Quantenmechanik and Spektroskopie" (Principles of Quantum Mechanics and Spectroscopy)

Module offered by
Institute of Physical and Theoretical Chemistry

ECTS
8

Method of grading
Only after succ. compl. of module(s)

Duration
1 semester

Module level
Undergraduate

Other prerequisites
Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).

Contents
This module introduces students to the fundamental principles of quantum mechanics. It analyses molecules on the basis of the following models: particle in a box, harmonic oscillator and rigid rotor. As regards spectroscopy, the module focuses on vibrational spectroscopy, angular momentum quantisation, microwave spectroscopy and UV-VIS spectroscopy. In addition, the module discusses linear operators, eigenvalue problems, matrix representation, differential equations, Fourier transform and orthogonal functions as mathematical bases of the topics listed above.

Intended learning outcomes
Students are able to explain key models of quantum mechanics and to apply them to molecules. They are able to describe different spectroscopic methods. In addition, students know how to apply the mathematical bases of quantum mechanics.

Courses (type, number of weekly contact hours, language — if other than German)
V + Ü + V + Ü (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: 60 or 90 minutes each; 3 written examinations: 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)

Allocation of places
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Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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<td>Physical Chemistry 2 for Biochemistry Majors</td>
<td>08-PC2V-BC-132-m01</td>
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<tbody>
<tr>
<td>lecturer of lecture &quot;Thermodynamik, Kinetik, Elektrochemie&quot;</td>
<td>Institute of Physical and Theoretical Chemistry</td>
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<td>Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).</td>
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</table>

**Contents**

This module introduces students to the principles of thermodynamics. It focuses on the laws of thermodynamics, chemical equilibria, ideal and real gases/solutions/mixed phases and electrochemistry. In addition to thermodynamic processes, it discusses the fundamental principles of kinetics.

**Intended learning outcomes**

Students are able to explain the laws of thermodynamics. They are able to describe thermodynamic aspects of solutions, gases, mixed phases and electrochemical reactions. Students are able to interpret the kinetic aspects of chemical reactions.

**Courses** (type, number of weekly contact hours, language — if other than German)

V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: 60 or 90 minutes each; 3 written examinations: 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

§ 62 (1) 1. Chemie "Allgemeine und Anorganische Chemie"; "Physikalische und Analytische Chemie"
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<td>Practical Course Physics for Students of Non-physics-related Minor Subjects</td>
<td>11-PFNF-072-m01</td>
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<td>Managing Director of the Institute of Applied Physics</td>
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<td>1 semester</td>
<td>undergraduate</td>
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**Contents**

Mechanics, vibration theory, thermodynamics, optics, X-rays, nuclear magnetic resonance, Atomic and Nuclear Physics.

**Intended learning outcomes**

The students have knowledge of the principles of Physics.

**Courses** (type, number of weekly contact hours, language — if other than German)

P (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) oral test (approx. 15 minutes) during experiment and b) ungraded written examination (approx. 90 minutes)

**Allocation of places**

Only as part of pool of general key skills (ASQ): 10 places. Places will be allocated by lot.

**Additional information**

--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--
### Module title
Physical and Theoretical Chemistry 3: Symmetry and Quantum Chemistry

### Abbreviation
08-PC3-092-m01

### Module coordinator
Lecturer of lecture "Quantenchemie"

### Module offered by
Institute of Physical and Theoretical Chemistry

### ECTS
6

### Method of grading
Numerical grade

### Only after succ. compl. of module(s)

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</table>

### Contents
This module deals with basics of quantum chemistry and symmetry in chemistry.

### Intended learning outcomes
Students have become familiar with the fundamental principles of quantum chemistry and symmetry in chemistry and are able to apply the knowledge they have developed.

### Courses
(V + Ü + V + Ü (no information on SWS (weekly contact hours) and course language available)

### Method of assessment
(a) 1 to 3 written examinations (1 written examination: 90 minutes; 2 written examinations: 60 or 90 minutes each; 3 written examinations: 60 minutes each) or (b) oral examination of one candidate each (approx. 20 minutes) or (c) oral examination in groups (groups of 2, approx. 30 minutes)

### Allocation of places

### Additional information

### Referred to in LPO I (examination regulations for teaching-degree programmes)
### Physiology

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<tr>
<td>Managing Director of the Institute of Physiology</td>
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**Contents**

Neurophysiology, cardiac/circulatory function, kidney, blood, respiration, acid/base homeostasis, endocrinology, nutrition and digestion, liver function.

**Intended learning outcomes**

Students are familiar with the fundamental principles of human physiology.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (30 multiple choice questions)

**Allocation of places**

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**Additional information**

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**Referred to in LPO** (examination regulations for teaching-degree programmes)

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<td>lecturer of lecture &quot;Thermodynamik, Kinetik, Elektrochemie&quot;</td>
<td>Institute of Physical and Theoretical Chemistry</td>
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<tr>
<td>1 semester</td>
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</table>

**Contents**

This module gives students the opportunity to apply in practice the knowledge they have gained through the related lecture(s). After a safety briefing, the students autonomously conduct experiments in the laboratory. In addition to those experiments, students will be expected to take oral tests and write lab reports to demonstrate their knowledge.

**Intended learning outcomes**

Students are able to connect the theoretical principles of thermodynamics, kinetics, electrochemistry and spectroscopy with practical laboratory experiments. They are able to analyse the resulting measurements.

**Courses** (type, number of weekly contact hours, language — if other than German)

P (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

Vortestate (pre-experiment exams), assessment of practical performance, Nachtestate (post-experiment exams), examination talks (approx. 15 minutes each), logs (approx. 5 to 10 pages)

Assessment offered: once a year, winter semester

**Allocation of places**

--

**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--
### Module title
Specific Microbiology 2 for Students of Biochemistry

### Abbreviation
07-5S2MiZ2-BC-132-m01

### Module coordinator
holder of the Chair of Microbiology

### Module offered by
Faculty of Biology

### ECTS
10

### Method of grading
numerical grade

### Only after succ. compl. of module(s)
--

### Duration
1 semester

### Module level
undergraduate

### Other prerequisites
--

### Contents
In this module, students will acquire an in-depth insight into approaches and methods in microbiology.

### Intended learning outcomes
Students have acquired knowledge about general strategies and methods of microbiology. They are able to independently perform scientific laboratory work.

### Courses
(S + Ü (no information on SWS (weekly contact hours) and course language available)

### Method of assessment
(a) written examination (approx. 45 to 60 minutes) or b) log (approx. 10 to 20 pages) or c) oral examination of one candidate each (approx. 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (approx. 20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete varies according to subject area but will not exceed a maximum of 4 hours). Students will be informed about the method and length of the assessment prior to the course.

### Allocation of places
Biochemie (Biochemistry) Bachelor's: 6 places. Selection process Biochemie (Biochemistry) Bachelor's: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places) number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

### Additional information
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### Referred to in LPO I
(examination regulations for teaching-degree programmes)

--
### Module title
Structural Biology

### Abbreviation
03-S2ST-BC-132-m01

### Module coordinator
holder of the Chair of Structural Biology

### Module offered by
Faculty of Medicine

### ECTS
10

### Method of grading
Only after succ. compl. of module(s)

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<th>Other prerequisites</th>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</table>

### Contents
This module provides a brief introduction to crystallography and commonly used biophysical techniques as well as the fundamental principles of macromolecular architectures. Building on this, the structure and function of selected biological macromolecules are presented. In small groups, participants will analyse one specific macromolecule in silico with respect to its structure and biological function and will present their results in a talk. The various macromolecules in their entirety reflect a number of important biological problems.

### Intended learning outcomes
On the basis of individually assigned model proteins, the students will acquire the ability to explore common problems in structural biology and to analyse structure-function relationships. They will also acquire skills in the oral presentation of scientific results as well as in the in silico analysis of biological macromolecules.

### Courses
- V + Ü (no information on SWS (weekly contact hours) and course language available)

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

- a) written examination (approx. 45 to 60 minutes) or
- b) log (approx. 10 to 20 pages) or
- c) oral examination of one candidate each (approx. 30 minutes) or
- d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or
- e) presentation (approx. 20 to 30 minutes) or
- f) practical examination (on average approx. 2 hours; time to complete varies according to subject area but will not exceed a maximum of 4 hours). Students will be informed about the method and length of the assessment prior to the course.

Language of assessment: German or English

### Allocation of places
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### Additional information
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### Referred to in LPO I
(examination regulations for teaching-degree programmes)
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### Module title
Toxicology and legal studies

### Abbreviation
03-TR-072-m01

### Module coordinator
- Lecturer of lecture "Toxikologie und Rechtskunde"

### Module offered by
Faculty of Medicine

### ECTS
3

### Method of grading
Numerical grade

### Only after succ. compl. of module(s)
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### Duration
1 semester

### Module level
Undergraduate

### Other prerequisites
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## Contents
Basics of legal regulations for chemists (handling and transportation of hazardous materials), fundamentals of toxicology.

## Intended learning outcomes
The students master the basics of legal regulations for chemists (handling and transport of hazardous substances) as well as the fundamentals of toxicology.

## Courses
- V + V (no information on SWS (weekly contact hours) and course language available)

## Method of assessment
- Written examination (approx. 90 minutes)

## Allocation of places
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## Additional information
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## Referred to in LPO I
(examination regulations for teaching-degree programmes)

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<table>
<thead>
<tr>
<th><strong>Module title</strong></th>
<th><strong>Abbreviation</strong></th>
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<tbody>
<tr>
<td>Consolidation Seminar</td>
<td>08-VS-BC-132-m01</td>
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<th><strong>Module coordinator</strong></th>
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<td>chairperson of examination committee Biochemie (Biochemistry)</td>
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<td>undergraduate</td>
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### Contents

Students deliver a presentation on the findings of their practical research projects and critically discuss them with their audience.

### Intended learning outcomes

The student is able to present the results of his/her Thesis. He/She can defend the choice of the experimental approaches used, the results as well as their evaluation and interpretation in a scientific discussion.

### Courses

S (no information on SWS (weekly contact hours) and course language available)

### Method of assessment

Oral examination (approx. 30 minutes) on a paper written by the candidate.

Language of assessment: German or English

### Allocation of places

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### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

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**Module title**
Virology for students of biochemistry

**Abbreviation**
03-4S1VIR-BC-132-m01

**Module coordinator**
holder of the Chair of Virology

**Module offered by**
Faculty of Medicine

**ECTS**
5

**Method of grading**
numerical grade

**Only after succ. compl. of module(s)**
--

**Duration**
1 semester

**Module level**
undergraduate

**Other prerequisites**
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**Contents**
Introduction to virology; the infectious cycle; virus structure and assembly; adsorption and entry; genomes and genetics; RNA-viruses: mRNA-synthesis and RNA-genome replication; retroviruses: reverse transcription and integration; DNA-viruses: transcription and genome replication. Foundations of cell biology. Introduction to the scientific method and scientific approach; principles of antiviral therapy and vaccination; introduction to clinical virology; HIV and AIDS. Safe work in a BSL-2 laboratory; cell culture; virus production, titre test; virus sequencing, phylogenetic analysis of viral quasispecies.

**Intended learning outcomes**
Fundamental knowledge of molecular virology, the structure and replication of viruses and virus-host interactions; principles of antiviral vaccines and chemotherapeutics; principal techniques in cell and molecular biology for virological research.

**Courses**
(V + S + P (no information on SWS (weekly contact hours) and course language available)

**Method of assessment**
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

- a) written examination (approx. 45 to 60 minutes) or
- b) log (approx. 10 to 20 pages) or
- c) oral examination of one candidate each (approx. 30 minutes) or
- d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or
- e) presentation (approx. 20 to 30 minutes) or
- f) practical examination (on average approx. 2 hours; time to complete varies according to subject area but will not exceed a maximum of 4 hours). Students will be informed about the method and length of the assessment prior to the course.

Assessment offered: once a year, summer semester
Language of assessment: German or English

**Allocation of places**
Biochemie (Biochemistry) Bachelor's: 18 places. Selection process Biochemie (Biochemistry) Bachelor's: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places) number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

**Additional information**
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**Referred to in LPO I** (examination regulations for teaching-degree programmes)
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<table>
<thead>
<tr>
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<td>08-WIRE1-132-m01</td>
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<td>1 semester</td>
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**Contents**

The module offers the opportunity to learn correct presenting and mediating scientific questions by giving a tutorial attendant to a lecture at the faculty of chemistry and pharmacy.

**Intended learning outcomes**

The students are able to adequately prepare and present scientific questions, and to guide students in lower semesters.

**Courses** (type, number of weekly contact hours, language — if other than German)

Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

preparation of materials for demonstrations and exercises (approx. 120 hours total)
Language of assessment: German or English

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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### Module title
Scientific lecturing 2

### Abbreviation
08-WIRE2-132-M01

### Module coordinator
Chairperson of examination committee Biochemie (Biochemistry)

### Module offered by
Chair of Biochemistry

### ECTS
5

### Method of grading
(only after successfully completed module(s))

### Duration
1 semester

### Module level
Undergraduate

### Other prerequisites
-

### Contents
The module offers the opportunity to learn correct presenting and mediating scientific questions by giving a tutorial attendant to a lecture at the faculty of chemistry and pharmacy.

### Intended learning outcomes
The students are able to adequately prepare and present scientific questions, and to guide students in lower semesters.

### Courses
(No information on SWS (weekly contact hours) and course language available)

### Method of assessment
(preparation of materials for demonstrations and exercises (approx. 120 hours total) Language of assessment: German or English)

### Allocation of places
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### Additional information
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### Referred to in LPO I
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<tr>
<th>Module title</th>
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<td>Faculty of Medicine</td>
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**Contents**

Becoming familiar with basic cell biological principles via hands-on training and seminars. Major topics are the structural organisation of eukaryotic cells, cell-cell and cell-matrix interactions, proliferation, differentiation and apoptosis.

**Intended learning outcomes**

Problem-oriented handling of eukaryotic cells under sterile conditions and understanding of principles of techniques for the analysis of cells. Understanding the molecular basis of cell biology and cellular malfunctions and their significance for disease development. Independent extraction of relevant information and presentation of selected examples of current literature.

**Courses** (type, number of weekly contact hours, language — if other than German)

P + S (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written examination (approx. 60 minutes)
Language of assessment: German or English

**Allocation of places**

Biochemie (Biochemistry) Bachelor’s: 12 places. Selection process Biochemie (Biochemistry) Bachelor’s: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places) number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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### Additional Qualification in Natural Sciences 3

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### Contents

Extracurricular event dealing with a life-science issue, which represents a special subject-related expansion of scientific knowledge. This may be a module offered internally or externally of the University of Würzburg. Recognition as academic achievement is conducted in an individual assessment by the examination board.

### Intended learning outcomes

The student has improved scientific knowledge, which contributes to the sharpening of specific qualifications. In particular, he/she gained additional expertise that contributes to individual specialization.

### Courses (type, number of weekly contact hours, language — if other than German)

V (no information on SWS (weekly contact hours) and course language available)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 60 to 90 minutes) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes) or f) successful completion as certified by lecturer. Students will be informed about the method and length of the assessment prior to the course.

Language of assessment: German or English

### Allocation of places

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### Additional information

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### Referred to in LPO I (examination regulations for teaching-degree programmes)

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### Module title

**Additional Qualification in Natural Sciences 5**

### Abbreviation

08-BC-ZQN5-141-m01

### Module coordinator

Chairperson of examination committee Biochemie (Biochemistry)

### Module offered by

Chair of Biochemistry

### ECTS

5

### Method of grading

Only after succ. compl. of module(s)

### (not) successfully completed

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### Duration

1 semester

### Module level

Undergraduate

### Other prerequisites

Please consult with academic advisory service in advance.

### Contents

Extracurricular event dealing with a life-science issue, which represents a special subject-related expansion of scientific knowledge. This may be a module offered internally or externally of the University of Würzburg. Recognition as academic achievement is conducted in an individual assessment by the examination board.

### Intended learning outcomes

The student has improved scientific knowledge, which contributes to the sharpening of specific qualifications. In particular, he/she gained additional expertise that contributes to individual specialization.

### Courses

(V no information on SWS (weekly contact hours) and course language available)

<table>
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<tr>
<th>Type</th>
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### Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 60 to 90 minutes) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes) or f) successful completion as certified by lecturer. Students will be informed about the method and length of the assessment prior to the course.

Language of assessment: German or English

### Allocation of places

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### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

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