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: 2015
Responsible: Faculty of Chemistry and Pharmacy
Contents

The subject is divided into

Content and Objectives of the Programme

Abbreviations used, Conventions, Notes, In accordance with

Compulsory Courses

Structural Biology
General Biology for Biochemistry Students
Principles of Inorganic Chemistry
Inorganic Chemistry 1 (lab) for Biochemistry students
Organic Chemistry 1
Organic Chemistry 2 and analytical methods in organic chemistry
Organic chemistry - laboratory course for Biochemistry students
Molecular structure and spectroscopy
Thermodynamics, Kinetics, Electrochemistry
Practical course of Physical Chemistry for Biochemistry Students
Bioanalytics
Biochemistry 1
Biochemistry 2
Practical course of Biochemistry
Molecular Biology
Mathematics for students in Chemistry and Biology
Introduction to Physics for Students of other Disciplines
Laboratory Course Physics for Students of other Disciplines

Compulsory Electives

Immunology for biochemistry students
Virology for biochemistry students
Human genetics for biochemistry students
Pathobiochemistry
Molecular Biology laboratory course
Cell biology
Specific Microbiology 2 for Students in Biochemistry
Organic Chemistry 4
Organic Chemistry - advanced laboratory course for students of chemistry
Bioinformatics for advanced Students in Biochemistry
Introduction to Neurobiology
Current Methods of Protein Chromatography
Advanced lab (abridged)
Advanced lab
Virology 2 for Biochemistry Students
Imaging methods in life-sciences

Transferable Skills

General Key Skills

Subject-specific Key Skills

Mathematical Biology and Biostatistics
Information Literacy (Basic Level)
Philosophical principles of sciences I
Bioinformatics
Toxicology and legal studies
Contemporary research in biochemistry
Physiology
Practical Course - external
Practical Course - external (abridged)
Practical Course - abroad
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**Thesis Area**

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<td>81</td>
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Content and Objectives of the Programme

The Biochemistry Bachelor study program of the Julius-Maximilians-University of Wuerzburg is offered by the Faculty of Chemistry and Pharmacy and the Faculty of Medicine as a basic study course with the degree "Bachelor of Science" (B.Sc.) (180 ECTS credits) as part of a consecutive Bachelor’s and Master’s study program.

After successful completion of the Bachelor’s studies, students possess the following skills:

• Proficiency in the basic sciences, in particular general, inorganic, organic and physical chemistry, molecular and cellular biology, mathematics, physics, and bioinformatics;

• Solid knowledge and practical skills in the experimental techniques of biochemistry, bioanalytics, molecular biology and structural biology;

• The ability to handle (under guidance, but considerably autonomous) a biochemical problem that is narrowly defined in terms of subject matter and time, by applying the acquired methods under scientific-analytical procedures, and to analyze, summarize and subsequently present the data obtained to a specialist audience.
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:

ASPO2015

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

22-Jul-2015 (2015-42)

20-Apr-2017 (2017-28)

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.
Compulsory Courses

(115 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Biology</td>
<td>03-5S2ST-BC-152-m01</td>
</tr>
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</table>

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

**Module offered by**  
Faculty of Medicine

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

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

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

| V | (2) | Ü | (6) |

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

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

**Allocation of places**

--

**Additional information**

--

**Referred to in LPO 1** (examination regulations for teaching-degree programmes)

--
Module title
General Biology for Biochemistry Students

Abbreviation
07-1A1ZO-BC-152-m01

Module coordinator
Dean of Studies Biologie (Biology)

Module offered by
Faculty of Biology

ECTS
5

Method of grading
Numerical grade

Only after successful completion of module(s)

Duration
1 semester

Module level
Undergraduate

Other prerequisites
--

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. Students will also acquire and practise some of the fundamental preparation skills bioscientists are often required to possess.

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. Fundamental skills in the interpretation of macroscopic and histologic preparations by light microscopy. Fundamental preparation skills.

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

V (5)

Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Written examination (approx. 180 minutes)

Allocation of places
--

Additional information
--

Referred to in LPO I (examination regulations for teaching-degree programmes)
--
## Module Catalogue for the Subject Biochemistry

### Bachelor's with 1 major, 180 ECTS credits

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<th>Module title</th>
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<td>Principles of Inorganic Chemistry</td>
<td>08-AC1-152-m01</td>
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### Module coordinator

lecturer of lecture "Experimentalchemie" (Experimental Chemistry)

### Module offered by

Institute of Inorganic Chemistry

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
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<tbody>
<tr>
<td>8</td>
<td>numerical grade</td>
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</tr>
</tbody>
</table>

### Duration

1 semester

### Module level

undergraduate

### Other prerequisites

--

### Contents

Basics of general and anorganic chemistry.

### Intended learning outcomes

German intended learning outcomes available but not translated yet.

**Kenntnis der Grundlagen der Allgemeinen und Anorganischen Chemie**

### Courses

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

V (4) + V (2)

### Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

- a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/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)

§ 42 I Nr. 1 and § 22 II Nr. 1 h)

§ 62 I Nr. 1
### Module title
**Inorganic Chemistry 1 (lab) for Biochemistry students**

### Abbreviation
08-ACP1-BC-152-m01

### Module coordinator
holder of the Chair of Anorganic Chemistry

### Module offered by
Institute of Inorganic Chemistry

### ECTS
6

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

### Duration
1 semester

### Module level
undergraduate

### Other prerequisites
--

### Contents
The module provides the opportunity to apply the knowledge of the introductory lectures in a practical course. After a safety introduction the students experiment independently in the laboratory. Focuses are laboratory safety, basic laboratory techniques, synthesis of basic compounds and analysis of an unknown compound.

### Intended learning outcomes
The student is able to identify basic chemical issues and to solve them experimentally. Therefore he/she can carry out the necessary stoichiometric calculations and correctly outline the chemical processes written and verbal.

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

- P (6) + S (2)

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

- A) assessment [a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or e) presentation (approx. 30 minutes)] as well as B) Vorlesungstage/Nachtestage (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical assignments (2 to 4 random examinations)

- Assessment offered: Once a year, winter semester

### Language of assessment
German and/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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Bachelor’s with 1 major Biochemistry (2015)

JMU Würzburg • generated 21-Jan-2020 • exam. reg. data record Bachelor (180 ECTS) Biochemie - 2015

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<td>08-OC1-152-m01</td>
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<table>
<thead>
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<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>holder of the Professorship of Organic Chemistry</td>
<td>Institute of Organic Chemistry</td>
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<table>
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<tr>
<td>5</td>
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<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
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<td>1 semester</td>
<td>undergraduate</td>
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### Contents

German contents available but not translated yet.

Das Modul bietet einen Überblick über die elementaren Grundkenntnisse der organischen Chemie. Dazu wird die Bindungssituation am Kohlenstoff betrachtet und in die Nomenklatur einfacher und mäßig komplexer organischer Verbindungen eingeführt. Es werden Grundlagen der Stereochemie, Substitutions-, Additions- und Eliminierungsreaktionen sowie der Syntheseplanung vermittelt.

### Intended learning outcomes

German intended learning outcomes available but not translated yet.


### Courses

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

V (3) + Ü (1)

### Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

- a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/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)

§ 62 l Nr. 2
Module title
Organic Chemistry 2 and analytical methods in organic chemistry

Abbreviation
08-OC2-152-m01

Module coordinator
holder of the Chair of Physically Organic Chemistry

Module offered by
Institute of Organic Chemistry

ECTS
9

Method of grading
numerical grade

Duration
1 semester

Module level
undergraduate

Other prerequisites
--

Contents
German contents available but not translated yet.


Intended learning outcomes
German intended learning outcomes available but not translated yet.


Courses
V (3) + Ü (1) + V (2)

Method of assessment
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

Allocation of places
--

Additional information
--

Referred to in LPO I (examination regulations for teaching-degree programmes)
--
Module title: Organic chemistry - laboratory course for Biochemistry students
Abbreviation: 08-OCP1-BC-152-m01

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<tbody>
<tr>
<td>holder of the Chair of Organic Chemistry II</td>
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### Contents

German contents available but not translated yet.


### Intended learning outcomes

German intended learning outcomes available but not translated yet.


### Courses

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<th>Language — if other than German</th>
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### Method of assessment

Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)

Language of assessment: German and/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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<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tr>
<td>Molecular structure and spectroscopy</td>
<td>08-PC-MBS-152-m01</td>
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<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>lecturer of lecture &quot;Molekülbau and Spektroskopie&quot;</td>
<td>Institute of Physical and Theoretical Chemistry</td>
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</table>

<table>
<thead>
<tr>
<th>ECTS</th>
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<td>1 semester</td>
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**Contents**

The module provides an introduction to the fundamental basics of molecular structure, spectroscopy and quantum mechanics. Via the particle in a box model and a quantum mechanical view of the hydrogen atom one gets to atomic orbitals, molecular orbitals and a basic understanding of the chemical bond. Molecules are analyzed based on the harmonic oscillator and the rigid rotor models. Spectroscopical focuses are UV/Vis spectroscopy, vibrational spectroscopy and rotational spectroscopy.

**Intended learning outcomes**

The student is able to explain basic models of quantum mechanics and to apply them on molecules. He/She can outline different spectroscopical methods.

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

V (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/or English creditable for bonus

**Allocation of places**

--

**Additional information**

--

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

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<table>
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<th>Module title</th>
<th>Abbreviation</th>
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<tr>
<td>Thermodynamics, Kinetics, Electrochemistry</td>
<td>08-PC-TKE-152-m01</td>
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</table>

<table>
<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
</tr>
</thead>
<tbody>
<tr>
<td>lecturer of lecture &quot;Thermodynamik, Kinetik, Elektrochemie&quot;</td>
<td>Institute of Physical and Theoretical Chemistry</td>
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<table>
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<th>ECTS</th>
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<tr>
<td>9</td>
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<table>
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<th>Duration</th>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</table>

**Contents**

German contents available but not translated yet.


**Intended learning outcomes**

German intended learning outcomes available but not translated yet.

Die Studierenden sind in der Lage, die Hauptsätze der Thermodynamik zu erklären. Er/Sie kann thermodynamische Aspekte von Lösungen, Gasen, Mischphasen sowie elektrochemischen Reaktionen darstellen. Die Studierenden können chemische Reaktionen auf kinetischer Ebene interpretieren.

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

V (4) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/or English creditable for bonus

**Allocation of places**

--

**Additional information**

--

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

§ 62 I Nr. 1
Module title

Practical course of Physical Chemistry for Biochemistry Students

Abbreviation

08-PCP-BC-152-m01

Module coordinator

lecturer of lecture "Thermodynamik, Kinetik, Elektrochemie"

Module offered by

Institute of Physical and Theoretical Chemistry

ECTS

6

Method of grading

Only after succ. compl. of module(s)

(1) successfully completed

08-PC-MBS or 08-PC-TKE

Duration

1 semester

Module level

undergraduate

Other prerequisites

--

Contents

German contents available but not translated yet.


Intended learning outcomes

German intended learning outcomes available but not translated yet.


Courses

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

P (4)

Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Vortestate/Nachttestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)

Assessment offered: Once a year, winter semester

Language of assessment: German and/or English

Allocation of places

--

Additional information

--

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

--
## Module title
Bioanalytics

## Abbreviation
08-BAN-152-m01

### Module coordinator
holder of the Chair of Biochemistry

### Module offered by
Chair of Biochemistry

### ECTS
9

### Method of grading
numerical grade

### 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
(V (1) + Ü (1) + P (5))

## Method of assessment
(a) written examination (approx. 45 to 90 minutes) or (b) log (10 to 20 pages) or (c) oral examination of one candidate each (20 to 30 minutes) or (d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or (e) presentation (20 to 30 minutes) or (f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)

Language of assessment: German and/or English

## Allocation of places
--

## Additional information
--

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

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<thead>
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<td>Biochemistry 1</td>
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<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</table>

**Contents**

The module imparts the basic knowledge of biochemistry by lectures and tutorials. Main topics of the module Biochemistry 1 are particularly the biochemistry of proteins (amino acids, peptide bond, primary, secondary, tertiary and quaternary structure), catalytic strategies and enzyme kinetics, carbohydrate metabolism (glycolysis, gluconeogenesis, citric acid cycle, cellular respiration, photosynthesis), fatty acid metabolism (beta-oxidation, fatty acid synthesis), nucleotide metabolism, urea cycle and metabolism of amino acids. Additionally the module conveys basic knowledge about the structure of DNA and the basics of passing and transformation of genetic information (central dogma).

**Intended learning outcomes**

The student has basic knowledge in the covered subject areas of biochemistry. He/She is able to describe the basic biochemical processes in cellular systems.

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

V (2) + Ü (1)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 60 to 90 minutes)

**Allocation of places**

--

**Additional information**

--

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

§ 42 I Nr. 2
§ 62 I Nr. 2
Module title | Abbreviation
--- | ---
Biochemistry 2 | 08-BC2-152-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) |
--- | --- | ---
5 | numerical grade | -- |

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

**Contents**

The module imparts the basic knowledge of biochemistry by lectures and in-depth tutorials. Main topics of the module Biochemistry 2 are particularly Replication, DNA repair, transcription, mRNA maturation, translation and regulation of translation, protein targeting, nuclear transport, and protein degradation. Additionally the module conveys basic knowledge about the cellular signal transduction.

**Intended learning outcomes**

The student has basic knowledge in the covered subject areas of biochemistry. He/She is able to describe the basic biochemical processes in cellular systems.

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

V (2) + Ü (1)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 60 to 90 minutes)

**Allocation of places**

--

**Additional information**

Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLmCh) in conjunction with No. II 2. Letter e) and No. II 1. Letter c) of Annex 1 of APOLmCh and No. 3 of Annex 3 of APOLmCh.

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

--
Module title
Practical course of Biochemistry

Abbreviation
08-BCP-152-m01

Module coordinator
holder of the Chair of Biochemistry

Module offered by
Chair of Biochemistry

ECTS
5

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

(08-BC1)

Duration
1 semester

Module level
undergraduate

Other prerequisites
--

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 pur-
posefully apply them.

Courses (type, number of weekly contact hours, language — if other than German)
P (6)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Log (approx. 30 pages)
Assessment offered: Once a year, summer semester

Allocation of places
Students of the Bachelor's degree programme Biochemie (Biochemistry, 180 ECTS credits): no restrictions with
regard to available places.
Students of the Bachelor's degree programme Chemie (Chemistry, 180 ECTS credits): no more than 6 places; pla-
ces 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; a waiting list will be maintained and places re-allocated by lot
as they become available.

Additional information
--

Referred to in LPO I (examination regulations for teaching-degree programmes)
--
Module title | Abbreviation
--- | ---
Molecular Biology | 08-BC-MOL-152-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 | --

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 and biosafety.

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)
V (2) + Ü (1) + V (1)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
a) written examination (approx. 45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or e) presentation (20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)
Language of assessment: German and/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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<td>10-M-MCB-152-m01</td>
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<tr>
<td>Dean of Studies Mathematik (Mathematics)</td>
<td>Institute of Mathematics</td>
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<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</tbody>
</table>

**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 (3) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

- written examination (approx. 90 to 120 minutes) and written exercises (approx. 25)

**Allocation of places**

--

**Additional information**

Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLmCh) in conjunction with No. I 2. Letter f) of Annex 1 of APOLmCh.

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

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<td>11-EFNF-152-m01</td>
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<td>Managing Director of the Institute of Applied Physics</td>
<td>Faculty of Physics and Astronomy</td>
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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 (4) + V (3)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
written examination (60 to 120 minutes)

**Allocation of places**
--

**Additional information**
--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)
--
Module title | Abbreviation
---|---
Laboratory Course Physics for Students of other Disciplines | 11-PFNF-152-m01

Module coordinator | Module offered by
Managing Director of the Institute of Applied Physics | Faculty of Physics and Astronomy

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<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</table>

Contents

Simple experiments in the fields of mechanics, vibration theory, thermodynamics, optics, X-rays, nuclear magnetic resonance, Atomic and Nuclear Physics, imaging methods.

Intended learning outcomes

The students have detected and understood physical contexts on the basis of the implementation of own experiments. They have a basic understanding of physical phenomena and know the basic ideas and ways of functioning of different measuring and imaging methods as well as their applications, especially in the field of Biomedicine.

Courses (type, number of weekly contact hours, language — if other than German)
P (4)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
a) practical assignment with oral test (approx. 15 minutes, during experiments) and b) written examination (90 minutes).

Each experiment comprises preparation, performance and evaluation. Test as well as performance of experiments can each be repeated once.

Allocation of places

Only as part of pool of general transferable skills (ASQ): 10 places (lottery)

Additional information

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

--
Compulsory Electives

(30 ECTS credits)
Module title | Abbreviation
---|---
Immunology for biochemistry students | 03:4S1/MM-BC-152-m01

Module coordinator | Module offered by
holder of the Professorship of Immunogenetics | Faculty of Medicine

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

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

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 (1) + Ü (1) + P (3)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 45 minutes)
Assessment offered: Once a year, summer semester

Allocation of places

Biochemie (Biochemistry), Bachelor’s: 16 places. Selection process Biochemie (Biochemistry), Bachelor’s (180 ECTS credits): 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
Virology for biochemistry students

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<th>Abbreviation</th>
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### Module coordinator
holder of the Chair of Virology

### Module offered by
Faculty of Medicine

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<th>Other prerequisites</th>
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<tr>
<td>1 semester</td>
<td>undergraduate</td>
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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 (1) + S (1) + P (3)

### Method of assessment
a) written examination (approx. 45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or e) presentation (20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)

Assessment offered: Once a year, summer semester
Language of assessment: German and/or English

### Allocation of places
Biochemie (Biochemistry), Bachelor’s: 18 places. Selection process Biochemie (Biochemistry), Bachelor’s (180 ECTS credits): 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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<td>holder of the Chair of of Human Genetics</td>
<td>Faculty of Medicine</td>
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<td>1 semester</td>
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</table>

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

V (1) + Ü (1.5) + S (0.5)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 30 minutes)

**Allocation of places**

Biochemie (Biochemistry), Bachelor’s: 5 places. Selection process Biochemie (Biochemistry), Bachelor’s (180 ECTS credits): 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>
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<tr>
<td>holder of the Chair of Clinical Biochemistry and Pathobiochemistry</td>
<td>Faculty of Medicine</td>
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<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)

V (1) + Ü (1) + P (3)

**Method of assessment**

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) written examination (approx. 45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or e) presentation (20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)

Assessment offered: Once a year, summer semester

Language of assessment: German and/or English

**Allocation of places**

Biochemie (Biochemistry), Bachelor's: 6 places. Selection process Biochemie (Biochemistry), Bachelor's (180 ECTS credits): 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 | Molecular Biology laboratory course
---|---
Abbreviation | 08-BC-MOLP-152-m01

Module coordinator | holder of the Chair of Biochemistry

Module offered by | Faculty of Chemistry and Pharmacy

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

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

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

P (5)

Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) written examination (approx. 45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or e) presentation (20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)

Assessment offered: Once a year, winter semester

Language of assessment: German and/or English

Allocation of places
Biochemie (Biochemistry), Bachelor’s: 24 places. Selection process Biochemie (Biochemistry), Bachelor’s (180 ECTS credits): 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.

Chemie (Chemistry), Master’s: 6 places. Selection process Chemie (Chemistry), Bachelor’s (120 ECTS credits): 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. A waiting list will be maintained and places re-allocated by lot as they become available.

Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
--
**Module title**  
Cell biology

**Abbreviation**  
03-ZBP-152-m01

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<td>holder of the Chair of Medical Radiation and Cell Research</td>
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<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
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<tr>
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<th>Module level</th>
<th>Other prerequisites</th>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</table>

**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 (4) + S (2)

**Method of assessment**  
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

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

**Allocation of places**

Biochemie (Biochemistry), Bachelor's: 12 places. Selection process Biochemie (Biochemistry), Bachelor's (180 ECTS credits): 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: Specific Microbiology 2 for Students in Biochemistry
Abbreviation: 07-5S2MiZ2-BC-152-m01

Module coordinator: holder of the Chair of Microbiology
Module offered by: Faculty of Biology

ECTS: 10
Method of grading: 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:
V (1) + S (1) + Ü (3)

Method of assessment:
Written examination (approx. 45 to 90 minutes) or log (10 to 20 pages) or oral examination of one candidate (20 to 30 minutes) or oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or presentation (20 to 30 minutes) or practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)

Allocation of places:
Biochemie (Biochemistry), Bachelor's: 6 places. Selection process Biochemie (Biochemistry), Bachelor's (180 ECTS credits): 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

<table>
<thead>
<tr>
<th>Organic Chemistry 4</th>
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</table>

## Abbreviation

| 08-OC4-152-m01 |

## Module coordinator

holder of the Chair of Organic Chemistry II

## Module offered by

Institute of Organic Chemistry

## ECTS

| 5 |

## Method of grading

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

## numerical grade

| -- |

## Duration

| 1 semester |

## Module level

| undergraduate |

## Other prerequisites

| -- |

## Contents

German contents available but not translated yet.

Das Modul behandelt biologisch wichtige Verbindungsklassen, deren Reaktionen und Synthesen, den Umgang mit besonderen Gefahrstoffen, anspruchsvollere Arbeits- und Synthesetechniken, Reinigungsmethoden und Produktanalytik.

## Intended learning outcomes

German intended learning outcomes available but not translated yet.


## Courses

| V (2) + Ü (2) |

## Method of assessment

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

## Allocation of places

| -- |

## Additional information

| -- |

## Referred to in LPO I

( examination regulations for teaching-degree programmes)

§ 22 II Nr. 1 h)
§ 22 II Nr. 2 f)
§ 62 I Nr. 2
Module title
Organic Chemistry - advanced laboratory course for students of chemistry

Abbreviation
08-OCP2-152-m01

Module coordinator
holder of the Chair of Organic Chemistry II

Module offered by
Institute of Organic Chemistry

ECTS
5

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

5 (not) successfully completed 08-OC2 and (08-OCP1 or OCP1-BC)

Duration
1 semester

Module level
undergraduate

Other prerequisites
--

Contents
The module deepens the experimental skills of the student by handling special hazardous substances, complex work and synthesis techniques, extensive purification methods and laborious product analyses.

Intended learning outcomes
The student is able to handle special hazardous substances responsibly. He/She can carry out extensive syntheses, purification techniques and product analyses. He/She can use specific literature to plan experiments.

Courses (type, number of weekly contact hours, language — if other than German)
P (11)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)
Language of assessment: German and/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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<table>
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<tr>
<td>Bioinformatics for advanced Students in Biochemistry</td>
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<tbody>
<tr>
<td>holder of the Chair of Pharmaceutical Biology</td>
<td>Faculty of Biology</td>
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<td>1 semester</td>
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</table>

**Contents**

This module will provide students with a theoretical and methodological introduction to fundamental techniques in molecular biology and drug analysis.

**Intended learning outcomes**

Students are able to analyse groups of drugs, using a variety of methods.

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

V (1) + Ü (4)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Log (10 to 20 pages)

Language of assessment: German and/or English

**Allocation of places**

Biochemie (Biochemistry), Bachelor’s: 4 places. Selection process Biochemie (Biochemistry), Bachelor’s (180 ECTS credits): 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>
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<tr>
<td>Introduction to Neurobiology</td>
<td>03-98-PGN-152-m01</td>
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<tbody>
<tr>
<td>holder of the Chair of Clinical Neurobiology</td>
<td>Faculty of Medicine</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 (2) + S (3)

Course type: S might be offered in Ü format

### Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (90 minutes) and successful completion of seminar/exercise

### 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>
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<tr>
<td>Current Methods of Protein Chromatography</td>
<td>08-BC-AMP-152-m01</td>
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<tr>
<td>holder of the Chair of Biochemistry</td>
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</table>

**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)

P (5)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) written examination (approx. 45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or e) presentation (20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)

Assessment offered: Once a year, winter semester

Language of assessment: German and/or English

**Allocation of places**

Biochemie (Biochemistry), Bachelor’s: 24 places. Selection process Biochemie (Biochemistry), Bachelor’s (180 ECTS credits): 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>
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<td>Advanced lab (abridged)</td>
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<td>chairperson of examination committee Biochemie (Biochemistry)</td>
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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)*
P (8)

**Method of assessment** *(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)*
Log (approx. 20 pages)
Language of assessment: German and/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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<table>
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<td>chairperson of examination committee Biochemie (Biochemistry)</td>
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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)

P (16)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Log (approx. 30 pages)
Language of assessment: German and/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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<table>
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<tr>
<td>Virology 2 for Biochemistry Students</td>
<td>03-VIR2-BC-171-m01</td>
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<td>holder of the Chair of Virology</td>
<td>Faculty of Medicine</td>
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### Contents

In the lecture the basic knowledge of virology is deepened by means of different virus groups. Simple molecular mechanisms of virus replication will be discussed on the basis of different viruses. The focus is on the understanding of the molecular host-virus interactions. The lecture should lead from clinical virology to molecular virology. In the practical part basic viral techniques such as virus purification, expression of recombinant viruses, and determination of viral cell tropisms will be learned and applied in small groups. This course is based on the knowledge of Virology 1 for Bachelor.

### Intended learning outcomes

The students will understand the molecular basis of viral replication and virus-host interaction and will be able to apply basic virological techniques independently.

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

V (2) + P (3)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

- a) written examination (approx. 45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or e) presentation (20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)

---

Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

### Allocation of places

Biochemie (Biochemistry) Bachelor's: 255 places.

### Additional information

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

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Module Catalogue for the Subject Biochemistry
Bachelor’s with 1 major, 180 ECTS credits

<table>
<thead>
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<th>Module title</th>
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<tr>
<td>Imaging methods in life-sciences</td>
<td>08-BGV-171-m01</td>
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**Module coordinator**
holder of the Chair of Biochemistry

**Module offered by**
Chair of Biochemistry

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**Duration**
1 semester

**Contents**
The module "Imaging Techniques in the Life Sciences" contains a lecture part and a seminar part. In the lecture part basic concepts of optics will be discussed and the functionality of a light microscope will be explained. Afterwards the principles of different variants of superresolution light microscopy will be introduced. Typical applications for the study of dynamic processes in cells and the temporal and spatial resolution potential of the different methods play a special role. Subsequently, the principles of electron microscopy (transmission electron microscopy and scanning electron microscopy) will be discussed. As far as possible, parallels to light microscopy will be developed. Typical electron microscopic applications in cell biology and structural biology will be discussed including correlative methods combining light and electron microscopy. Then the principles of more specific microscopy methods such as X-ray microscopy, scanning probe microscopy and nuclear resonance microscopy will be introduced. It will be worked out how the fields of application differ from those of classical microscopy methods and what the temporal and spatial resolution capabilities of the individual methods are. Finally, selected imaging methods from the clinical field (X-ray tomography, nuclear spin tomography and ultrasound) for the imaging of entire organisms will be discussed. As far as possible, parallels are drawn to the microscopic procedures. In the seminar part some aspects of the different methods will be deepened by case studies from the literature and by applying the theoretical basics.

**Intended learning outcomes**
The participants learn the functionalities of different imaging techniques. They will be able to classify typical advantages and limitations of the methods and understand general principles of imaging techniques. Building on this understanding, they can easily evaluate and classify other methods. In order to apply what they have learned independently, the participants will analyse a primary publication independently and answer questions on the imaging methods in writing. The participants will acquire competences in dealing with primary literature in a foreign language. By working on the questions, the participants are trained to recognise relevant information in the primary publication and to reproduce it in a different context. Participants will have the opportunity to optimise their written expression skills in a scientific environment by working on questions relating to primary literature.

**Courses** (type, number of weekly contact hours, language — if other than German)
| V (2) + S (1) |

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
a) written examination (approx. 45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or e) presentation (20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

**Allocation of places**
Biochemie (Biochemistry) Bachelor’s: 245 places.

**Additional information**
--
Referred to in LPO I (examination regulations for teaching-degree programmes)
Transferable Skills
(20 ECTS credits)
General Key Skills
(5 ECTS credits)

Students may select any of the modules offered as part of the pool of general transferable skills (ASQ) of JMU.
Subject-specific Key Skills
(15 ECTS credits)
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<td>Mathematical Biology and Biostatistics</td>
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<td>holder of the Chair of Bioinformatics</td>
<td>Faculty of Biology</td>
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**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 (2) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 60 minutes)
creditable for bonus

**Allocation of places**

--

**Additional information**

--

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

--
### Module title

**Information Literacy (Basic Level)**

| Abbreviation | 41-IK-BM-152-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

2 (not) successfully completed

### Module level

undergraduate

### Other prerequisites

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### Contents

Information literacy in an academic context: search strategies, resources, reference management, copyright, etc.

### Intended learning outcomes

Students know what information is needed for what purpose. They are able to locate information that is relevant within their discipline(s) 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. The module aims to equip students with the skills needed to find information and literature that is relevant to the topics of their papers.

### Courses

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

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### Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation (approx. 15 minutes) with written elaboration (approx. 2 pages)

### Allocation of places

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### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

§ 99 I Nr. 1 (2 ECTS credits)
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<td>holder of the Chair of Theoretical Philosophy</td>
<td>Institute of Philosophy</td>
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</table>

**Contents**

Introduction to the theory of intellectual disciplines and to the historical and philosophical bases of the individual intellectual disciplines.

**Intended learning outcomes**

Insight into the relationship of philosophy to individual intellectual disciplines; ability to reflect on the historical and intellectual origins of our knowledge culture; insight into the scope and limits of various intellectual disciplines; familiarity with, and ability to criticize, basic assumptions of visions of the world and systems of thought.

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

V (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (45 minutes)

**Allocation of places**

Only as part of pool of general transferable skills (ASQ): max. 20 places. Should the number of applications exceed the number of available 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. A waiting list will be maintained and places re-allocated by lot 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>

**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 (1) + S (1)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 20 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>lecturer of lecture &quot;Toxikologie und Rechtskunde&quot;</td>
<td>Faculty of Medicine</td>
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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** (type, number of weekly contact hours, language — if other than German)
V (1) + V (1)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
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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§ 22 II Nr. 2 f)
§ 22 II Nr. 3 f)
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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 (2)

### Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Wrap-up report (approx. 1 page)

### 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**

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 (3)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 60 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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Module title: Practical Course - external  
Abbreviation: 08-EP-152-m01

Module coordinator: chairperson of examination committee Biochemie (Biochemistry)
Module offered by: Faculty of Chemistry and Pharmacy

ECTS: 10  
Method of grading: Only after succ. compl. of module(s)

Duration: (not) successfully completed
Module level: undergraduate  
Other prerequisites: Please consult with course advisory service in advance.

Contents:
The internship is carried out in a non-university research / diagnostic institution or in a company. The contents of the internship will be determined by the institution. The requirements in content shall correspond to an internship offered in the study program of the Biochemistry bachelor program (180 ECTS), what has to be defined in advance in consultation with the module coordinator.

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 (0)

Method of assessment:
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Log (approx. 30 pages)
Language of assessment: German and/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**

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**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 (0)

**Method of assessment**

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Log (approx. 20 pages)
Language of assessment: German and/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 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 (0)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Log (approx. 30 pages)
Language of assessment: German and/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
Practical Course - abroad (abridged)

### Abbreviation
08-APK-152-m01

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

### Duration

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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 (0) |

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Log (approx. 20 pages)
Language of assessment: German and/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 | Abbreviation
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Practical Lab Course | 08-LP-152-m01

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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 (16)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Log (approx. 30 pages)
Language of assessment: German and/or English

**Allocation of places**

--

**Additional information**

--

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

--
Module title | Abbreviation
--- | ---
Practical Lab Course (abridged) | 08-LPK-152-m01

Module coordinator | Module offered by
chairperson of examination committee Biochemie (Biochemistry) | Chair of Biochemistry

ECTS | Method of grading | Only after succ. compl. of module(s)
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5 | (not) successfully completed | --

Duration | Module level | Other prerequisites
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 | undergraduate | Please consult with course advisory service in advance.

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 (8)

Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
Log (approx. 20 pages)
Language of assessment: German and/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 | Abbreviation
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Scientific lecturing 1 | 08-WIRE1-152-m01

Module coordinator | Module offered by
--- | ---
chairperson of examination committee Biochemie (Biochemistry) | Chair of Biochemistry

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

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)

T (0)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Wrap-up report (approx. 2 pages)
Language of assessment: German and/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 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)

**T (0)**

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Wrap-up report (approx. 2 pages)
Language of assessment: German and/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 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

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### Allocation of places

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### Additional information

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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 (2) + S (1)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

presentation (approx. 10 minutes)

Language of assessment: German and/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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### Intended learning outcomes

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### Courses

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

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### Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

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

### Allocation of places

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### Additional information

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(examination regulations for teaching-degree programmes)

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**Contents**

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**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 (1)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Wrap-up report (approx. 1 page)
Language of assessment: German and/or English

**Allocation of places**

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**Additional information**

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

S (1)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Wrap-up report (approx. 1 page)
Language of assessment: German and/or English

**Allocation of places**

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**Intended learning outcomes**

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**Courses**

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

S (1)

**Method of assessment**

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Wrap-up report (approx. 1 page)

Language of assessment: German and/or English

**Allocation of places**

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**Additional information**

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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)

T (0)

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Wrap-up report (approx. 1 page)
Language of assessment: German and/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 | Abbreviation
---|---
Elemental Organic Chemistry | 08-AC-ELO-152-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)
---|---|---
5 | numerical grade | --

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

Contents
German contents available but not translated yet.

Das Modul vermittelt vertiefendes Wissen über Organometalle. Schwerpunkte sind Stuktur und Eigenschaften, Spezielle Stoffklassen, Reaktivität und Technische Prozesse.

Intended learning outcomes
German intended learning outcomes available but not translated yet.

Der/Die Studierende kann die Struktur und Eigenschaften von Organometallen fachgerecht darstellen. Er/Sie ist in der Lage, diese zu systematisieren und in Bezug auf Struktur und Reaktivität zu charakterisieren. Zudem kann er/sie Syntheseprinzipien für elementorganische Verbindungen entwickeln und erklären.

Courses (type, number of weekly contact hours, language — if other than German)
V (2) + Ü (1)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/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)
§ 22 II Nr. 1 h)
§ 22 II Nr. 2 f)
§ 22 II Nr. 3 f)
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**Module coordinator**
holder of the Chair of Anorganic Chemistry

**Module offered by**
Institute of Inorganic Chemistry

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**Contents**
The module provides the opportunity to plan and carry out complex syntheses after an individual research. Focuses are the handling of organometallic compounds, their synthesis and the work in inert atmospheres. Spectroscopic methods are used for the precise determination of the products.

**Intended learning outcomes**
The student is able to experimentally solve complex issues after an individual research. He/She can describe the technical backrounds and explain them written and verbal using technical language. He/She can independently plan and carry out the synthesis of a chemical compound. Therefor he/she can apply advanced laboratory techniques.

**Courses**
(type, number of weekly contact hours, language — if other than German)
P (12)

**Method of assessment**
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)
Language of assessment: German and/or English

**Allocation of places**
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**Additional information**
--

**Referred to in LPO I**
(examination regulations for teaching-degree programmes)
--
### Module title
Symmetry, chemical bonding and light

### Abbreviation
08-PC-SBL-152-m01

### Module coordinator
lecturer of lecture "Symmetrie, chemische Bindung und Licht"

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

### ECTS
9

### Method of grading
numerical grade

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

### Duration
2 semester

### Module level
undergraduate

### Other prerequisites
--

### Contents
The module provides an introduction to the symmetry of molecules. It focuses on group theory, symmetry operations, point groups, character tables, and selection rules. The module deals with the chemical bond based on the qualitative MO theory and gives an introduction into the basics of computational chemistry. The module provides the opportunity to analyze the interactions between symmetry, chemical bonding and light in detail.

### Intended learning outcomes
The student is able to analyze the symmetry of molecules. He/She can imply on the spectroscopic properties of a molecule by its symmetry.

### Courses
\( V (3) + Ü (2) + V (2) + Ü (2) \)

### Method of assessment
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/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: Inorganic Chemistry of the Elements
Abbreviation: 08-AS1-152-m01

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

ECTS: 6
Method of grading: numerical grade
Only after succ. compl. of module(s): --
Duration: 1 semester
Module level: undergraduate
Other prerequisites: --

Contents:
German contents available but not translated yet.


Intended learning outcomes:
German intended learning outcomes available but not translated yet.


Courses:
V (2) + V (2)

Method of assessment:

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

Allocation of places: --

Additional information: --

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

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### Contents

The module provides the opportunity to apply the knowledge of the introductory lectures in a practical course. After a safety introduction the students experiment independently in the laboratory. Focuses are different analysis methods with unknown compounds.

### Intended learning outcomes

The student is able to analyze unknown compounds using different methods. He/She is able to separate and analyze mixtures.

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

| P (12) + S (1) |

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Vorteststate/Nachtteststate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)

Assessment offered: Once a year, summer semester

Language of assessment: German and/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
Organic Chemistry 4

### Abbreviation
08-OC4-152-m01

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

### 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
--

### Contents
German contents available but not translated yet.

Das Modul behandelt biologisch wichtige Verbindungsklassen, deren Reaktionen und Synthesen, den Umgang mit besonderen Gefahrstoffen, anspruchsvollere Arbeits- und Synthesetechniken, Reinigungsmethoden und Produktanalytik.

### Intended learning outcomes
German intended learning outcomes available but not translated yet.


**Courses**

| (type, number of weekly contact hours, language — if other than German) |
| V (2) + Ü (2) |

### Method of assessment

- a) written examination (approx. 90 to 180 minutes)
- b) oral examination of one candidate each (20 to 30 minutes)
- c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate)
- d) log (approx. 20 pages)
- e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

### Allocation of places
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### Additional information
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### Referred to in LPO I

- § 22 II Nr. 1 h)
- § 22 II Nr. 2 f)
- § 62 I Nr. 2
# Module Catalogue for the Subject Biochemistry

Bachelor's with 1 major, 180 ECTS credits

## Module title

**Additional Qualification in Natural Sciences 3**

**Abbreviation**

08-BC-ZQN3-152-m01

## Module coordinator

Chairperson of examination committee Biochemie (Biochemistry)

## Module offered by

Chair of Biochemistry

## ECTS

3

## 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 course 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**

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## Method of assessment

**Type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus**

a) written examination (approx. 45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or e) presentation (20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)

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 | Abbreviation
--- | ---
Additional Qualification in Natural Sciences 5 | 08-BC-ZQN5-152-m01

Module coordinator | Module offered by
chairperson of examination committee Biochemie (Biochemistry) | Chair of Biochemistry

**ECTS** | **Method of grading** | **Only after succ. compl. of module(s)**
5 | (not) successfully completed | --

**Duration** | **Module level** | **Other prerequisites**
1 semester | undergraduate | Please consult with course 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)

Ü (0)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) written examination (approx. 45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or e) presentation (20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)

Language of assessment: German or English

**Allocation of places**

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**Additional information**

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<td>08-BC-EQN3-152-m01</td>
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<table>
<thead>
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<th>Module coordinator</th>
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<tr>
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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)

| Ü (0) |

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) written examination (approx. 45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or e) presentation (20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)

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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<table>
<thead>
<tr>
<th>Module title</th>
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<td>Compleative Qualification in Natural Sciences 5</td>
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**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)

| Ü (Ü) |

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) written examination (approx. 45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or e) presentation (20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)

Language of assessment: German or English

**Allocation of places**

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**Additional information**

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**Referred to in LPO 1** (examination regulations for teaching-degree programmes)

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Thesis Area
(15 ECTS credits)
<table>
<thead>
<tr>
<th>Module title</th>
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<tbody>
<tr>
<td>Bachelor Thesis in Biochemistry</td>
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**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 to module

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

Bachelor's thesis (50 to 70 pages)
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 Catalogue for the Subject

**Biochemistry**

Bachelor's with 1 major, 180 ECTS credits

<table>
<thead>
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<tbody>
<tr>
<td>Defense of the Bachelor Thesis in Biochemistry</td>
<td>08-KOLL-BC-152-m01</td>
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**Contents**

In the Defense the student is presenting the results of her / his Bachelor-Thesis and is defending them in a subsequent discussion.

**Intended learning outcomes**

The student is able to defend the results of her/his Bachelor’s Thesis in a scientific discussion.

**Courses**

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

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**Method of assessment**

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

final colloquium (approx. 30 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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