Subdivided Module Catalogue
for the Subject
Biochemistry
as a Master’s with 1 major
with the degree "Master of Science"
(120 ECTS credits)

Examination regulations version: 2012
Responsible: Faculty of Chemistry and Pharmacy
Course of Studies - Contents and Objectives

No translation available.
Abbreviations used

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

Term: SS = summer semester, WS = winter semester

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

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

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

Conventions

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

Notes

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

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

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

In accordance with

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

ASPO2009

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

28-Aug-2012 (2012-151) except for mandatory elective 08-MCB-MSP-142 added in Fast Track procedure at a later time

17-Dec-2014 (2014-87)

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

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Module title</th>
<th>ECTS credits</th>
<th>Method of grading</th>
<th>page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Compulsory Electives (90 ECTS credits)</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Compulsory Electives 1 (50 ECTS credits)</strong></td>
<td></td>
<td></td>
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<td>08-MBC-RNAW-122-m01</td>
<td>RNA worlds</td>
<td>5</td>
<td>NUM</td>
<td>53</td>
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<tr>
<td>08-MBC-LCP-122-m01</td>
<td>Life cycle of proteins</td>
<td>5</td>
<td>NUM</td>
<td>38</td>
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<td>Genome stability</td>
<td>5</td>
<td>NUM</td>
<td>24</td>
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<td>Structure and function of RNA-protein complexes</td>
<td>10</td>
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<td>55</td>
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<td>Protein quality control</td>
<td>10</td>
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<td>52</td>
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<tr>
<td>08-MBC-EGG-122-m01</td>
<td>Genome and epigenetics</td>
<td>10</td>
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<td>23</td>
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<tr>
<td>08-MBC-MK-122-m01</td>
<td>Macromolecular Crystallography</td>
<td>10</td>
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<td>08-MCM3-102-m01</td>
<td>Principles of drug design</td>
<td>5</td>
<td>NUM</td>
<td>60</td>
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<tr>
<td>08-MBC-MSP-142-m01</td>
<td>Mass-Spectrometry and Proteomics</td>
<td>5</td>
<td>NUM</td>
<td>42</td>
</tr>
<tr>
<td>08-BC-MOL-122-m01</td>
<td>Molecular Biology for Biochemistry students</td>
<td>6</td>
<td>NUM</td>
<td>46</td>
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<tr>
<td>08-MBC-LIT1-122-m01</td>
<td>Literature seminar 1</td>
<td>5</td>
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<td>08-AMB-122-m01</td>
<td>Contemporary Biochemical Methods</td>
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<td>03-MTUB-092-m01</td>
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<td>03-98-PBG-092-m01</td>
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<td>54</td>
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<td>31</td>
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<td>03-98-MVTF-122-m01</td>
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<td>Modules 07-3A3BI, 07-4BFMZ4-BC and 03-VTK may only be taken by students that did not take these modules in the Bachelor’s degree programme; module component 08-MBC-OC4-1 may only be taken by students that did not take module component 08-OC4-1 in the Bachelor’s degree programme.</td>
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<td>07-4BFM24-BC-092-m01</td>
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<td>08-MBC-OC4-122-m01</td>
<td>Basics in Organic Chemistry 4</td>
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<tr>
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<td>5</td>
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<tr>
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<td>5</td>
<td>B/NB</td>
<td>37</td>
</tr>
<tr>
<td>08-MBC-WR2-122-m01</td>
<td>Scientific lecturing M2</td>
<td>5</td>
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<tr>
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<td>Assistance in practical courses 2</td>
<td></td>
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<td><strong>Thesis (30 ECTS credits)</strong></td>
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<td>Final Examination in Biochemistry</td>
<td>30</td>
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<td>08-MBC-MA-122-m01</td>
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<tr>
<td>chairperson of examination committee Biochemie (Biochemistry)</td>
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<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
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<table>
<thead>
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<th>Module level</th>
<th>Other prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>graduate</td>
<td>--</td>
</tr>
</tbody>
</table>

**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. The results will be defended in a final colloquium.

**Intended learning outcomes**

Students are able to conduct research on a defined problem/topic, adhering to the principles of good scientific practice, and to write up the results of their work. They are able to present the findings of their projects. They can defend their choice of experimental methods, their findings as well as the evaluation and interpretation of those findings in a scientific discussion.

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

This module has 2 components; information on courses listed separately for each component.

- 08-MBC-MA-2-122: K (no information on language and number of weekly contact hours available)
- 08-MBC-MA-1-122: A (no information on language and number of weekly contact hours available)

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

This module has the following 2 assessment components. Unless stated otherwise, students must pass all of these assessment components to pass the module as a whole.

**Assessment component to module component 08-MBC-MA-2-122**: Abschlusskolloquium

- 5 ECTS credits, method of grading: numerical grade
- Abschlusskolloquium (approx. 45 minutes)
- Language of assessment: German or English

**Assessment component to module component 08-MBC-MA-1-122**: Master-Arbeit

- 25 ECTS credits, method of grading: numerical grade
- written thesis (approx. 60 pages)
- Language of assessment: German or English

**Allocation of places**

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**Additional information**

- --

**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>
</tr>
</thead>
<tbody>
<tr>
<td>Contemporary Research in Biochemistry M1</td>
<td>08-MBC-AFB1-122-m01</td>
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</thead>
<tbody>
<tr>
<td>2 semester</td>
<td>graduate</td>
<td>--</td>
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</tbody>
</table>

**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)

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

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

presentation/talk (approx. 15 to 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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### Module title
Contemporary Research in Biochemistry M2

### Abbreviation
08-MBC-AFB2-122-m01

### Module coordinator
holder of the Chair of Biochemistry

### Module offered by
Chair of Biochemistry

### ECTS
3

### Method of grading
numerical grade

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

### Module level
graduate

### Other prerequisites
--

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

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

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

### Method of assessment
Presentation/talk (approx. 15 to 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 1
(examination regulations for teaching-degree programmes)
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</thead>
<tbody>
<tr>
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<td>graduate</td>
<td>--</td>
</tr>
</tbody>
</table>

### Contents

A series of lectures that introduce students to a range of cutting-edge methods in biochemistry. Renowned experts will discuss the methods used by them as well as the theoretical principles of those methods in depth and detail.

### Intended learning outcomes

Students have become familiar with cutting-edge methods in biochemistry. They are able to explain and describe the methods covered in the module as well as to critically evaluate whether those methods can provide answers to new problems in biochemistry.

### Courses

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

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

### Method of assessment

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

1 to 3 written examinations (1 written examination: approx. 60 minutes; 2 written examinations: approx. 45 minutes each; 3 written examinations: approx. 40 minutes each)

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>
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</thead>
<tbody>
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<tbody>
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<td>1 semester</td>
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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)

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

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

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

Language of assessment: German or English

**Allocation of places**

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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>Assistance in practical courses 2</td>
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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

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

### Method of assessment

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

Language of assessment: German or English

### Allocation of places

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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>Practical course - abroad 1</td>
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**Contents**

Practical course to be completed at universities abroad. Students may complete this course in the context of exchange programmes such as Erasmus etc. The contents of the course should correspond to the contents of a lab course offered in the context of the Master’s programme in Biochemistry (120 ECTS credits); please consult with the competent coordinator in advance.

**Intended learning outcomes**

Students are familiar with procedures and processes used at universities in countries other than Germany. They have acquired subject-specific skills as well as language and interpersonal skills.

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

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

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

a) log (approx. 20 pages) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation/talk (approx. 15 to 30 minutes)

Language of assessment: German or English

**Allocation of places**

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**Additional information**

Additional information on module duration: block lab course with a minimum duration of 15 weeks.

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

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### Module title

**Practical course - abroad 2**

<table>
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### Module coordinator

Chairperson of examination committee Biochemie (Biochemistry)

### Module offered by

Chair of Biochemistry

### ECTS

15

### Method of grading

Only after successfully completed module(s)

### Duration

1 semester

### Module level

Graduate

### Other prerequisites

---

### Contents

Practical course to be completed at universities abroad. Students may complete this course in the context of exchange programmes such as Erasmus etc. The contents of the course should correspond to the contents of a lab course offered in the context of the Master's programme in Biochemistry (120 ECTS credits); please consult with the competent coordinator in advance.

### Intended learning outcomes

They have acquired subject-specific skills as well as language and interpersonal skills. Students are familiar with procedures and processes used at universities in countries other than Germany.

### Courses

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<td>(no information on SWS)</td>
<td>German</td>
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### Method of assessment

- a) log (approx. 20 pages) or
- b) oral examination of one candidate each (approx. 20 minutes) or
- c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or
- d) presentation/talk (approx. 15 to 30 minutes)

Language of assessment: German or English

### Allocation of places

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### Additional information

Additional information on module duration: block lab course with a minimum duration of 8 weeks.

### Referred to in LPO 1

(examination regulations for teaching-degree programmes)

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<td>Bacterial genetics - Infectiology</td>
<td>03-98-PBG-092-m01</td>
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<td>Admission prerequisite to assessment: regular attendance of courses (lectures excluded) as specified at the beginning of the course.</td>
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</table>

## Contents

Foundations and analytical approaches of bacterial genetics are taught based on selected questions from molecular microbiology. Genetic processes are analysed with the help of examples of gene transfer. Molecular genetic and functional biochemical pathways are presented using examples from microbiology.

## Intended learning outcomes

Students have developed the ability to approach, analyse and interpret general problems in bacterial genetics based on individually assigned tasks, using techniques of modern molecular biology, microbiology and genetics. They also have developed skills in experimental design, bench work, data analysis and the presentation of scientific results both orally and in writing.

## Courses

<table>
<thead>
<tr>
<th>(type, number of weekly contact hours, language — if other than German)</th>
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<tbody>
<tr>
<td>V + S + Ü (no information on SWS (weekly contact hours) and course language available)</td>
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</table>

## Method of assessment

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

## Allocation of places

Biochemistry Bachelor's: no restrictions. Biochemistry Master's: 4 places. Places will be allocated by lot.

## Additional information

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## Referred to in LPO I

(examination regulations for teaching-degree programmes)

--
### Module title
Bioinorganic Chemistry

### Abbreviation
08-ACM2-102-m01

### Module coordinator
Lecturer of seminar "Anorganische Aspekte der Biochemie und Medizinischen Chemie" (Inorganic Aspects of Biochemistry and Medicinal Chemistry)

### Module offered by
Institute of Inorganic Chemistry

### ECTS
5

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

### Duration
1 semester

### Module level
Graduate

### Other prerequisites

#### Contents
This module introduces students to the fundamental principles of bioinorganic chemistry (BIC). It discusses the methods of BIC, structures and effects of metalliferous enzymes and applications of BIC in the fields of diagnosis and therapy.

#### Intended learning outcomes
Students are able to describe the principles of, and methods in, BIC. They can explain the structure and effects of metalliferous enzymes and describe applications of BIC in biochemistry and medicine.

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

#### Method of assessment
(a) 1 to 3 written examinations (60 or 90 minutes) or (b) oral examination of one candidate each (20 minutes) or (c) oral examination in groups (groups of 2, 30 minutes). Should there be the option to choose between several methods of assessment, the module coordinator will choose the method to be used for the module component in the current semester at the beginning of the course.

Language of assessment: German or English

#### Allocation of places

#### Additional information

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


### Module title

**Bioinformatics**

### Abbreviation

07-3A3Bl-072-m01

### Module coordinator

holder of the Chair of Bioinformatics

### Module offered by

Faculty of Biology

### ECTS

2

### Method of grading

numerical grade

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

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### Duration

1 semester

### Module level

undergraduate

### Other prerequisites

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## Contents

Fundamental principles of bioinformatics.

## Intended learning outcomes

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

## Courses

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

- **07-3A3Bl-1B-072**: V (no information on SWS (weekly contact hours) and course language available)
- **07-3A3Bl-2B-072**: S (no information on SWS (weekly contact hours) and course language available)

## Method of assessment

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

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

### Assessment in module component 07-3A3Bl-1B-072: Bioinformatics (Lecture)

- 1 ECTS, Method of grading: numerical grade
- written examination (approx. 20 minutes)

### Assessment in module component 07-3A3Bl-2B-072: Bioinformatics (Seminar)

- 1 ECTS, Method of grading: (not) successfully completed
- term paper (approx. 5 to 10 pages)

## Allocation of places

Only as part of Biochemistry Master’s: 5 places. Places will be allocated by lot.

## Additional information

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## Referred to in LPO I

(examination regulations for teaching-degree programmes)

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<table>
<thead>
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<th>Abbreviation</th>
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<td>graduate</td>
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</table>

### Contents
Advances and current results of bioinformatics are explained and discussed, this includes results from genome and sequence analysis, protein domains and protein families, large-scale data analysis (e. g. net generation sequences, proteomics data), analysis of different functional RNAs (e. g. miRNAs, lncRNAs).

### Intended learning outcomes
Understand recent results in bioinformatics. Discuss their implications. Have an advanced (Master) level knowledge of typical technologies and research questions in bioinformatics.

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

### Method of assessment
Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) oral examination of one candidate each (30 to 60 minutes) or c) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)

### Allocation of places
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### Additional information
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### Referred to in LPO I
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<td>Admission prerequisite to assessment: regular attendance of exercises and successful completion of the respective exercises as specified at the beginning of the course.</td>
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</table>

**Contents**

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

**Intended learning outcomes**

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

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

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

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

log (approx. 10 to 20 pages)

Assessment offered: once a year, summer semester

Language of assessment: German or English

**Allocation of places**

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

**Additional information**

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<table>
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<td>Abbreviation</td>
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| Module coordinator                | lecturer of lecture "Bioorganische Chemie" (Bioorganic Chemistry) |
| Module offered by                 | Institute of Organic Chemistry                            |

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<tr>
<td>This module discusses topics at the interface of organic chemistry, biology and medicine. It focuses on molecular interactions and recognition, molecular diversity, active agent development, new aspects of DNA, RNA, proteins and carbohydrates.</td>
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<table>
<thead>
<tr>
<th>Intended learning outcomes</th>
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<tbody>
<tr>
<td>Students are able to describe molecular interactions and detection mechanisms of bioorganic chemistry. They can explain the molecular diversity of biological systems. They can characterise the fabrication of agents. They can describe modern aspects of DNA, RNA, proteins and carbohydrates.</td>
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Module title | Abbreviation
---|---
Biophysics and Molecular Biotechnology (Lecture and Seminar) | 07-MS2BT-102-m01

Module coordinator | Module offered by
holder of the Chair of Biotechnology and Biophysics | Faculty of Biology

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

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

Contents
This lecture provides a broad overview of biophysical techniques and their applications. The first part of the lecture discusses fundamental aspects of thermodynamics, kinetics and molecular interactions. The course then moves on to discuss biophysical methods that facilitate the investigation of individual cells down to the level of single molecules. Focus is on electromanipulation and dielectric spectroscopy of cells, biomembranes, electrophysiology, ion channels, protein folding, single-molecule fluorescence methods and high-resolution as well as dynamic microscopy.

Intended learning outcomes
Students will have acquired a knowledge of fundamental biophysical methods and their applications that will enable them to independently review relevant literature. In addition, they will have become acquainted with - or, where necessary, will be able to independently acquaint themselves with - biophysical mechanisms.

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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) oral examination of one candidate each (30 to 60 minutes) or c) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)

Allocation of places
Biochemistry Master's: 4 places. Places will be allocated by lot.

Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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### Module title
Practical course - external 1

### Abbreviation
08-MBC-EP1-122-m01

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

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

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

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

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

a) log (approx. 20 pages) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation/talk (approx. 15 to 30 minutes)

Language of assessment: German or English

### Allocation of places
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### Additional information
Additional information on module duration: block lab course with a minimum duration of 8 weeks.

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

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<tbody>
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**Contents**

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

**Intended learning outcomes**

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

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

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

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

a) log (approx. 20 pages) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation/talk (approx. 15 to 30 minutes)

Language of assessment: German or English

**Allocation of places**

--

**Additional information**

Additional information on module duration: block lab course with a minimum duration of 8 weeks.

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

--
### Module title
Genome and epigenetics

### Abbreviation
08-MBC-GEG-122-m01

### Module coordinator
holder of the Chair of Biochemistry

### Module offered by
Chair of Biochemistry

### ECTS
10

### Method of grading
numerical grade

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

### Duration
1 semester

### Module level
graduate

### Other prerequisites
--

### Contents
The module allows a deeper incorporation into the research methods and techniques in the field of investigation of epigenetic modifications, DNA structures, and genome stability in a practical course.

### Intended learning outcomes
After completing the module, the student masters the techniques used in the practical course. He/She is able to explain and to critically reflect the performed experiments, and to both present and discuss the results in a written report.

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

### Method of assessment
(a) log (approx. 20 pages) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation/talk (approx. 15 to 30 minutes)

Assessment offered: once a year

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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**Module coordinator**

holder of the Chair of Biochemistry

**Module offered by**

Chair of Biochemistry

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**Duration**

1 semester

**Module level**

graduate

**Other prerequisites**

--

**Contents**

The module imparts detailed and in-depth the current state of science in the field of research on the stability of genomes in dependence of certain structural and epigenetic factors.

**Intended learning outcomes**

After participating in the module events, the student is familiar with the course contents and is able to transfer them to new scientific problems. He/She is able to classify new research results in the context of recent findings and to assess their significance.

**Courses**

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

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

**Method of assessment**

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

- a) 1 to 3 written examinations (1 written examination: approx. 60 minutes; 2 written examinations: approx. 45 minutes each; 3 written examinations: approx. 40 minutes each) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or e) presentation/talk (approx. 15 to 30 minutes)

Language of assessment: German or English

**Allocation of places**

--

**Additional information**

--

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

--
Subdivided Module Catalogue for the Subject Biochemistry
Master’s with 1 major, 120 ECTS credits

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<td>Basics in Organic Chemistry 4</td>
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### Contents
This module discusses biologically important bonding classes, their reactions and syntheses, working with special hazardous substances, complicated working and synthesis techniques, purification methods and product analysis.

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

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

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

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

Language of assessment: German or English

### Allocation of places
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### Additional information
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### Referred to in LPO I (examination regulations for teaching-degree programmes)
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<td>Faculty of Medicine</td>
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**Contents**

This module will discuss current topics in human genetics.

**Intended learning outcomes**

Students have developed the ability to understand relevant questions in human genetics and to discuss these in detail.

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

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

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

Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) oral examination of one candidate each (30 to 60 minutes) or c) oral examination in groups of up to 3 candidates (approx. 30 to 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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### Contents

Familiarity with the fundamentals of molecular and cellular immunology that allow a deeper understanding of immune-mediated defence mechanisms. This incorporates common literature readings, presentations and tests on selected immunology book chapters and recent original literature in English language.

### Intended learning outcomes

Students will gain a knowledge of fundamental concepts and methods in molecular and cellular immunology and will be able to present and discuss these.

### Courses

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

### Method of assessment

Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)

### Allocation of places

Biochemistry Master's: 3 places. Places will be allocated by lot.

### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

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<table>
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**Module coordinator**

holder of the Professorship of Immunogenetics

**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 | graduate | --

**Contents**

Recent progress in molecular and cellular immunology. Deeper insights into selected immunology chapters, such as autoimmunity and immune modulation, development of the immune system, immunogenetics, evolution, infection immunology, and more. This incorporates common literature readings, presentations and tests on selected immunology book chapters and recent original literature.

**Intended learning outcomes**

Students are able to understand current problems in immunology and to discuss these in detail.

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

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

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

Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)

**Allocation of places**

Biochemistry Master's: 3 places. Places will be allocated by lot.

**Additional information**

--

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

--
Module title | Abbreviation
---|---
Cardiovascular Biology | 03-98-MVKB-122-m01

Module coordinator | Module offered by
holder of the Chair of Experimental Biomedicine | Faculty of Medicine

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Duration | Module level
1 semester | graduate

Contents
Fundamental and specific knowledge of cardiovascular biology is taught based on selected questions from this field.

Intended learning outcomes
Students have developed the ability to approach, analyse and interpret general problems in cardiovascular biology and, in particular, in developmental biology, erythropoiesis, blood coagulation, myocardial diseases, diabetes, regulation of blood pressure, platelets and stroke.

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

Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)

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>1 semester</td>
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**Contents**

This module covers specific topics of clinical analytical chemistry.

**Intended learning outcomes**

Students have developed an advanced knowledge of molecular biology.

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

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

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

written examination (120 minutes)

**Allocation of places**

--

**Additional information**

--

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

--
Module title: Clinical Neurobiology
Abbreviation: 03-98-MVKN-122-m01

Module coordinator: holder of the Chair of Clinical Neurobiology
Module offered by: Faculty of Medicine

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

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

Contents:
Students will get a theoretical introduction to neurobiology and clinical neurobiology. The following topics will be discussed: introduction to neurons and glia, ion channels and membrane potential, ion channelopathies, synapses, transmitter release, NMJ, myasthenia gravis, cerebellum, basal ganglia, ataxia and Morbus Parkinson, somatosensory system, touch, pain, schizophrenia and autism spectrum disorders, disorders of cognition, muscle and muscle diseases, anatomy and function of the motor system, spinal reflexes, motoneuron diseases, hippocampus, learning and memory, anterograde amnesia, visual agnosia, cortex and the limbic system, emotions, disorders of conscious and unconscious mental processes, attention, smell and taste and hearing, sleep, EEG, epilepsy, vision and diseases of the visual system. The literature seminars are based on fundamental literature on lecture-relevant topics to document the experiments underlying our present knowledge in neurobiology.

Intended learning outcomes:
Students who successfully completed this module will have acquired insights into current theoretical concepts in neurobiology. They will have examined clinical aspects of neurobiology with a focus on the molecular, cellular and physiological mechanisms. Additionally, they will have learned how to evaluate and present data in oral form. The students will have learned to critically read scientific publications in the field of neurobiology and will have been trained in the ability to extract relevant information from the original literature.

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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus):
Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 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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**Contents**

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

**Intended learning outcomes**

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

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

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

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

a) log (approx. 20 pages) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation/talk (approx. 15 to 30 minutes)

Language of assessment: German or English

**Allocation of places**

--

**Additional information**

Additional information on module duration: block lab course with a minimum duration of 8 weeks.

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

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**Module coordinator**
chairperson of examination committee Biochemie (Biochemistry)

**Module offered by**
Chair of Biochemistry

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

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

a) log (approx. 20 pages) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation/talk (approx. 15 to 30 minutes)

Language of assessment: German or English

**Allocation of places**
--

**Additional information**
Additional information on module duration: block lab course with a minimum duration of 8 weeks.

**Referred to in LPO I**
(examination regulations for teaching-degree programmes)
--
### Module title
Practical lab course 3

### Abbreviation
08-MBC-LP3-122-m01

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

### Module offered by
Chair of Biochemistry

### ECTS
10

#### Method of grading
(Not) successfully completed

#### Duration
1 semester

#### Module level
Graduate

#### Other prerequisites
--

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

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

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

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

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

a) Log (approx. 20 pages) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation/talk (approx. 15 to 30 minutes)

Language of assessment: German or English

### Allocation of places
--

### Additional information

Additional information on module duration: block lab course with a minimum duration of 6 weeks.

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

--
Module title  | Abbreviation
---|---
Practical lab course 4 | 08-MBC-LP4-122-m01

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

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Contents

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

Intended learning outcomes

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

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

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

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

a) log (approx. 20 pages) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation/talk (approx. 15 to 30 minutes)

Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: block lab course with a minimum duration of 6 weeks.

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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<tr>
<td>Practical lab course 5</td>
<td>08-MBC-LP5-122-m01</td>
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<td>chairperson of examination committee Biochemie (Biochemistry)</td>
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<tbody>
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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

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

<table>
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<th>Method of assessment</th>
<th>(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)</th>
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<tr>
<td>a) log (approx. 20 pages) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation/talk (approx. 15 to 30 minutes)</td>
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### Allocation of places

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### Additional information

Additional information on module duration: block lab course with a minimum duration of 3 weeks.

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

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Module title | Abbreviation
---|---
Practical lab course 6 | 08-MBC-LP6-122-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 | graduate | --

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

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

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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
a) log (approx. 20 pages) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation/talk (approx. 15 to 30 minutes)
Language of assessment: German or English

Allocation of places
--

Additional information
Additional information on module duration: block lab course with a minimum duration of 3 weeks.

Referred to in LPO I (examination regulations for teaching-degree programmes)
--
### Module title
**Life cycle of proteins**

### Abbreviation
08-MBC-LCP-122-m01

### Module coordinator
holder of the Chair of Biochemistry

### Module offered by
Chair of Biochemistry

### ECTS
5

### Method of grading
numerical grade

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

### Duration
1 semester

### Module level
graduate

### Other prerequisites
--

### Contents
The module imparts detailed and in-depth the current state of science in the field of research on the regulation and control of the entire life cycle of proteins.

### Intended learning outcomes
After participating in the module events, the student is familiar with the course contents and is able to transfer them to new scientific problems. He/She is able to classify new research results in the context of recent findings and to assess their significance.

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

### Method of assessment
(a) 1 to 3 written examinations (1 written examination: approx. 60 minutes; 2 written examinations: approx. 45 minutes each; 3 written examinations: approx. 40 minutes each) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or e) presentation/talk (approx. 15 to 30 minutes)

### Language of assessment
German or English

### Allocation of places
--

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

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### Literature seminar 1

**Module title:** Literature seminar 1  
**Abbreviation:** 08-MBC-LIT1-122-m01

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<tr>
<th><strong>Module coordinator</strong></th>
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</table>

**Contents**

Participants deliver presentations on a topic in the life sciences (to be pre-agreed with lecturer). Those presentations will discuss publications in the relevant field and will be followed by critical discussions of those publications.

**Intended learning outcomes**

Students are able to summarise publications on a topic in the life sciences and deliver presentations of those publications to the scientific community. They have practised engaging critically with scientific literature and situating that literature within the context of the current state of research in the relevant field.

**Courses**

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

**Method of assessment**

presentation/talk (approx. 15 to 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)

--
## Literature seminar 2

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

### Module offered by
Chair of Biochemistry

### ECTS
5

### Method of grading
Numerical grade

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

### Duration
1 semester

### Module level
Graduate

### Other prerequisites
--

### Contents
Participants deliver presentations on a topic in the life sciences (to be pre-agreed with lecturer). Those presentations will discuss publications in the relevant field and will be followed by critical discussions of those publications.

### Intended learning outcomes
Students are able to summarise publications on a topic in the life sciences and deliver presentations of those publications to the scientific community. They have practised engaging critically with scientific literature and situating that literature within the context of the current state of research in the relevant field.

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

### Method of assessment
Presentation/talk (approx. 15 to 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 1
(examination regulations for teaching-degree programmes)

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<table>
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<td>Macromolecular Crystallography</td>
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</table>

**Contents**

Comprising a lecture, an exercise and a seminar, this module discusses cloning and the expression of protein constructs for crystallisation. It teaches students the fundamental principles and techniques of crystallisation and crystal optimisation as well as crystallographic data collection.

**Intended learning outcomes**

Students have developed an understanding of the method of selecting protein constructs for crystallisation. They have learned the theoretical foundations of, as well as key skills and techniques for, protein crystallisation and data collection/processing. They are able to write up, reflect upon and discuss the results obtained.

**Courses**

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

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

a) 1 to 3 written examinations (1 written examination: approx. 60 minutes; 2 written examinations: approx. 45 minutes each; 3 written examinations: approx. 40 minutes each) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or e) presentation/talk (approx. 15 to 30 minutes)

Assessment offered: once a year

Language of assessment: German or English

**Allocation of places**

--

**Additional information**

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

--
Module title
Mass-Spectrometry and Proteomics

Abbreviation
08-MBC-MSP-142-m01

Module coordinator
holder of the Chair of Biochemistry

Module offered by
Chair of Biochemistry

ECTS
5

Method of grading
numerical grade

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

Duration
1 semester

Module level
graduate

Other prerequisites
--

Contents
This module comprises a lecture, a seminar and a lab course. The lecture will discuss the theoretical principles of, and essential methods for, the mass spectrometry of biomolecules. In the seminar, students will become familiar with different software packages and the fundamental principles of the analysis of mass spectrometry data. The lab course will give students the opportunity to independently apply to practical experiments what they have learned in theory.

Intended learning outcomes
Students have learned the theoretical foundations of mass spectrometry protein and proteomic analysis and are able to work with software tools for the analysis of mass spectrometry data. They have learned the steps involved in the procedure - from sample preparation through to mass spectrometry protein analysis - and have gained an insight into how to operate a nanoHPLC-coupled mass spectrometer.

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

Method of assessment
a) written examination (approx. 60 minutes) or Biochemie (Biochemistry): b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or e) presentation/talk (approx. 15 to 30 minutes)

Language of assessment: German, English

Allocation of places
Biochemistry Master's: 6 places. Places will be allocated by lot.

Additional information
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Referred to in LPO I
(examination regulations for teaching-degree programmes)
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<th>Module title</th>
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**Contents**

Fundamentals of molecular microbiology and infection biology, mechanisms of adherence and invasion, bacterial pathogenicity factors, regulation of virulence, mechanisms of host defence and pathogen interference, current methods in infection biology.

**Intended learning outcomes**

The students are able to understand fundamental theories of molecular microbiology and infection biology, emergence of infectious diseases.

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

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

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

Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) oral examination of one candidate each (30 to 60 minutes) or c) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)

**Allocation of places**

Biology Master’s: no restrictions. Biochemistry Master’s: 15 places. Places will be allocated by lot.

**Additional information**

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

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<table>
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<td>1 semester</td>
<td>graduate</td>
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</table>

**Contents**

Fundamental principles of the mode of action of microbial pathogenicity factors will be presented using selected prokaryotic and eukaryotic pathogens as model organisms. In addition, current research methods in infection biology will be presented.

**Intended learning outcomes**

Students have gained fundamental knowledge in infection biology and pathogenicity research and the mechanisms behind infectious diseases.

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

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

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

Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) oral examination of one candidate each (30 to 60 minutes) or c) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)

**Allocation of places**

Biology Master's: no restrictions. Biochemistry Master's: 15 places. Places will be allocated by lot.

**Additional information**

--

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

--
### Module title
Modern Aspects of Natural Product Chemistry and Biological Chemistry

### Abbreviation
08-OCM-NAT-102-m01

### Module coordinator
Lecturer of the seminar

### 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
Graduate

### Other prerequisites
--

## Contents
This module discusses advanced topics in natural product chemistry and biological chemistry.

## Intended learning outcomes
Students are able to discuss advanced topics in natural product chemistry and biological chemistry.

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

### S

## Method of assessment
(a) 1 to 3 written examinations (60 or 90 minutes) or (b) oral examination of one candidate each (20 minutes) or (c) oral examination in groups (groups of 2, 30 minutes). Should there be the option to choose between several methods of assessment, the module coordinator will choose the method to be used for the module component in the current semester at the beginning of the course.

Language of assessment: German or English

## Allocation of places
Chemistry Master's: no restrictions. Biochemistry Master's: 20 places. Places will be allocated by lot.

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

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Subdivided Module Catalogue for the Subject
Biochemistry
Master's with 1 major, 120 ECTS credits

<table>
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<td>Molecular Biology for Biochemistry students</td>
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<tr>
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</table>

### 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)

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

- **03-GTBS-1-092**: V (no information on SWS (weekly contact hours) and course language available)
- **08-BC-MOL-1-122**: V + Ü (no information on SWS (weekly contact hours) and course language available)

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

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

**Assessment in module component 03-GTBS-1-092**: Genetic Engineering and Biosafety

- 1 ECTS, Method of grading: (not) successfully completed
- written examination (approx. 30 minutes)

**Assessment in module component 08-BC-MOL-1-122**: Molecular Biology Molecular Biology

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

### Allocation of places

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### Additional information

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

--
## Molecular Oncology

**Module title**
Molecular Oncology

**Abbreviation**
03-98-MVMO-122-m01

**Module coordinator**
holder of the Chair of Biochemistry and Molecular Biology

**Module offered by**
holder of the Chair of Biochemistry and Molecular Biology

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**Duration**
1 semester

**Module level**
graduate

**Other prerequisites**
--

### Contents
Molecular mechanisms of tumourigenesis; experimental dissection of tumours; metabolic reprogramming in cancer; visualising in vivo tumour progression and response to therapy; targeting Myc for tumour therapy; Wnt signalling and colorectal cancer; cell cycle and tumour suppressor genes; protein turnover in normal and cancer cells; molecular mechanisms of melanoma development; tumour immunology; stem cells and epigenetics; signal transduction and personalised cancer therapy; molecular pathology; infections and tumour development.

### Intended learning outcomes
Students understand the current topics and challenges in tumour research and the methods used to address such challenges.

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

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<thead>
<tr>
<th>Type</th>
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### Method of assessment
Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes).

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

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

**Intended learning outcomes**

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

**Courses**

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

**Method of assessment**

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

Assessment offered: once a year, winter semester

Language of assessment: German, English

**Allocation of places**

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

**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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<tbody>
<tr>
<td>Organo- and Biocatalysis</td>
<td>08-HKM1-102-m01</td>
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<th>Module offered by</th>
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<tbody>
<tr>
<td>lecturer of the seminar &quot;Organo- and Biokatalyse&quot;</td>
<td>Institute of Organic Chemistry</td>
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### Contents

This module provides students with deeper insights into topics in organic compounds and enzymes in catalytic processes. Organocatalysis: enantioselective implementation, principles, green chemistry, substance classes and application areas. Biocatalysis: effects of enzymes in view of different aspects, especially regarding organic synthesis.

### Intended learning outcomes

Students are able to categorise organocatalysts and explain their effects and areas of application. They can describe the structure and applications of enzymes in organic synthesis. They are able to mechanistically describe and analyse the effects of enzymes.

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

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

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

a) 1 to 3 written examinations (60 or 90 minutes) or b) oral examination of one candidate each (20 minutes) or c) oral examination in groups (groups of 2, 30 minutes). Should there be the option to choose between several methods of assessment, the module coordinator will choose the method to be used for the module component in the current semester at the beginning of the course.

Language of assessment: German or English

### Allocation of places

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### Additional information

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

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<table>
<thead>
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<td>Clinical and Analytical Chemistry (practical course)</td>
<td>08-PH-KACP-092-m01</td>
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<tr>
<td>lecturer of lecture &quot;Klinisch-analytische Chemie&quot; (Clinical and Analytical Chemistry)</td>
<td>Institute of Pharmacy and Food Chemistry</td>
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<td>1 semester</td>
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**Contents**

This module covers practical topics in clinical chemistry and clinical diagnostics as well as the related analytical methods.

**Intended learning outcomes**

Students have developed a knowledge of clinical analytical chemistry and are able to apply it to practical experiments.

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

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

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

examination talks (Testate, approx. 15 minutes each), log (approx. 5 to 10 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)

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<th><strong>Module title</strong></th>
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<td>Presentation of Scientific Data</td>
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<td>Coordinator BioCareers</td>
<td>Faculty of Biology</td>
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<td>1 semester</td>
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</table>

**Contents**

Principles for the preparation of scientific manuscripts, citations and the presentation of scientific data. Students will write a scientific mini review and present this in a talk (15 minutes). Content, structure, coherence and the logical chain of arguments will be discussed. Students will write and publish (where possible) a scientific paper or review on a selected topic in a scientific journal. The students' work will be based on original papers as well as on reviews and will follow the instructions of a scientific journal of the students' choice. These instructions can be found on the website of the respective journal under "Instructions to Authors" or similar. Both length of chapters and structure of the article should be based on the style of the journal selected. Attendance of no less than 20 scientific talks (e.g. defences of doctoral theses, presentations of research projects, retreats) including presentations by guest speakers. Students are to obtain proof of attendance from the organisers or speakers.

**Intended learning outcomes**

The students are familiar with the details of publishing scientific data in written and oral form. They have become familiar with the methodology of scientific publishing in oral or written fashion. In addition, they have enhanced their English reading, speaking and writing skills.

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

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

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

Students will be informed about the length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)

**Allocation of places**

Biology Master's: no restrictions. Biochemistry Master's: 10 places. Places will be allocated by lot.

**Additional information**

--

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

--
Module title: Protein quality control
Abbreviation: 08-MBC-PQK-122-m01

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

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Duration: 1 semester
Module level: graduate

Contents:
The module allows a deeper incorporation into the research methods and techniques in the field of protein degradation in eukaryotes in a practical course.

Intended learning outcomes:
After completing the module, the student masters the techniques used in the practical course. He/She is able to explain and to critically reflect the performed experiments, and to both present and discuss the results in a written report.

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

Method of assessment:
a) log (approx. 20 pages) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation/talk (approx. 15 to 30 minutes)
Assessment offered: once a year
Language of assessment: German or English

Allocation of places:
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Additional information:
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Referred to in LPO I (examination regulations for teaching-degree programmes):
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### Subdivided Module Catalogue for the Subject
Biochemistry

#### Master’s with 1 major, 120 ECTS credits

<table>
<thead>
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<th>Module title</th>
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<td>RNA worlds</td>
<td>08-MBC-RNAW-122-m01</td>
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<td>Chair of Biochemistry</td>
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### Contents

The module imparts detailed and in-depth the current state of science in the field of research on RNA-protein complexes, their structure and function, as well as the theoretical basics of current RNA-based research methods.

### Intended learning outcomes

After participating in the module events, the student is familiar with the course contents and is able to transfer them to new scientific problems. He/She is able to classify new research results in the context of recent findings and to assess their significance.

### Courses

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

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

### Method of assessment

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

a) 1 to 3 written examinations (1 written examination: approx. 60 minutes; 2 written examinations: approx. 45 minutes each; 3 written examinations: approx. 40 minutes each) or b) oral examination (one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or e) presentation/talk (approx. 15 to 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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Module title

Stem Cell Biology

Abbreviation

03-98-MVSZ-122-m01

Module coordinator

Institute of Medical Radiology and Cell Research (MSZ)

Module offered by

Faculty of Medicine

ECTS

5

Method of grading

numerical grade

Only after succ. compl. of module(s)

Duration

1 semester

Module level

graduate

Other prerequisites

--

Contents

In this module, current problems in the research areas of stem cell biology, cellular differentiation and regenerative medicine are discussed and specific solutions are taught.

Intended learning outcomes

Students have developed the ability to approach, analyse and critically interpret problems in stem cell biology, cellular differentiation and regenerative medicine, taking into account current literature.

Courses

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

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

Method of assessment

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

Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)

Allocation of places

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Additional information

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

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<table>
<thead>
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<td>Structure and function of RNA-protein complexes</td>
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<td>1 semester</td>
<td>graduate</td>
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</table>

**Contents**

The module allows a deeper incorporation into the research methods and techniques in the field of investigation of RNA-protein complexes in a practical course.

**Intended learning outcomes**

After completing the module, the student masters the techniques used in the practical course. He/She is able to explain and to critically reflect the performed experiments, and to both present and discuss the results in a written report.

**Courses**

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

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

**Method of assessment**

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

a) log (approx. 20 pages) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation/talk (approx. 15 to 30 minutes)

Assessment offered: once a year

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>
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<td>Laboratory animal sciences</td>
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### Module coordinator

Animal Welfare Officer of the University of Würzburg

### Module offered by

Faculty of Medicine

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

### Duration | Module level | Other prerequisites
---|--------------|----------------------------------
1 semester | undergraduate | Admission prerequisite to assessment: regular attendance of lab course as specified at the beginning of the course.

### Contents

Theoretical and practical basic knowledge of animal welfare legislation, animal welfare ethics and laboratory animal science.

### Intended learning outcomes

Students have the expertise to carry out or participate in animal experiments according to the guidelines of FELASA (Cat. B).

### Courses

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

### Method of assessment

written examination (approx. 60 minutes)

### 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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<td>Tissue Engineering / Functional Materials</td>
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<tr>
<td>holder of the Chair of Tissue Engineering (University Hospital)</td>
<td>Faculty of Medicine</td>
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**Contents**

Cell culture techniques, fundamentals of tissue engineering, test systems as an alternative to animal experiments in skin, intestine, lung, trachea, kidney, blood-brain barrier, tumours and other diseases, development of cell-based transplants, regulatory fundamentals for approval of medical products and drugs. These are REACH (registration, evaluation, restriction and approval of drugs), medicine products law, GLP (good lab practice), GMP (good manufacturing practice), GCP (good clinical practice).

**Intended learning outcomes**

Students have developed a knowledge of cell biology, metabolism, differentiation, adhesion to surfaces, mechanobiology. They are familiar with the fundamental principles of tissue engineering and quality management.

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

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

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

Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)

**Allocation of places**

--

**Additional information**

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

--
### Module title

| Virology 1 | 03-MS2V1-122-m01 |

### Module coordinator

holder of the Chair of Virology

### Module offered by

Faculty of Medicine

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

### Duration | Module level | Other prerequisites
--- | --- | ---
1 semester | graduate | --

### Contents

This module will discuss contemporary topics in virology.

### Intended learning outcomes

Students are able to understand current problems in virology and to discuss these in detail.

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

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

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

Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) oral examination of one candidate each (30 to 60 minutes) or c) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)

### Allocation of places

Biochemistry Master's: 3 places. Places will be allocated by lot.

### Additional information

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

--
### Module title
Virology 2

### Abbreviation
03-MS2V2-122-m01

### Module coordinator
holder of the Chair of Virology

### Module offered by
Faculty of Medicine

### ECTS
10

### Method of grading
numerical grade

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

### Duration
1 semester

### Module level
graduate

### Other prerequisites
--

### Contents
This module will discuss contemporary topics in virology.

### Intended learning outcomes
Students are able to understand current problems in virology and to discuss these in detail.

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

### Method of assessment
Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) oral examination of one candidate each (30 to 60 minutes) or c) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)

### Allocation of places
Biochemistry Master’s: 3 places. Places will be allocated by lot.

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

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<table>
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<td>08-MCM3-102-m01</td>
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<td>Pharmazeutische Chemie (Pharmaceutical Chemistry)</td>
<td>Institute of Pharmacy and Food Chemistry</td>
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**Contents**

Fundamentals: drug targets (types and classification), target validation, effect mechanisms, protein-ligand interactions, lead finding; lead optimisation. Experimental methods: bioassays, HTS, combinatorial chemistry, naturally occurring substances. Theoretical methods: molecular modelling, structure-based drug design, pharmacophore models, docking, virtual screening, simulation methods, de novo design. Ligand-based drug design. QSAR. Predictions of pharmacokinetic and toxicological components (ADME). Case examples, prodrug strategies, bioisosterism, SAR.

**Intended learning outcomes**

The student masters theoretical and experimental methods and aspects of drug design.

**Courses**

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

**Method of assessment**

presentation with discussion (approx. 30 minutes)
Language of assessment: German or English

**Allocation of places**

Chemistry Master’s and Mathematics Master’s: no restrictions. Biochemistry Master’s: 10 places. Places will be allocated by lot.

**Additional information**

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**Referred to in LPO I**

(examination regulations for teaching-degree programmes)
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<td>chairperson of examination committee Biochemie (Biochemistry)</td>
<td>Chair of Biochemistry</td>
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<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
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<tbody>
<tr>
<td>1 semester</td>
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**Contents**

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

**Intended learning outcomes**

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

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

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

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

Preparing and supervising study groups: assessment to be successfully completed (type and length of assessment to be specified at the beginning of the course)

Language of assessment: German or English

**Allocation of places**

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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>Scientific lecturing M2</td>
<td>08-MBC-WR2-122-m01</td>
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<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
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<tbody>
<tr>
<td>chairperson of examination committee Biochemie (Biochemistry)</td>
<td>Chair of Biochemistry</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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