Subdivided Module Catalogue
for the Subject
Biomedicine
as a Bachelor’s with 1 major
with the degree "Bachelor of Science"
(180 ECTS credits)

Examination regulations version: 2018
Responsible: Faculty of Medicine
Responsible: Faculty of Biology
Course of Studies - Contents and Objectives

The subject Biomedicine is offered by the Faculties of Medicine and Biology at JMU as a fundamental science course with a Bachelor of Science degree (B.Sc., 180 ECTS credits) as part of a consecutive study programme model (B.Sc/M.Sc).

After the successful completion graduates have gained:

- an overview of Sciences, particularly Life Sciences
- deep understanding of the molecular and cellular processes in the human body including disease-driven processes
- the ability to experimentally address biomedical questions
- competencies in solid handling of scientific literature and data, as well as in critical analysis of biomedical content
- presentation and communication
Abbreviations used

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

Term: SS = summer semester, WS = winter semester

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

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

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

Conventions

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

Notes

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

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

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

In accordance with

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

ASPO2015

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

24-Nov-2016 (2018-6)

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

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<td>Statistics for Students of natural sciences and biomedicine</td>
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<td>03-98-PZB1-172-m01</td>
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Advanced Compulsory Electives (15 ECTS credits)
Students may also take modules from the areas "Zellbiologie, Genetik und Bioinformatik" ("Cell Biology, Genetics and Bioinformatics") and "Infektion und Immunologie" ("Infection and Immunity").

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<tr>
<th>Code</th>
<th>Module Description</th>
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<td>Introduction to Methods in Experimental Biomedicine</td>
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<td>Concepts in Immunology</td>
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Key Skills Area (20 ECTS credits)

General Key Skills (5 ECTS credits)
In the area of general transferable skills, students may choose from the modules offered as part of the pool of general transferable skills (ASQ) of the University of Würzburg.

Subject-specific Key Skills (15 ECTS credits)

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<td>Laboratory Animal Sciences 2</td>
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<td>03-TM-BSTAT-181-m01</td>
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<td>03-98-FSQ-MB1-182-m01</td>
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<td>Selected Courses from Biology and Medicine 2</td>
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<td>Journal Club 1</td>
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### Subdivided Module Catalogue for the Subject Biomedicine

Bachelor's with 1 major, 180 ECTS credits

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**Thesis (15 ECTS credits)**

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<th>Module coordinator</th>
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<tr>
<td>Dean of Studies Biologie (Biology)</td>
<td>Faculty of Biology</td>
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<th>Module level</th>
<th>Other prerequisites</th>
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<td>1 semester</td>
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<td>Admission prerequisite to assessment: exercises. Regular attendance (minimum 80%) and successful completion of exercises (approx. 25 to 30 hours) are prerequisites for admission to assessment.</td>
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**Contents**

In this module, students will acquire theoretical and practical background knowledge on animal developmental biology. The following topics will be covered: early embryonic development of various model organisms (amphibians, nematodes, Drosophila, mouse) and relevance for the systematics of animals, gametogenesis (production of spermatozoa and ova), differential gene expression, cell growth and molecular regulation of cell development, organogenesis, pattern formation, carcinogenesis, stem cell research and cloning, metamorphosis (amphibians, insects), eco-devo, evo-devo.

**Intended learning outcomes**


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

V (1) + Ü (3)

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

written examination (approx. 60 minutes)
creditable for bonus

**Allocation of places**

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**Additional information**

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

§ 61 I Nr. 5
Module title | Abbreviation
--- | ---
**Basics of Biology - From Cells to Organisms** | 07-ZEORG-152-m01

**Module coordinator**
Dean of Studies Biologie (Biology)

**Module offered by**
Faculty of Biology

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**Duration**
1 semester

**Module level**
undergraduate

**Other prerequisites**
Admission prerequisite to assessment: exercises. Regular attendance of exercises (minimum 80%) and successful completion of the respective exercises (approx. 25 to 30 hours) are prerequisites for admission to assessment.

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

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

**Courses** (type, number of weekly contact hours, language — if other than German)
V (1.5) + V (1.5) + V (2) + Ü (3)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
written examination (approx. 60 minutes) creditable for bonus

**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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<tbody>
<tr>
<td>Physiology of Organisms</td>
<td>07-PHYORG-152-m01</td>
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<thead>
<tr>
<th>Module coordinator</th>
<th>Module offered by</th>
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<tbody>
<tr>
<td>Dean of Studies Biologie (Biology)</td>
<td>Faculty of Biology</td>
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<th>Other prerequisites</th>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
<td>Admission prerequisite to assessment: exercises. Regular attendance of exercises (minimum 80%) and successful completion of the respective exercises (approx. 25 to 30 hours) are prerequisites for admission to assessment.</td>
</tr>
</tbody>
</table>

**Contents**

This module will acquaint students with the principles of the general and comparative physiology of organisms and will provide them with an opportunity to develop the fundamental skills for working in a physiological laboratory. The module will first address the biochemistry of the cell and will then move on to discuss prokaryotic metabolic diversity. Subsequently, the module will discuss the physiological processes that regulate the internal environment of multicellular organisms such as plants and animals.

**Intended learning outcomes**

Students have developed an understanding of the physiological functions and regulation of organisms. They have acquired fundamental knowledge on planning, setup, interpretation and presentation of scientific results.

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

V (1) + V (1) + V (1) + Ü (2)

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

written examination (approx. 60 minutes) creditable for bonus

**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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<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
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<td>Genetics and Neurobiology</td>
<td>07-GENEU-152-m01</td>
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<tbody>
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<td>holder of the Chair of Neurobiology and Genetics</td>
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<tr>
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<td>Admission prerequisite to assessment: exercises. Regular attendance of exercises (minimum 80%) and successful completion of the respective exercises (approx. 25 to 30 hours) are prerequisites for admission to assessment.</td>
</tr>
</tbody>
</table>

**Contents**

Fundamental principles of genetics and neurobiology.

**Intended learning outcomes**

Students will understand that there are molecular, cellular and system biological mechanisms and processes involved in animal behaviour and will be able to relate animal behaviour to the molecular and formal bases of inheritance.

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

V (2) + Ü (1.5)

**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 (60 to 90 minutes) creditable for bonus

**Allocation of places**

--

**Additional information**

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

--
### Module title
General Chemistry for Students of Biomedicine

### Abbreviation
08-CH-BM-152-m01

### Module coordinator
Dean of Studies Chemie (Chemistry)

### Module offered by
Institute of Organic Chemistry

### ECTS
8

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

### Duration
2 semester

### Module level
undergraduate

### Other prerequisites
--

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

Das Modul vermittelt die Grundlagen der Anorganischen sowie der Organischen Chemie. Im Praktikum lernen die Studierenden zudem grundlegende Arbeitstechniken kennen und führen einfache Versuche selbst durch.

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


### Courses (type, number of weekly contact hours, language — if other than German)
V (2) + V (2) + P (5)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
written examination (approx. 120 minutes) and assessment of practical skills during lab course (ungraded): Vor- testate/Nachtestate (pre and post-experiment oral exams; approx. 15 minutes each) and log (approx. 3 to 5 pages)

Assessment offered: Once a year, summer semester

### Allocation of places
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### Additional information
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### Referred to in LPO I (examination regulations for teaching-degree programmes)
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<table>
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<td>Advanced Organic Chemistry for Students of Biomedicine</td>
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<th>Module offered by</th>
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<tr>
<td>lecturer of lecture &quot;Organische Chemie für Studierende der Medizin, Biomedizin, Zahnmédizin, Ingenieur- und Naturwissenschaften&quot;</td>
<td>Institute of Organic Chemistry</td>
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<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</table>

### Contents

The module will equip students with the basics of organic chemistry.

### Intended learning outcomes

German intended learning outcomes available but not translated yet.

Der/Die Studierende verfügt über grundlegende Kenntnisse der Organischen Chemie und kann diese auf wissenschaftliche Fragestellungen anwenden.

### Courses

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

V (3)

### Method of assessment

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

a) written examination (90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (approx. 30 minutes)

### Allocation of places

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### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

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<table>
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<th>Module title</th>
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<tr>
<td>Introduction to Physics for Students of other Disciplines</td>
<td>11-EFNF-152-m01</td>
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**Module coordinator**
Managing Director of the Institute of Applied Physics

**Module offered by**
Faculty of Physics and Astronomy

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**Duration**
2 semester

**Module level**
undergraduate

**Other prerequisites**
--

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

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

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

V (4) + V (3)

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

written examination (60 to 120 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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<table>
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<td>Laboratory Course Physics for Students of other Disciplines</td>
<td>11-PFNF-152-m01</td>
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<td>Managing Director of the Institute of Applied Physics</td>
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<td>1 semester</td>
<td>undergraduate</td>
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</table>

**Contents**

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

**Intended learning outcomes**

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

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

P (4)

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

a) practical assignment with oral test (approx. 15 minutes, during experiments) and b) written examination (90 minutes).

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

**Allocation of places**

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

**Additional information**

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

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<table>
<thead>
<tr>
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<th>Abbreviation</th>
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<tbody>
<tr>
<td>Statistics for Students of natural sciences and biomedicine</td>
<td>10-M-STAB-152-m01</td>
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<tbody>
<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</table>

**Contents**

**Intended learning outcomes**
The student is able to utilise basic statistical methods for the evaluation of data and interpret the results.

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

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

**Allocation of places**
--

**Additional information**
--

**Referred to in LPO I** (examination regulations for teaching-degree programmes)
--
## Module title
### Basic Biochemistry and Molecular Biology

### Abbreviation
03-98-BCH-152-m01

### Module coordinator
holders of the Chairs of Physiological Chemistry, Developmental Biochemistry, Biochemistry and Molecular Biology

### Module offered by
Faculty of Medicine

### ECTS
10

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

### Numerical grade
--

### Duration
2 semester

### Module level
undergraduate

### Other prerequisites
Admission prerequisite to assessment: presentations.

### Contents

### Intended learning outcomes
Students gain an understanding of the foundations of human biochemistry and molecular biology. They develop the ability to prepare and present material on selected topics. They are proficient in the reproducible collection of simple biochemical and molecular biological data.

### Courses
(type, number of weekly contact hours, language — if other than German)
V (5) + S (4) + Ü (4)

### 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 (45 to 90 minutes)
creditable for bonus

### Allocation of places
--

### Additional information
--

### Referred to in LPO I
(examination regulations for teaching-degree programmes)
--
Module title | Advanced Biochemistry and Molecular Biology
---|---
Abbreviation | 03-98-BCHF-152-m01

| Module coordinator | holders of the Chairs of Physiological Chemistry, Developmental Biochemistry, Biochemistry and Molecular Biology |
| ECTS | 10 |
| Method of grading | Only after succ. compl. of module(s) |
| Duration | 1 semester |
| Module level | undergraduate |
| Other prerequisites | Admission prerequisite to assessment: presentations. |

Contents

Enhanced insight into functional biochemical and molecular biological relationships. Examples of the molecular control of cell and organ functions. Application of molecular biology and genetic engineering methods to investigate cellular parameters such as gene expression patterns, protein expression or growth and apoptosis. Review of current literature on selected topics.

Intended learning outcomes

Students gain an advanced knowledge of functional biochemistry and molecular biology. They develop an understanding of the driving forces of normal and misguided cell functions and acquire practical routine in circumscribed experiments. Students gain an insight into the critical interpretation of experimental data.

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

V (4) + S (1) + Ü (6)
Module taught in: German and/or English

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 (60 to 90 minutes). If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (20 to 30 minutes) or an oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate). creditable for bonus
<table>
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<tr>
<td>Anatomy and Cell Biology</td>
<td>03-98-ANA-1-152-m01</td>
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<tbody>
<tr>
<td>Institute of Anatomy and Cell Biology</td>
<td>Faculty of Medicine</td>
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<tr>
<td>1 semester</td>
<td>undergraduate</td>
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</table>

**Contents**

Gross anatomy: musculoskeletal system, cranium, respiratory system, cardiovascular organs, digestive organs, urinary organs, sexual organs, brain. Introduction to cytology and histology.

**Intended learning outcomes**

The students have developed a fundamental knowledge of general microscopic as well as macroscopic anatomy.

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

V (3) + S (2) + Ü (2)

**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 (60 to 90 minutes)

Assessment offered: Once a year, winter semester

**Allocation of places**

--

**Additional information**

--

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

--
### Module title
**Histology**

### Abbreviation
03-98-ANA-2-152-m01

### Module coordinator
Institute of Anatomy and Cell Biology

### Module offered by
Faculty of Medicine

### ECTS
5

### Method of grading
numerical grade

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

### Duration
1 semester

### Module level
undergraduate

### Other prerequisites
--

### Contents
Foundations of general cytology and histology. General and special microscopic anatomy (histology) of the digestive, cardiovascular, respiratory and urogenital organs and endocrine glands, central and peripheral nervous system (microscopy of tissue sections and practical exercises), fundamentals of histopathology.

### Intended learning outcomes
The students have developed a fundamental knowledge of general and special microscopic anatomy.

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

**V (1) + P (5)**

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

Written examination (approx. 60 minutes) and assessment of practical skills (approx. 60 minutes), weighted 1:2

Assessment offered: Once a year, summer semester

### Allocation of places
--

### Additional information
--

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

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## General Pathology

<table>
<thead>
<tr>
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<td>General Pathology</td>
<td>03-98-APA-152-m01</td>
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### Module coordinator
holder of the Chair of Pathology

### Module offered by
Faculty of Medicine

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### Duration
1 semester  

### Module level
undergraduate

### Other prerequisites
--

### Contents
General and special pathology: pathology of cell damage, classification of inflammation, immunopathology, tumour pathology, examples of important organ diseases.

### Intended learning outcomes
The students are familiar with the fundamental principles of general pathology and methods of pathology such as morphological, immunohistochemical, cytogenetic and molecular analyses. They have acquired a first insight into the pathogenesis, histopathology, macroscopic pathology and clinicopathologic correlations of cancer, inflammation, metabolic disorders and organ diseases.

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

| V (3) + P (1) |

### 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 (60 to 90 minutes) and successful completion of practical exercises (ungraded)

### 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>Human Physiology 1</td>
<td>03-98-PHY1-152-m01</td>
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<tbody>
<tr>
<td>holders of the Chairs of Cardiovascular Physiology and Neurophysiology</td>
<td>Faculty of Medicine</td>
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<td>1 semester</td>
<td>undergraduate</td>
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</table>

**Contents**

Fundamental principles of physiology and pathophysiology 1: functionality of the cardiovascular system - part I and II, electrocardiogram, membrane physiology, mechanics of breathing, kidney function and electrolyte balance, acid-base balance.

**Intended learning outcomes**

Students gain a fundamental knowledge of human physiology and pathophysiology. They develop the ability to understand physiological principles and learn to conduct functional analyses of physiological processes.

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

V (3) + Ü (2)

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

written examination (approx. 60 minutes)

Assessment offered: Once a year, winter semester

**Allocation of places**

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**Additional information**

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

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<td>Human Physiology 2</td>
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<td>holders of the Chairs of Cardiovascular Physiology and Neurophysiology</td>
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</table>

**Contents**

Fundamental principles of physiology and pathophysiology 2: functions of blood, energy balance and carbohydrate metabolism, exercise physiology, nerves and muscles - part I and II, hearing and vestibular apparatus, eyes and vision.

**Intended learning outcomes**

Students gain an advanced knowledge of human physiology and pathophysiology. They are able to understand physiological principles and to conduct functional analyses of physiological processes.

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

V (3) + Ü (2)

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

written examination (approx. 60 minutes)
Assessment offered: Once a year, summer semester

**Allocation of places**

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**Additional information**

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

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<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tr>
<td>Pharmacology and Toxicology</td>
<td>03-98-APT-152-m01</td>
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<tbody>
<tr>
<td>holder of the Chair of Pharmacology and Toxicology</td>
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<tr>
<td>1 semester</td>
<td>undergraduate</td>
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### Contents

General pharmacology and toxicology, principles of pharmacodynamics and pharmacokinetics, drugs influencing the autonomous and central nervous systems, cardiovascular pharmacology, diuretics, anti-coagulative drugs, drugs affecting the gastrointestinal tract, analgesic drugs, hormonal treatment, drugs used in the treatment of infections and cancer, immune suppressive drugs, toxins, treatment of intoxication.

### Intended learning outcomes

Students have acquired a fundamental knowledge of general principles in pharmacology and toxicology. They have acquired specific knowledge of each named drug class, their mechanisms of action, basal pharmacokinetic properties and their most relevant side effects.

### Courses

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

| V (5) |

### Method of assessment

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

written examination (45 to 60 minutes).
If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (20 to 30 minutes) or an oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate).

### 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>General Microbiology, Virology, Immunology</td>
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<tr>
<td>holder of the Chair of Microbiology, holder of the Chair of Virology, holder of the Chair of Immunology</td>
<td>Faculty of Medicine</td>
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</table>

**Contents**

Foundations of virology, microbiology, immunology - part virology: virus families and selected topics; part microbiology: bacteriology, mycology and parasitology; part immunology: tasks, principles and components of the immune system, evolution.

**Intended learning outcomes**

The students will be introduced to scientific questions in virology, microbiology and immunology. They will acquire fundamental knowledge in these three subjects.

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

V (1.5) + V (1.5) + V (1.5)

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

written examination (approx. 90 minutes).

If announced by the lecturer at the beginning of the course, the written examination may be replaced by an oral examination of one candidate each (20 to 30 minutes) or an oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate).

**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>Module title</th>
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<td>Other prerequisites</td>
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</table>

**Contents**

Project work in a research laboratory focusing on training in new methods and the in-depth analysis of a scientific problem. This project may lay the foundation for a subsequent Bachelor's thesis.

**Intended learning outcomes**

Performing more complex experiments with sequential methods. Students gain an insight into new areas of research based on current literature and knowledge transfer.

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

R (12)

Module taught in: German/English

**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 (20 to 30 minutes) as well as log (10 to 15 pages) or, where applicable, project proposal (approx. 5 pages)

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: Introduction to Genetics and Human Genetics
Abbreviation: 03-98-PGH-152-m01

Module coordinator:
holder of the Chair of Clinical Biochemistry and Pathobiology
holder of the Chair of Neurobiology and Genetics
Research Center for Infectious Diseases

Module offered by:
Faculty of Medicine

ECTS:
5

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

Numerical grade:
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Duration:
1 semester

Module level:
undergraduate

Other prerequisites:
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Contents:

Intended learning outcomes:
Students will acquire a fundamental knowledge of human, trypanosome and Drosophila genetics as well as molecular genetic diagnostics and genetic counselling. They will develop an advanced knowledge of the genetics of selected diseases.

Courses (type, number of weekly contact hours, language — if other than German):
V (2) + Ü (3)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus):
written examination (30 to 90 minutes) and successful completion of exercises (ungraded), oral test during experiments (approx. 15 minutes) and written examination (90 minutes). Each experiment comprises preparation, performance and evaluation. Test as well as performance of experiments can each be repeated once.

Allocation of places:
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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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<thead>
<tr>
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<td>Introduction to Bioinformatics</td>
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<td>1 semester</td>
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</table>

**Contents**
Fundamental principles of bioinformatics.

**Intended learning outcomes**
Students are proficient in methods for the analysis of DNA and protein databases.

**Courses** (type, number of weekly contact hours, language — if other than German)
V (0.5) + Ü (4)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
a) written examination (45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (20 to 30 minutes).
Students will be informed about the type and length of assessment at the beginning of the course.

**Allocation of places**
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**Additional information**
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**Referred to in LPO I** (examination regulations for teaching-degree programmes)
--
# Practical Course in Immunology and Virology

**Module title**: Practical Course in Immunology and Virology  
**Abbreviation**: 03-98-PIV-152-m01  
**Module coordinator**:  
**Module offered by**: Faculty of Medicine  
**ECTS**: 5  
**Method of grading**: Only after succ. compl. of module(s)  
**Numerical grade**: --  
**Duration**: Module level  
**Other prerequisites**: undergraduate  

### Contents

Part immunology: how antigen recognition, uptake and presentation by dendritic cells lead to induction of activation markers, transcription factors, cytokines and proliferation of CD4+ T lymphocytes. Part virology: fundamental methods to demonstrate viral infections and to recognise viral pathogenesis using the microscope.

### Intended learning outcomes

Section immunology: The students acquire theoretical and practical knowledge about mechanisms that cells of the innate immune system use to sense pathogens and how this information is translated in the activation of T lymphocytes. They learn fundamental techniques of sterile cell culture, flow cytometry and confocal microscopy analysis techniques and ELISA. Section virology: Practical knowledge about the detection of viral infections and pathogenetic alterations following viral infections.

### Courses

P (5) + S (1)  
Module taught in: German / English  

### Method of assessment

a) written examination (45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (20 to 30 minutes).  
Students will be informed about the type and length of assessment at the beginning of the course.

### Allocation of places

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### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)  
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**Module title**  
Practical Course in Molecular Infection Biology

**Abbreviation**  
03-98-PMIB-152-m01

**Module coordinator**  
Institute of Molecular Infection Biology

**Module offered by**  
Faculty of Medicine

**ECTS**  
5

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

**Duration**  
undergraduate

**Module level**

**Other prerequisites**

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**Contents**

Fundamental principles of the interaction of bacterial pathogens and multicellular parasites with host organisms; invasion of mammalian cells by intracellular bacteria as well as the regulation and mode of action of bacterial virulence factors; fundamental principles of microbial diagnostics.

**Intended learning outcomes**

Students will acquire theoretical and practical knowledge on bacterial virulence factors, their regulation and mode of action in the context of infectious disease, including the invasion of eukaryotic host cells by bacterial pathogens and the multiplication and persistence of bacteria within host cells. The students will learn fundamental principles of the cultivation of bacteria and multicellular parasites under laboratory conditions as well as the utilisation of these cultivation systems for the development of novel antinfectives. The students will learn the principles of microbial diagnostics, including microbial cultivation as well as DNA-based, microscopical, serological and physiological methods of diagnostic differentiation.

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

P (5) + S (1)  
Module taught in: German / English

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

a) written examination (45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (20 to 30 minutes).  
Students will be informed about the type and length of assessment at the beginning of the course.

**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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<tr>
<td>holder of the Chair of Pharmacology and Toxicology</td>
<td>Faculty of Medicine</td>
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</table>

**Contents**

Fundamental pharmacological and toxicological techniques: membrane preparation, radioligand binding, pharmacology of the heart, cell culture and transfection, assessment of DNA damage by micro adducts, comet-assay etc.

**Intended learning outcomes**

At the end of the course, students will be able to perform routine pharmacological and toxicological techniques. They will also be able to perform microscopic analyses of samples, the functional characterisation of selected target proteins and cell toxicity analyses.

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

P (3) + S (1)

Module taught in: German / English

**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 of practical work (approx. 30 minutes) and application (preparing a scientific publication; approx. 1.5 hours), weighted 7:3

**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: Pathophysiology and Pathobiochemistry

Abbreviation: 03-98-PPC-152-m01

Module coordinator:
holder of the Professorship Clinical Biochemistry at the Rudolf Virchow Center for Experimental Biomedicine

Module offered by:
Faculty of Medicine

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

Duration: 1 semester
Module level: undergraduate
Other prerequisites:

Contents:
The lecture series will cover the pathobiochemistry and pathophysiology of selected diseases from nephrology, cardiology, endocrinology, pneumology, psychiatry and aspects of clinical molecular biology. The focus is on the biochemical and molecular causes of these diseases and the challenges for respective clinical diagnosis, treatment and translational research.

Intended learning outcomes:
Students gain an understanding of how knowledge of pathobiochemical and pathophysiological disease processes translates into clinical diagnosis and treatment.

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

V (3) + V (1)
Module taught in: German/English

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

a) written examination (45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (20 to 30 minutes).

Students will be informed about the type and length of assessment 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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Module title | Abbreviation
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Introduction to Methods in Experimental Biomedicine | 03-98-RVZ-152-m01

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

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Contents

Fundamental knowledge and analytical approaches of experimental biomedicine are taught based on selected questions of platelet physiology and megakaryopoiesis. Emphasis is put on the generation and use of antibodies. Transgenic mouse models are used to elucidate the interplay underlying (patho-)physiological processes.

Intended learning outcomes

Students have developed the ability to approach, analyse and interpret experimental data obtained with the help of monoclonal antibodies, in particular in the field of platelet physiology. They also have developed skills in experimental design, bench work, data analysis and the interpretation of scientific literature as well as the presentation of scientific results in English.

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

P (6)

Module taught in: German/English

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

a) written examination (45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (20 to 30 minutes).

Students will be informed about the type and length of assessment 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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<td>Dean of Studies Biomedizin (Biomedicine)</td>
<td>Faculty of Medicine</td>
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</table>

**Contents**

Working in a research laboratory under individual supervision. The topic will vary according to the lab selected.

**Intended learning outcomes**

Students expand their repertoire of experimental methods and learn how to critically examine experimental data. They become familiar with workflows and organisational patterns in research laboratories.

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

P (6)

Module taught in: German/English

**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)

practical assignment with presentation (approx. 10 minutes) and log (approx. 10 pages)

Language of assessment: German or English

**Allocation of places**

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**Additional information**

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

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<td>Genetic Engineering and Biosafety</td>
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<td>holder of the Chair of Molecular Infection Biology</td>
<td>Faculty of Medicine</td>
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<td>1 semester</td>
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</table>

**Contents**

Theoretical foundations of genetic engineering and genetic engineering safety regulations; applications of genetic engineering.

**Intended learning outcomes**

The students are familiar with methods of genetic engineering as well as relevant legal provisions regarding genetic engineering safety and biomaterials.

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

V (1)

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

a) written examination (45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (20 to 30 minutes).

Students will be informed about the type and length of assessment at the beginning of the course.

**Allocation of places**

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**Additional information**

Students MUST take this module.

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

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<td>Animal Welfare Officer of the University of Würzburg</td>
<td>Faculty of Medicine</td>
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<td>1 semester</td>
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**Contents**
Theoretical basic knowledge of animal welfare legislation, animal welfare ethics and laboratory animal science.

**Intended learning outcomes**
Students have the theoretical expertise to carry out or participate in animal experiments.

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

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

**Allocation of places**
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**Additional information**
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<td>holder of the Chair of Experimental Biomedicine and Animal Welfare Officer of the University of Würzburg</td>
<td>Faculty of Medicine</td>
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**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** (type, number of weekly contact hours, language — if other than German)

V (2) + P (1)

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

written examination (approx. 90 minutes)

**Allocation of places**

--

**Additional information**

Equivalent to animal welfare qualification (GV-SOLAS (Society of Laboratory Animals) / FELASA category B).

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

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<td>03-98-FSQ-LIT1-152-m01</td>
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**Contents**

Students present selected recent publications and discuss their contents, methods and results within the group.

**Intended learning outcomes**

Students acquire the ability to critically read scientific literature, draw their own conclusions and to evaluate the results.

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

S (1)

Module taught in: German/English

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

presentation (approx. 15 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
Journal Club 2

### Abbreviation
03-98-FSQ-LIT2-152-m01

### Module coordinator
holder of the Chair of Experimental Biomedicine

### Module offered by
Faculty of Medicine

### ECTS
2

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

### (not) successfully completed
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### Duration
2 semester

### Module level
undergraduate

### Other prerequisites
--

### Contents
Students present selected recent publications and discuss their contents, methods and results within the group.

### Intended learning outcomes
Students acquire the ability to critically read scientific literature, draw their own conclusions and to evaluate the results.

### Courses (type, number of weekly contact hours, language — if other than German)
S (1)

### Module taught in: German/English

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
presentation (approx. 15 minutes)
Language of assessment: German or English

### Allocation of places
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### Additional information
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**Module coordinator**
Dean of Studies Biomedizin (Biomedicine)

**Module offered by**
Faculty of Medicine

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**Duration**
1 semester

**Module level**
undergraduate

**Contents**
Field trip to selected institutions or companies that are relevant to the life sciences.

**Intended learning outcomes**
Students make contact with industry and other potential employers.

**Courses** (type, number of weekly contact hours, language — if other than German)
E (1)

**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)
report (1 to 2 pages)

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

Field trip to selected institutions or companies that are relevant to the life sciences.

**Intended learning outcomes**

Students make contact with industry and other potential employers.

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

- E (1)

**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)

- Report (1 to 2 pages)

**Allocation of places**

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**Additional information**

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

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### Contents
Students spend 2 weeks at a laboratory and participate in routine work.

### Intended learning outcomes
Students gain first insights into routine lab work and acquire new practical skills.

### Courses (type, number of weekly contact hours, language — if other than German)
P (2)

### 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 (5 to 10 pages)

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

Students spend 2 weeks working on a small, well-defined scientific lab project.

**Intended learning outcomes**

Students reinforce previously acquired lab skills, acquire new lab techniques and learn how to apply theoretical knowledge in the lab. Students gain expertise in the analysis and presentation of raw data.

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

P (4)

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

Log (5 to 10 pages)

**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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### Laboratory Course in Biomedical Research 2

**Abbreviation:** 03-98-FSQ-F2PR2-152-m01

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**Module coordinator:** Dean of Studies Biomedizin (Biomedicine)

**Module offered by:** Faculty of Medicine

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**Duration:**
undergraduate

**Other prerequisites:**
May be combined neither with 03-98-FSQ-F2PR1 nor with 03-98-FSQ-F2PR3.

**Contents**

Students spend 3 weeks working on a small, well-defined scientific lab project.

**Intended learning outcomes**

Students reinforce previously acquired lab skills, acquire new lab techniques and learn how to apply theoretical knowledge in the lab. Students gain expertise in the analysis and presentation of raw data.

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

P (6)

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

Log (10 to 15 pages) and talk (approx. 10 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

Students spend 4 weeks working on a small, well-defined scientific lab project.

### Intended learning outcomes

Students reinforce previously acquired lab skills, acquire new lab techniques and learn how to apply theoretical knowledge in the lab. Students gain expertise in the analysis and presentation of raw data.

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

P (8)

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

Log (10 to 15 pages) and talk (approx. 10 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

Foundations of intercultural communication and culture-related communication problems, pathways to successful collaboration, international team building and conflict management.

### Intended learning outcomes

Students have been sensitised to intercultural issues and are able to reflect on their own culture. They have developed a sensitivity towards cultural differences and potential points of friction.

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

S (3)

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

a) written examination (45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (20 to 30 minutes).

Students will be informed about the type and length of assessment at the beginning of the course.

### 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**

Identifying and formulating questions that are scientifically approachable, describing and explaining scientific phenomena and interpreting scientific evidence are key competences that are required, in addition to purely technical skills, to answer or solve scientific problems. Based on concrete examples, students interactively practise the respective skills in small groups and present their results.

**Intended learning outcomes**

In addition to honing their professional and methodological skills, the students develop and enhance their individual personal and interactive skills.

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

V (2)

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

a) written examination (45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (20 to 30 minutes).

Students will be informed about the type and length of assessment at the beginning of the course.

**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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### Personal Skills in Science

**Module title:** Personal Skills in Science  
**Abbreviation:** 03-98-FSQ-NETW2-152-m01

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

### Contents

Identifying and formulating questions that are scientifically approachable, describing and explaining scientific phenomena and interpreting scientific evidence are key competences that are required, in addition to purely technical skills, to answer or solve scientific problems. Based on concrete examples, students interactively practise the respective skills in small groups and present their results.

### Intended learning outcomes

In addition to honing their professional and methodological skills, the students develop and enhance their individual personal and interactive skills.

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

V (3)

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

1. written examination (45 to 90 minutes) or 2. log (10 to 20 pages) or 3. oral examination of one candidate each (20 to 30 minutes) or 4. oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or 5. presentation (20 to 30 minutes).

Students will be informed about the type and length of assessment at the beginning of the course.

### 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
Bachelor Thesis Biomedicine

### Abbreviation
03-98-TH-152-m01

### Module coordinator
chairperson of examination committee Biomedizin (Biomedicine)

### Module offered by
Faculty of Medicine

### ECTS
12

### Method of grading
numerical grade

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

### Other prerequisites
--

### Contents
Conduct a defined and focused research project under supervision within a limited time frame.

### Intended learning outcomes
Students demonstrate their ability to solve a defined problem within a chosen area within a given time frame by applying scientific research methods.

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

Module taught in: German / English

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
written thesis (20 to 40 pages)

Language of assessment: German or English

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

Students present the results of their thesis projects in a scientific colloquium.

**Intended learning outcomes**

Students are able to present and defend the data from their thesis project in front of a professional audience.

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

K (0)

Module taught in: German / English

**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)

oral examination of one candidate each (20 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 | Abbreviation
---|---
Imaging methods in life-sciences | 08-BGV-171-m01

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

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

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

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

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

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

Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
--
Module title | Abbreviation
---|---
Cell Biology - Focus signal transduction and stem cells | 03-98-PZB1-172-m01

| Module coordinator | Module offered by |
---|---|
holder of the Chair of Medical Radiation and Cell Research | Faculty of Medicine |

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

| Duration | Module level | Other prerequisites |
---|---|---|
undergraduate | May not be combined with 03-98-PZB2 or 03-98-PZB3. |

### Contents

Becoming familiar with basic cell biological principles via hands-on training and seminars. Major topics are the structural organisation of eukaryotic cells, isolation of stem cells, analyses of cell-cell and cell-matrix interactions, as well as cell proliferation. Differentiation of stem cells and involved signalling pathways.

### Intended learning outcomes

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

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

P (5) + S (1)

Module taught in: German / English

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

a) written examination (45 to 90 minutes) or c) oral examination of one candidate each (20 to 30 minutes). Students will be informed about the type and length of assessment at the beginning of the course.

Language of assessment: German and/or English

### Allocation of places

Biomedizin (Biomedicine) Bachelor’s: 18 places.

### 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>Cell Biology Focus cytoskeleton and microscopic imaging</td>
<td>03-98-PZB2-172-m01</td>
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**Module coordinator**
holder of the Chair of Experimental Biomedicine and holder of the Professorship of Molecular Microscopy

**Module offered by**
Faculty of Medicine

**ECTS**

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<th>Other prerequisites</th>
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<td>May not be combined with 03-98-PZB1 or 03-98-PZB3.</td>
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</table>

**Contents**

Becoming familiar with basic cell biological principles via hands-on training and seminars. Major topics are the structural organisation, the stability and the dynamics of the cytoskeleton in eukaryotic cells. Biochemical analysis of cytoskeletal components. Complementary imaging using modern microscopic approaches and implementation of the results into the dynamic processes of the cytoskeleton living cells.

**Intended learning outcomes**

Problem-oriented handling of eukaryotic cells under sterile conditions and understanding principles of techniques for the analysis of the cellular cytoskeleton. Understanding the molecular basis of cell biology and recognising targets for drugs affecting the cytoskeleton. Principles and limitations of classical and modern forms of microscopic imaging for the analysis of the cytoskeleton. Cellular malfunctions and their significance for the disease development. Independent extraction of relevant information and presentation of selected examples of the current literature.

**Courses**

P (5) + S (1)

Module taught in: German / English

**Method of assessment**

a) written examination (45 to 90 minutes) or c) oral examination of one candidate each (20 to 30 minutes). Students will be informed about the type and length of assessment at the beginning of the course.

Language of assessment: German and/or English

**Allocation of places**

Biomedizin (Biomedicine) Bachelor’s: 8 places.

**Additional information**

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**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

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<td>holder of the Chair of Experimental Biomedicine II and University Hospital, Department of Dermatology, Venerology and Allergology</td>
<td>Faculty of Medicine</td>
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### Contents

Becoming familiar with basic cell biological principles via hands-on training. Major topics are: cell culture under sterile conditions; transfection of cells and basics in microscopy. In addition, gene expression analysis at RNA level by quantitative real-time PCR, identification and quantification of proteins by immunological techniques such as FACS, ELISA, Western Blot and histology.

### Intended learning outcomes

Students learn basic laboratory protocols, such as handling of adherent and non-adherent eukaryotic cells under sterile conditions, and principle techniques to analyse cellular processes. They establish own protocols for processing probes as required, and develop an understanding of the molecular basis of cell biology with a focus on inflammation and immunology.

### Courses

<table>
<thead>
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<td>P (5) + S (1)</td>
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</table>

Module taught in: German / English

### Method of assessment

<table>
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### Allocation of places

Biomedizin (Biomedicine) Bachelor's: 12 places.

### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

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<tbody>
<tr>
<td>1 semester</td>
<td>graduate</td>
<td>May not be combined with 03-TM-BIOM.</td>
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</table>

**Contents**

Working with the statistical software SPSS; preparation of data; descriptive statistics; common methods of statistical testing.

**Intended learning outcomes**

This course concisely deals with the basics of statistical methods. It consists of data preparation, import, export, merging, transformation, recoding, descriptive statistics (numerically and graphically) and the most common significance tests.

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

V (0.5) + S (0.5)

Module taught in: German or English

**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)

oral examination (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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**Contents**

No information on contents available.

**Intended learning outcomes**

No information on intended learning outcomes available.

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

P (5) + S (1)

Module taught in: German / English

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

a) written examination (45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (20 to 30 minutes).

Language of assessment: German or English

**Allocation of places**

--

**Additional information**

--

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

--
Module title | Abbreviation
-------------------------------|----------------------
Concepts in Immunology | 03-98-ImmK-182-m01

Module coordinator | Module offered by
unknown | Faculty of Medicine

ECTS | Method of grading | Only after succ. compl. of module(s)
5 | numerical grade | 03-98-MVI

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

Contents
No information on contents available.

Intended learning outcomes
No information on intended learning outcomes available.

Courses (type, number of weekly contact hours, language — if other than German)
V (1) + S (2.5)
Module taught in: German / English
Course type: alternatively S instead of Ü

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
a) written examination (45 to 90 minutes) or b) log (10 to 20 pages)
Language of assessment: German and/or English

Allocation of places
Biomedizin (Biomedicine) Bachelor’s: 16 places.

Additional information
--

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

## Abbreviation
03-98-PGN-182-m01

## Module coordinator
holder of the Chair of Clinical Neurobiology

## Module offered by
Faculty of Medicine

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

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

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

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

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

## 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 (90 minutes)

## Allocation of places
--

## Additional information
--

## Referred to in LPO I
(examination regulations for teaching-degree programmes)
--
### Module title
**Selected Courses from Biology and Medicine 1**

### Abbreviation
03-98-FSQ-MB1-182-m01

### Module coordinator
Dean of Studies Biomedizin (Biomedicine)

### Module offered by
Faculty of Medicine

### ECTS
2

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

<table>
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<tbody>
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### Contents
Courses offered by the Faculties of Biology or Medicine that contribute to further professional qualification. Recognition (successfully completed/not successfully completed) as assessment to be granted by the module coordinator.

### Intended learning outcomes
The students have acquired a broader range of knowledge that enables them to enhance their interdisciplinary thinking skills and improve their professional qualification.

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

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

a) written examination (45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (20 to 30 minutes).

### Allocation of places
--

### Additional information
--

### Referred to in LPO I (examination regulations for teaching-degree programmes)
--
Module title | Abbreviation
---|---
Selected Courses from Biology and Medicine 2 | 03-98-FSQ-MB2-182-m01

Module coordinator | Module offered by
Dean of Studies Biomedizin (Biomedicine) | Faculty of Medicine

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Duration | Module level | Other prerequisites
1 semester | unknown | Prior approval from degree programme coordinator required.

Contents
Courses offered by the Faculties of Biology or Medicine that contribute to further professional qualification. Recognition (successfully completed/not successfully completed) as assessment to be granted by the module coordinator.

Intended learning outcomes
The students have acquired a broader range of knowledge that enables them to enhance their interdisciplinary thinking skills and improve their professional qualification.

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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
a) written examination (45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (20 to 30 minutes).

Allocation of places
--

Additional information
--

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

Selected Courses from Biology and Medicine 3

### Abbreviation

03-98-FSQ-MB3-182-m01

### Module coordinator

Dean of Studies Biomedizin (Biomedicine)

### Module offered by

Faculty of Medicine

### ECTS

3

### Method of grading

(not) successfully completed

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

--

### Duration

1 semester

### Module level

unknown

### Other prerequisites

Prior approval from degree programme coordinator required.

### Contents

Courses offered by the Faculties of Biology or Medicine that contribute to further professional qualification. Recognition (successfully completed/not successfully completed) as assessment to be granted by the module coordinator.

### Intended learning outcomes

The students have acquired a broader range of knowledge that enables them to enhance their interdisciplinary thinking skills and improve their professional qualification.

### Courses

V (3)

### Type, number of weekly contact hours, language — if other than German

#### Method of assessment

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

a) written examination (45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (20 to 30 minutes).

### Allocation of places

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### Additional information

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

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**Contents**

Courses, in particular in the area of natural sciences, offered by other Faculties that contribute to further professional qualification. Recognition (successfully completed/not successfully completed) as assessment to be granted by the module coordinator.

**Intended learning outcomes**

The students have acquired a broader range of knowledge that enables them to enhance their interdisciplinary thinking skills and improve their professional qualification.

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

V (2)

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

a) written examination (45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (20 to 30 minutes).

**Allocation of places**

--

**Additional information**

--

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

--
### Module title

**Selected Courses from other Faculties with a Biomedical Focus 2**

### Abbreviation

03-98-FSQ-AF2-182-m01

### Module coordinator

Dean of Studies Biomedizin (Biomedicine)

### Module offered by

Faculty of Medicine

### ECTS

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### Duration

1 semester

### Module level

unknown

### Other prerequisites

Prior approval from degree programme coordinator required.

### Contents

Courses, in particular in the area of natural sciences, offered by other Faculties that contribute to further professional qualification. Recognition (successfully completed/not successfully completed) as assessment to be granted by the module coordinator.

### Intended learning outcomes

The students have acquired a broader range of knowledge that enables them to enhance their interdisciplinary thinking skills and improve their professional qualification.

### Courses

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

V (3)

### Method of assessment

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

a) written examination (45 to 90 minutes) or b) log (10 to 20 pages) or c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (20 to 30 minutes).

### Allocation of places

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### Additional information

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

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### Module title

Supervising Tutorials 1

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### Module coordinator

Dean of Studies Biomedizin (Biomedicine)

### Module offered by

Faculty of Medicine

### ECTS

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### Duration

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<tbody>
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<td>Prior approval from degree programme coordinator required.</td>
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</table>

### Contents

Students work as tutors. They support other students, in particular in the context of courses and study planning, and they participate as assistants in the organisation and planning of exercises and lab courses.

### Intended learning outcomes

Tutors are able to communicate complex technical facts in a clear and structured way. They have gained experience in the supervision and motivation of groups, and they have practised applying conflict resolution strategies.

### Courses

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### Method of assessment

(Examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

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### Allocation of places

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### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

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### Supervising Tutorials 2

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<td>Prior approval from degree programme coordinator required.</td>
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### Contents

Students work as tutors. They support other students, in particular in the context of courses and study planning, and they participate as assistants in the organisation and planning of exercises and lab courses.

### Intended learning outcomes

Tutors are able to communicate complex technical facts in a clear and structured way. They have gained experience in the supervision and motivation of groups, and they have practised applying conflict resolution strategies.

### Courses

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<thead>
<tr>
<th>Type, number of weekly contact hours, language (if other than German)</th>
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### Method of assessment

<table>
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<tr>
<td>Log (2 to 3 pages)</td>
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</table>

### 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 title
Supervising Tutorials 3

### Abbreviation
03-98-FSQ-TUT3-182-m01

### Module coordinator
Dean of Studies Biomedizin (Biomedicine)

### Module offered by
Faculty of Medicine

### ECTS
3

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

### (not) successfully completed
--

### Duration
1 semester

### Module level
unknown

### Other prerequisites
Prior approval from degree programme coordinator required.

### Contents
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Log (2 to 3 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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