Module Catalogue
for the Subject
Translational Medicine
as a Master’s with 1 major
with the degree "Master of Science"
(90 ECTS credits)

Examination regulations version: 2018
Responsible: Faculty of Medicine
## Contents

The subject is divided into  
Learning Outcomes  
Abbreviations used, Conventions, Notes, In accordance with  
Compulsory Courses  
Compulsory Electives I: Translational Medicine  
Compulsory Electives II: Professional advancement  
Thesis

### Compulsory Courses

- Introduction to Experimental Medicine: from the Molecular Basis to Translational Leads  
- Introduction to Clinical Research / Epidemiology: from Clinical Studies to Implementation in the Population  
- Research Internship I  
- Research Internship II

### Compulsory Electives I: Translational Medicine

- Experimental Methods Course  
- Cardiovascular Biology  
- Molecular Oncology  
- Infection and Immunity  
- Clinical Neurobiology I  
- Individualized / Genetic Medicine  
- Stem Cell Biology  
- Tissue Engineering / Functional Materials  
- Biometric Methods  
- Clinical Studies (GCP, AMG, MPG)  
- Biobanking, Biomarkers and Bioinformatics  
- Disease-Specific Epidemiology  
- Epidemiologic Methods  
- Evidence-Based Medicine  
- Prognostic and Diagnostic Studies  
- Medical Informatics  
- Global Health  
- Selected Courses from Related Study Programs

### Compulsory Electives II: Professional advancement

- Integrated Research Seminar  
- Journal Club  
- Winter School  
- Genetic Engineering and Biosafety  
- Laboratory Animal Sciences 2  
- Biostatistics  
- Responsible Conduct of Research  
- Scientific Writing and Presentation  
- Service Learning: Community Engagement  
- Global Systems and Intercultural Competence  
- Selected Courses from other Faculties

### Thesis

- Master Thesis  
- Colloquium
The subject is divided into

<table>
<thead>
<tr>
<th>section / sub-section</th>
<th>ECTS credits</th>
<th>starting page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compulsory Courses</td>
<td>25</td>
<td>6</td>
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<tr>
<td>Compulsory Electives I: Translational Medicine</td>
<td>25</td>
<td>11</td>
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<tr>
<td>Compulsory Electives II: Professional advancement</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Thesis</td>
<td>30</td>
<td>42</td>
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</table>
Learning Outcomes

German contents and learning outcome available but not translated yet.
Die Qualifikationsziele umfassen:
1. Ein vertieftes Verständnis der naturwissenschaftlichen Grundlagen der Medizin und ihrer Anwendung auf die einzelnen Disziplinen der theoretischen Medizin.
2. Einblick in die Methoden und Vorgehensweisen der experimentellen biomedizinischen Forschung.
5. Vertiefte Fähigkeiten und Fertigkeiten zur Analyse klinischer und epidemiologischer Daten.
6. Überblick über aktuelle Fragestellungen und Konzepte im Bereich Translational Medicine, die anhand einzelner Beispiele praktisch und theoretisch vertieft werden.
7. Erfahrung in der kritischen Analyse wissenschaftlicher Publikationen.

Profilbildend ist eine intensive Betreuung der Studierenden, die sie in aktuelle Forschungsgebiete führt.
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)):


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

**Introduction to Experimental Medicine: from the Molecular Basis to Translational Leads**

<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>Introduction to Experimental Medicine: from the Molecular Basis to Translational Leads</td>
<td>03-TM-EEM-181-m01</td>
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</table>

## Module coordinator

holder of the Chair of Developmental Biochemistry

## Module offered by

Faculty of Medicine

## ECTS

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
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## Duration

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<thead>
<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
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<tbody>
<tr>
<td>1 semester</td>
<td>graduate</td>
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## Contents

From the molecular basis to translational leads: Molecular and cell biological methods, imaging modalities in research, overview of model systems such as mouse and zebrafish, case studies for translational research.

## Intended learning outcomes

Students gain an overview of molecular and cell biology research methods as well as imaging modalities in research and they know important model systems in biomedicine. They get first insights into the translation of results from basic research.

## Courses

<table>
<thead>
<tr>
<th>(type, number of weekly contact hours, language — if other than German)</th>
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<td>V (2)</td>
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Module taught in: German or English

## Method of assessment

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<thead>
<tr>
<th>(type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)</th>
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<tbody>
<tr>
<td>written examination (approx 60 minutes)</td>
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<td>Language of assessment: German or English</td>
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## Allocation of places

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## Additional information

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## Referred to in LPO I

(examination regulations for teaching-degree programmes)

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## Module Catalogue for the Subject
Translational Medicine
Master’s with 1 major, 90 ECTS credits

<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>Introduction to Clinical Research / Epidemiology: from Clinical Studies to Implementation in the Population</td>
<td>03-TM-EKFE-181-m01</td>
</tr>
</tbody>
</table>

### Module coordinator
- Institute of Clinical Epidemiology and Biometry (ICE-B)
- Faculty of Medicine

### ECTS
- 5

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

### Duration
- 1 semester

### Module level
- Graduate

### Contents
From clinical studies to implementation in the population: Fundamentals of clinical and epidemiological research; basic concepts of diagnostics and their application; computation and interpretation of epidemiological measures.

### Intended learning outcomes
The students have basic knowledge on questions of clinical research and epidemiology, on study designs and potential sources of, and measures against bias of study results. They know performance parameters of diagnostic tests and are able to provide quantitative interpretations of diagnostic test results. They also know basic epidemiological risk measures and are able to compute them from data.

### Courses
- **V (2)**
  - Module taught in: German or English

### Method of assessment
- written examination (approx 60 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
---|---
Research Internship I | 03-TM-FP1-181-m01

Module coordinator | Module offered by
degree programme coordinator Translational Medicine | Faculty of Medicine

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

Duration | Module level | Other prerequisites
---|---|---
grGraduate | Prior approval from director of studies required.

Contents
The content depends on the profile of the research group and can cover the following topics.
Experimental section: Visualization of molecular and cellular processes by in vivo imaging; Cell analysis; Use of high-throughput techniques and bioinformatic analyses of Omics data.
Clinical-epidemiological area: preparation of study materials; Implementation and testing of databases, Quality control / monitoring, Creation and supervision of standard operating procedures (SOPs) for clinical trials, Data collection (also on patients or subjects) in clinical and epidemiological studies.

Intended learning outcomes
Students know an extended spectrum of methods of experimental and / or clinical research and are familiar with their implementation.

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

Log (approx. 15 pages)
Language of assessment: English

Allocation of places
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Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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<table>
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<tr>
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<tr>
<td>Research Internship II</td>
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<td>graduate</td>
<td>Prior approval from director of studies required.</td>
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</table>

**Contents**

Participation in a research project or a clinical study. The content and methods depend on the selected workgroup.

**Intended learning outcomes**

Students learn new methods and approaches, and they can apply these in practice on the basis of different scientific questions. Important competencies are data collection, the interpretation of new results as well as their presentation and discussion.

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

P (12)

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 is creditable for bonus)

oral presentation (approx. 10 to 15 minutes) and log (approx. 20 to 30 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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Compulsory Electives I: Translational Medicine
(25 ECTS credits)
<table>
<thead>
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<th>Module title</th>
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<tr>
<td>Experimental Methods Course</td>
<td>03-TM-METH-181-m01</td>
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<td>Institute of Hygiene and Microbiology / RVZ</td>
<td>Faculty of Medicine</td>
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**Contents**

Full-time basic Molecular Biology practical course with a focus on DNA, RNA, protein, cell biology and microscopy in theory and practical exercises.

**Intended learning outcomes**

Students know about fundamental analytical methods of relevance to molecular and cell biology and can apply them practically. Students are able to discuss their results.

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

P (5) + S (1)

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 is creditable for bonus)

Log (approx. 20 pages)
Language of assessment: 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)

--
## Module Catalogue for the Subject
### Translational Medicine

#### Master's with 1 major, 90 ECTS credits

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<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tr>
<td>Cardiovascular Biology</td>
<td>03-98-MVKB-152-m01</td>
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<tbody>
<tr>
<td>holder of the Chair of Experimental Biomedicine</td>
<td>Faculty of Medicine</td>
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<tr>
<td>1 semester</td>
<td>graduate</td>
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#### Contents

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

#### Intended learning outcomes

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

#### Courses

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<th>(type, number of weekly contact hours, language — if other than German)</th>
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<td>V (2)</td>
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Module taught in: German/English

#### Method of assessment

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

Students will be informed about the method, length and scope of the assessment prior to the course.

Assessment offered: Once a year, winter semester

Language of assessment: German or English

#### Allocation of places

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#### Additional information

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#### Referred to in LPO I

(examination regulations for teaching-degree programmes)

--
**Module title** | **Abbreviation**
---|---
Molecular Oncology | 03-98-MVMO-152-m01

| Module coordinator | Module offered by |
---|---
holder of the Chair of Biochemistry and Molecular Biology | 

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

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

**Contents**

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

**Intended learning outcomes**

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

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

V (2)

- 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 is creditable for bonus)

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

Students will be informed about the method, length and scope of the assessment prior to the course.

Assessment offered: Once a year, winter semester

Language of assessment: German or English

**Allocation of places**

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**Additional information**

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

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### Module title

**Infection and Immunity**

**Abbreviation**

03-TM-INFIMM-181-m01

### Module coordinator

holder of the Chair of Molecular Infection Biology and holder of the Chair of Medical Microbiology and Mycology

### Module offered by

Faculty of Medicine

### ECTS

5

### Method of grading

numerical grade

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

--

### Duration

1 semester

### Module level

graduate

### Other prerequisites

--

### Contents

Relevant topics of translational research in microbiology and immunology will be introduced based on relevant examples like vaccine development, immunotherapy, RNA-base therapy, new antibiotics, probiotics, human microbiome, host niches, heterogeneity as well as resistance and new therapeutics.

### Intended learning outcomes

Students will get an overview on the development of new diagnostics and therapeutics in infectious diseases and basic insight into standardised steps in the approval of new tools for clinical application. They can assess the use of modern technologies, including high throughput sequencing and genome wide typing in the development of individualised therapeutic approaches.

### Courses

(V (1) + S (1))

### Method of assessment

presentation (approx. 10 minutes) with oral examination of one candidate each (approx. 20 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
---|---
Clinical Neurobiology 1 | 03-TN-NB1-152-m01

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

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

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

**Contents**

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

**Intended learning outcomes**

Students who successfully completed this module will have acquired insights into current theoretical concepts in neurobiology. The students will have examined clinical aspects of neurobiology with a focus on the molecular, cellular and physiological mechanisms. Additionally, they will have learned how to evaluate and present data in oral form.

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

V (2)

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

a) written examination (30 to 60 minutes, including multiple choice questions) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)

**Allocation of places**

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**Additional information**

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

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<table>
<thead>
<tr>
<th>Module title</th>
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<tbody>
<tr>
<td>Individualized / Genetic Medicine</td>
<td>03-TM-IGM-181-m01</td>
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<tbody>
<tr>
<td>Comprehensive Cancer Center Mainfranken</td>
<td>Faculty of Medicine</td>
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**Contents**

Methodological and bioinformatic principles of high throughput methods for the analysis of tumors. Based on selected examples it will be illustrated how targeted and personalized therapies can be developed in oncology based on these novel technologies and how this will influence future developments in clinical research and patient care.

**Intended learning outcomes**

Students recognize the fundamental importance of genetics and modern Omics technologies for understanding the pathogenesis and course of cancer. They understand the translation of molecular changes into clinical research questions and individual treatment decisions.

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

V (2)
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 is creditable for bonus)

written examination (30 to 60 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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<table>
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<td>Stem Cell Biology</td>
<td>03-98-MVSZ-152-m01</td>
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<th>Module offered by</th>
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<tbody>
<tr>
<td>Institute of Medical Radiology and Cell Research (MSZ)</td>
<td>Faculty of Medicine</td>
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</table>

Contents

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

Intended learning outcomes

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

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

V (2)

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 is creditable for bonus)

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

Students will be informed about the method, length and scope of the assessment prior to the course.

Assessment offered: Once a year, summer semester

Language of assessment: German or English

Allocation of places

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Additional information

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

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<table>
<thead>
<tr>
<th>Module title</th>
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<td>Tissue Engineering / Functional Materials</td>
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<tbody>
<tr>
<td>holder of the Chair of Tissue Engineering (University Hospital)</td>
<td>Faculty of Medicine</td>
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<tr>
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<tbody>
<tr>
<td>1 semester</td>
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</table>

**Contents**

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

**Intended learning outcomes**

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

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

V (2)  
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 is creditable for bonus)

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

Students will be informed about the method, length and scope of the assessment prior to the course.

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

**Allocation of places**

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**Additional information**

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

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<table>
<thead>
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<th>Module title</th>
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<tbody>
<tr>
<td>1 semester</td>
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<td>May not be combined with 03-TM-BSTAT.</td>
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</tbody>
</table>

**Contents**

Working with the statistical software SPSS; preparation of data; descriptive statistics; methods of inferential statistics; statistical modeling for quantitative, binary, ordinal and survival data.

**Intended learning outcomes**

The students are able to prepare data tables, import, export, merge, transform and recode data. They can describe data by numerical measures and present them graphically. They are familiar with tests of significance and confidence intervals and know the common basic methods of statistical analysis. The students perform multiple regression analyses with the general linear model, binary and ordinal logistic regression and Cox regression (including time-dependent covariates) and are able to check for statistical interaction. At the end of the course, the students perform analyses and create tables and figures for a scientific paper.

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

- V (3) + S (1)

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 is creditable for bonus)

- Belegarbeit (thesis)
- Language of assessment: German or English

**Allocation of places**

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**Additional information**

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

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<table>
<thead>
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<td>Clinical Studies (GCP, AMG, MPG)</td>
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**Module coordinator**
Institute of Clinical Epidemiology and Biometry (ICE-B)

**Module offered by**
Faculty of Medicine

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</table>

**Contents**
Design and implementation of clinical trials; conduct of clinical trials according to ethical and legal requirements.

**Intended learning outcomes**
The students are faced practical issues of the development and implementation of study designs. They acquire knowledge in protocol development, trial documents, ethical issues, patient information, data management and establishing trial procedures in multi-center studies. They learn about trial conduct in accordance with Good Clinical Practice and legal requirements (drug law, medical product law). The course for investigators visited within this setting allows participating physicians to act as trial investigators. Seminars serve to develop knowledge to practical abilities using examples from the real study world. In addition, the students will acquire special knowledge about design aspects, e.g., sample size calculation.

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

V (1) + S (1)
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 is creditable for bonus)

oral examination (approx. 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

Biobanking, Biomarkers and Bioinformatics

### Abbreviation

03-TM-BIO3-181-m01

### Module coordinator

holder of the Professorship of Translational Clinical Research / IBDW

### Module offered by

Faculty of Medicine

### ECTS

5

### Method of grading

numerical grade

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

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### Duration

1 semester

### Module level

graduate

### Other prerequisites

--

### Contents

Conception and purpose of biobanks; quality assurance; analysis of biomarkers; linking to existing (clinical) databases; ethical and data protection aspects; practical implementation and interaction with stakeholders / donors / public.

### Intended learning outcomes

The students understand the concept of biobanking and its central challenges. They gain first insights into the practical use and analysis of biomaterials using different methods. They also know about the basic principles of the ethical and legal framework. They are aware of the importance of interactions with the various stakeholders.

### Courses

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

V (1) + S (1)

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 is creditable for bonus)

a) Oral examination (approx. 30 minutes) or b) written examination (approx. 45 to 90 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)

--
Module title | Disease-Specific Epidemiology
---|---
Abbreviation | 03-TM-KEPI-181-m01

Module coordinator | Institute of Clinical Epidemiology and Biometry (ICE-B)
Module offered by | Faculty of Medicine

ECTS | 5
Method of grading | numerical grade
Duration | 1 semester
Module level | graduate
Other prerequisites | --

Contents

Development of disease-specific study designs and patient-relevant endpoints by means of specific study examples; Application of statistical models to individual cases.

Intended learning outcomes

The students learn to define patient-relevant endpoints (e.g., survival time, number of repetitive hospitalizations, different issues of quality of life) depending on specific diseases to characterize the success of diagnostic-therapeutic strategies. Based on the knowledge of the specific course of a patient population determined by the profile and stages of diseases, they will acquire the ability to construct purposeful designs and outcome measures for the optimal capture of the therapeutic progress. It will be pointed out in particular, why a certain outcome measure is relevant for a specific patient population and which is the distinction from other patient populations. Moreover, the students will be able to apply statistical models for prognosis and therapeutic decision making to individual cases.

Courses

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

V (2) + S (1)
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 is creditable for 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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</table>

**Contents**

Advanced aspects of study design; analysis of the relationship between risk factors and outcome; aims and methods of health care research; concept of health economy.

**Intended learning outcomes**

In further discussions of design aspects, the students learn how to purposefully use methodological elements to answer research questions and to assure the quality of study data. They perform numerical analyses to quantify the relationship between risk factor and outcome in the given study context and assess the evidence arising from the data. They are able to apply methods to avoid or eliminate confounding in study design and analysis. The students get to know aims and methods of health care research and study examples of common diseases (heart failure, stroke). They know basic concepts of health economy (cost assessment, quality and disability adjusted life time).

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

V (1.5) + S (1.5)  
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 is creditable for 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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<table>
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</table>

**Contents**

Principles of evidence-based medicine; critical assessment of scientific publications; standards of reporting evidence; systematic reviews and meta-analyses; structure and objectives of clinical guidelines.

**Intended learning outcomes**

The students are able to critically review published papers with respect to methods, quality, arising evidence and limitations. They know the contemporary standards of reporting evidence from studies (CONSORT, STROBE etc.). Students are able to assess evidence from several sources. They are familiar with methods of systematic review of existing evidence and meta-analysis. They know methods how to test for inhomogeneity and publication bias and how to compute aggregated estimates. They have background knowledge about the development of clinical guidelines.

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

V (1.5) + S (1.5)

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 is creditable for 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)

--
Module title: Prognostic and Diagnostic Studies
Abbreviation: 03-TM-PROGDIAG-181-m01

Module coordinator: Comprehensive Heart Failure Center (DZHI)
Module offered by: Faculty of Medicine

ECTS: 5
Method of grading: numerical grade
Only after succ. compl. of module(s):
Duration: 1 semester
Module level: graduate
Other prerequisites: --

Contents
Prognostic studies: Prognosis is a key concept in patient care, but the methodology behind it is relatively underdeveloped. The course discusses the principles and methods of non-experimental prognostic research, together with the practice of prognostic research in a clinical setting. Emphasis is on learning and applying design and statistical analysis of prognostic studies, construction and estimation of prediction rules, approaches to validation, and generalization of research results. Further, the challenges of dealing with small data sets will be discussed. Diagnostic studies: Diagnostic processes as diagnostic studies play an increasingly important role. However, awareness of the most appropriate methodology is often poorly developed at the mind of the clinical researcher leading to suboptimal study design and analysis. The course will explain established principles and new challenges arising for example from high dimensional data. Focus will be on implementation of strategies supporting a joint evaluation of sensitivity and specificity in diagnostic studies, the adoption of guidelines for non-standard diagnostic studies (e.g. multiple raters, multiple decisions), the development of approaches to demonstrate the long term clinical benefit of new diagnostic modalities.

Intended learning outcomes
Prognostic studies: Student are able to: apply design and statistical analysis of prognostic studies to selected clinical research questions; construct and estimate prediction rules; have insight into approaches to validation; gain judgement on reliable generalization of research results; can deal with the challenges of prognostic modelling in small data sets. Diagnostic studies: Student will have knowledge on: main elements of diagnostic studies; main elements of test accuracy; main elements of test utility; how to integrate diagnostic research questions into study design & study planning; main elements of statistical analysis in diagnostic studies; study design options in diagnostic research; main elements how to summarize evidence from several diagnostic studies; main elements on good practice of publication of diagnostic studies.

Courses (type, number of weekly contact hours, language — if other than German)
V (1.5) + S (1.5)
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 is creditable for bonus)
written examination (30 to 60 minutes)
Language of assessment: German or English

Allocation of places
--

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

### Abbreviation
03-TM-MEDINF-181-m01

### Module coordinator
holder of the Chair of Computer Science VI

### Module offered by
Faculty of Medicine

### ECTS
5

### Method of grading
numerical grade

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

### Duration
1 semester

### Module level
graduate

### Other prerequisites
--

### Contents
Data bases and data structures; creation and utilization of data warehouses; extraction of information and data transfer; ethical and legal aspects.

### Intended learning outcomes
The students are familiar with the organization of different data base systems and their data structures in the clinical domain (e.g., electronic patient file) and in research. They learn how and for what purposes data warehouses are used (e.g., data mining, decision making, case-based training systems) and how to purposefully build them up. The students acquire technical skills in extracting, transforming, linking, transferring and supplying information. They know the ethical and legal requirements for the capture, processing and the use of data. In particular, they are able to apply the relevant law in a specific context and can adequately handle pseudonymization and anonymization of data.

### Courses
(type, number of weekly contact hours, language — if other than German)
V (1.5) + S (1.5)
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 is creditable for bonus)
a) Oral examination (approx. 30 minutes) or b) written examination (approx. 60 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: Global Health
Abbreviation: 03-TM-GLGH-181-m01

Module coordinator: Klinikum Würzburg Mitte, Tropical Medicine Department
Module offered by: Faculty of Medicine

ECTS: 5
Method of grading: numerical grade
Duration: 1 semester
Module level: graduate
Other prerequisites: --

Contents:
This module will introduce the students to the important aspects of Global Health based on examples in the following four thematic fields: 1) Global Burden of Disease 2) Determinants of Health 3) Intercultural Competence 4) Global Research/Evidence

Intended learning outcomes:
At the end of the seminar, the participants will be able to determine the key aspects of Global Health, to analyze typical challenges and problems on selected examples and to describe their possible solutions. Furthermore they will be able to use the acquired skills of the "problem tree analysis" for scientific projects and integrate them in daily work processes.

Courses:
S (2)
Module taught in: German or English

Method of assessment:
presentation (approx. 15 to 30 minutes)
Language of assessment: German or English

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

### Master's with 1 major, 90 ECTS credits

<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<td>Selected Courses from Related Study Programs</td>
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### Contents

No information on contents available.

### Intended learning outcomes

No information on intended learning outcomes available.

### Courses

- **V (2)**

  **Module taught in:** German or English

### Method of assessment

- **oral examination (45 to 60 minutes)**
  - Language of assessment: German or English

### Allocation of places

- --

### Additional information

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### Referred to in LPO I

- **(examination regulations for teaching-degree programmes)**
  - --
Compulsory Electives II: Professional advancement
(10 ECTS credits)
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<td>1 semester</td>
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</table>

**Contents**

Students present their own work from research internships, master's theses or a medical doctorate and discuss it. The focus will be the interdisciplinary presentation, relevance for translational medicine and possible future implications.

**Intended learning outcomes**

Students can present their own scientific work to an audience and they can illustrate and discuss the results from different sides.

**Courses**

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

S (2)

**Method of assessment**

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

presentation (approx. 30 minutes)
Language of assessment: English

**Allocation of places**

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**Additional information**

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**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

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<table>
<thead>
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**Module coordinator**

degree programme coordinator Translational Medicine

**Module offered by**

Faculty of Medicine

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</table>

**Contents**

Students present recent publications from the entire range of Translational Medicine.

**Intended learning outcomes**

Students can qualitatively assess and question scientific publications. They are capable of describing the accuracy of the approach, the qualitative aspects, the stringency of argumentation and the validity of the conclusions drawn from it.

**Courses**

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

S (2)

**Method of assessment**

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

presentation (approx. 30 minutes)

Language of assessment: English

**Allocation of places**

--

**Additional information**

--

**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

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### Module Catalogue for the Subject

#### Translational Medicine

**Master's with 1 major, 90 ECTS credits**

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</table>

### Contents

Alternating and comprehensive topics of high relevance from the field of translational medicine are presented and discussed by students, lecturers and external speakers within the framework of a retreat.

### Intended learning outcomes

Discussion of current research results in a cross-disciplinary context.

### Courses

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

**S (2)**

**Method of assessment**

- Presentation (approx. 30 minutes)
- Language of assessment: English

### Allocation of places

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### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

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

The 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 is creditable for 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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Master's with 1 major Translational Medicine (2018)
<table>
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<th>Module title</th>
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<td>Laboratory Animal Sciences 2</td>
<td>03-98-FSQ-VTK2-152-m01</td>
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<tbody>
<tr>
<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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</table>

**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 is creditable for bonus)

Written examination (approx. 90 minutes)

**Allocation of places**

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**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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**Module coordinator**

Institute of Clinical Epidemiology and Biometry (ICE-B)  
Faculty of Medicine

**ECTS**

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**Duration**

1 semester  
graduate

**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**

V (0.5) + S (0.5)  
Module taught in: German or English

**Method of assessment**

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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<td>Responsible Conduct of Research</td>
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</table>

**Contents**

Principles of Good Scientific Practice, their development and worldwide implementation; Individual stakeholders, (societal) groups and organizations involved, their roles, interests and specific regulations, in particular those of the University of Würzburg; Case studies.

**Intended learning outcomes**

Knowledge of the principles of good scientific practise and ability to put them into perspective, reflect on them and apply them.

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

S (1)

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 is creditable for bonus)

written 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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<td>Scientific Writing and Presentation</td>
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### Contents

Basic rules for preparation of scientific manuscripts, literature references, and ways of data presentation. Gain practice in structured approaches, delineation of a chosen topic, structuring of research questions of compliance with deadlines. Preparation of scientific data for presentation, basic principles of visual design, conception and organization of lectures, rhetoric, and body language.

### Intended learning outcomes

The students have learned to retrieve scientific results from the literature or from other sources and to present these in written form. Students can present scientific facts in poster format or orally in an understandable and appealing form.

### Courses

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

Ü (1) + Ü (1)

### Method of assessment

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

a) Log (10 to 20 pages) or b) oral examination of groups (groups of up to 3 candidates, approx. 30 minutes per candidate) or c) presentation (20 to 30 minutes)

Type and length/scope of assessment to be specified at the beginning of the course.

Language of assessment: 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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<tr>
<th>Module title</th>
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<td>Service Learning: Community Engagement</td>
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<tr>
<td>holder of the Chair of Didactics of Medicine</td>
<td>Faculty of Medicine</td>
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</table>

**Contents**

Students link their knowledge to the implementation of practical projects, which benefit charitable organizations or public facilities (for example, the accompaniment of self-help groups, press and public relations work). Transfer of knowledge and expertise in practice and formulation / presentation of complex scientific issues in an easily and generally understandable form.

**Intended learning outcomes**

Subject or discipline-specific competence building, academic character building, strengthening of social commitment:
- Putting theoretical knowledge to the test in practice
- Conveyance or acquirement of personal and social competencies
- Broadening one’s horizons and a change of perspective
- The development of a community spirit and a sense of responsibility
- Project management
- Promotion of the orientation of values
- The shared civic responsibility of the University toward shaping the community

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

Ü (2)
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 is creditable for bonus)

portfolio or project
Type and length/ scope of assessment to be specified at the beginning of the course.
Language of assessment: German or English

**Allocation of places**
--

**Additional information**
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**Referred to in LPO I** (examination regulations for teaching-degree programmes)
--
## Module title
Global Systems and Intercultural Competence

### Abbreviation
00-GSIK-IKK-M-172-m01

### Module coordinator
holder of the Chair of Systematic Educational Science

### Module offered by
Service Centre for Innovation in Teaching and Learning (ZiLS)

### ECTS
2

### Method of grading
(only after success. compl. of module(s))

### Duration
1 semester

### Module level
graduate

### Other prerequisites
--

## Contents
Basic knowledge and concepts of interculturality and intercultural phenomena, examples of intercultural phenomena

## Intended learning outcomes
Sensitization to intercultural and global phenomena, enhancement of intercultural competences

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

### S (2)

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

a) presentation (approx. 15 to 30 minutes) or b) term paper (5 to 10 pages) or c) written examination (approx. 30 minutes) or d) portfolio (approx. 10 hours) or d) oral examination (approx. 15 minutes)

Type and length/scope of assessment to be specified at the beginning of the course.

## Allocation of places
30 places. Places will be allocated after review of written applications (CV, letter of motivation, essay) and (group) interviews. Should there be more than 14 equally qualified applicants, places will be allocated according to the number of subject semesters. Lottery. A waiting list will be maintained and places re-allocated as they become available.

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

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<table>
<thead>
<tr>
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<td>Prior approval from director of studies required.</td>
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</table>

**Contents**

Courses from other faculties that contribute to the professional qualification.

**Intended learning outcomes**

The students have acquired a wider range of knowledge, which contributes to improved interdisciplinary thinking and supports professional qualification.

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

V (2)  
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 is creditable for 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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Thesis
(30 ECTS credits)
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### Contents

Students conduct a scientific research project with the help of appropriate methods according to current scientific practice. The work is documented and discussed in a thesis and it is defended in a final colloquium.

### Intended learning outcomes

Students are qualified to independently carry out scientific work according to the rules of good scientific practice. They are competent to document and to adjust their research and to interpret their findings in a larger context. Students are able to defend their work in front of a professional audience.

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

A (0)

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

Master's thesis (approx. 30 to 60 pages)

Language of assessment: 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**

Students present the results of their thesis project 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)

A (0)

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

colloquium (30 to 45 minutes)
Language of assessment: 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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