



Module Catalogue

for the Subject

Biomedicine

as a Master's with 1 major
with the degree "Master of Science"
(120 ECTS credits)

Examination regulations version: 2013
Responsible: Faculty of Medicine
Responsible: Faculty of Biology

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The subject is divided into

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Content and Objectives of the Programme

The Faculty of Medicine and the Faculty of Biology of the JMU Würzburg offer the opportunity to acquire a “Master of Science” (M.Sc.) degree in Biomedicine within a consecutive Bachelor’s and Master’s programme. This degree programme has a strong emphasis on research. This Master of Science degree equips graduates with further professional qualifications as well as extensive research experience. This degree programme aims to impart to students in-depth and interdisciplinary knowledge at the interface between biology and medicine and to enable them to competently apply and implement concepts and methods of molecular medicine. Students in this degree programme gain the skills and specialist knowledge necessary for a career in research, development and practical application and will be able to independently conduct scientific research in the field of biomedicine.

In their thesis, students demonstrate their ability to illustrate and handle a defined biomedical problem from an academic perspective using established or modified methods within a given time frame.

By passing their Master’s examination, students demonstrate their grasp of biomedical research and their ability to independently apply scientific methods. In compliance with the effective doctoral regulations of the JMU a successfully completed Master’s degree qualifies candidates for admission to a doctoral programme.

Abbreviations used

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

Term: **SS** = summer semester, **WS** = winter semester

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

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

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

Conventions

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

Notes

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

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

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

In accordance with

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

ASPO2009

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

23-Sep-2013 (2013-72)

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

(60 ECTS credits)

Lab Course Model Organisms

(25 ECTS credits)

Module title		Abbreviation
Model Organisms		03-98-MMOD-132-m01
Module coordinator		Module offered by
Dean of Studies Biomedizin (Biomedicine)		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
25	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
<p>With the help of selected eukaryotic model organisms (mouse, fish, Drosophila, nematodes and flatworms, yeast) and complex tissue models, students will become familiar with methods and questions of experimental biomedicine and will apply these. Building on the students' knowledge of anatomy, cell biology and developmental biology, the module will illustrate the relevance and usage of individual models for understanding physiological processes and pathophysiological changes and will experimentally analyse these with molecular, cell biological, histological and imaging techniques. The module will acquaint students with cell-based strategies for regenerative therapies and biodiagnostics as well as as an alternative to animal experiments. Over the course of one week each, students will examine model organisms in detail, also taking into account current research.</p>		
Intended learning outcomes		
<p>Students are able to define key terms for each model organism and use them in the right context. They are able to correctly assess the importance of model organisms and 3D tissue culture systems for current biomedical issues and questions. They are able to discuss the relevant scientific advantages and disadvantages in a deliberative manner, also taking into account ethical issues. Under supervision, they are able to independently perform sophisticated genetic, cell biological and histological experiments and document the results. In particular, they are able to present the results in a written report in accordance with scientific standards, to critically evaluate and interpret the data and put it in the context of current literature. Working in small groups as well as preparing and delivering group presentations, they demonstrate their knowledge of the contents covered as well as their team working skills.</p>		
Courses (type, number of weekly contact hours, language – if other than German)		
S + P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
per block of organisms: one log (5 to 10 pages each) as well as one of the following assessments: a) written examination (30 to 60 minutes; including multiple choice questions) or b) oral examination of one candidate each (30 to 60 minutes) or c) presentation (20 to 45 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biomedicine (2013)		

Advanced Lab Courses

(20 ECTS credits)

Module title		Abbreviation
Advanced Laboratory Course in Biology		03-98-MFPB-132-m01
Module coordinator		Module offered by
Dean of Studies Biomedizin (Biomedicine)		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
10	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Participation in a research project in the life sciences. Students will become familiar with new methods and approaches. Contents and methods will vary according to the research laboratory chosen.		
Intended learning outcomes		
Application of current methods to diverse and complex scientific questions. Critical data collection and analysis as well as interpretation of new findings. Presentation of data.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
methods of assessment: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes); students will be informed about the method, length and scope of the assessment prior to the course Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biomedicine (2013)		

Module title		Abbreviation
Advanced Laboratory Course in Medicine		03-98-MFPM-132-m01
Module coordinator		Module offered by
Dean of Studies Biomedizin (Biomedicine)		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
10	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Prior approval by Dean of Studies required.
Contents		
Participation in a research project in the life sciences. Students will become familiar with new methods and approaches. Contents and methods will vary according to the research laboratory chosen.		
Intended learning outcomes		
Application of current methods to diverse and complex scientific questions. Critical data collection and analysis as well as interpretation of new findings. Presentation of data.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
methods of assessment: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes); students will be informed about the method, length and scope of the assessment prior to the course Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biomedicine (2013)		

Research Lab Course

(15 ECTS credits)

Module title		Abbreviation
Internship in a research lab		03-98-MPPF-122-m01
Module coordinator		Module offered by
Dean of Studies Biomedizin (Biomedicine)		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
15	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Prior approval by Dean of Studies required.
Contents		
Project work in a research laboratory, focusing on training in new methods and the in-depth analysis of a complex scientific problem. This project may lay the foundation for a subsequent Master's thesis.		
Intended learning outcomes		
Execution of complex sequential experimental methods. Students gain an insight into new areas of research on the basis of current literature and knowledge transfer.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
log (approx. 20 to 30 pages) or research proposal for thesis based on project (approx. 20 pages) Language of assessment: English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedicine (2012)		

Compulsory Electives

(30 ECTS credits)

Compulsory Electives I

(25 ECTS credits)

Completion of modules 03-98-MVKN, 03-98-MVKB and 03-98-MVMO is mandatory. Module 07-MBI-B may only be taken by students that did not take 07-MBI-B in the Bachelor's degree programme.

Module title		Abbreviation
Bioinformatics B		07-MBI-B-121-m01
Module coordinator		Module offered by
holder of the Chair of Bioinformatics		Faculty of Biology
ECTS	Method of grading	Only after succ. compl. of module(s)
5	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
Advances and current results of bioinformatics are explained and discussed, this includes results from genome and sequence analysis, protein domains and protein families, large-scale data analysis (e. g. net generation sequences, proteomics data), analysis of different functional RNAs (e. g. miRNAs, lncRNAs).		
Intended learning outcomes		
Understand recent results in bioinformatics. Discuss their implications. Have an advanced (Master) level knowledge of typical technologies and research questions in bioinformatics.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
Students will be informed about the method, length and scope of the assessment prior to the course. a) written examination (30 to 60 minutes, including multiple choice questions) or b) oral examination of one candidate each (30 to 60 minutes) or c) oral examination in groups of up to 3 candidates (30 to 60 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biology (2011) Master's degree (1 major) Biology (2014) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedicine (2012) Master's degree (1 major) Computational Mathematics (2012)		

Module title		Abbreviation
Systems Biology B		07-MS-B-121-m01
Module coordinator		Module offered by
holder of the Chair of Bioinformatics		Faculty of Biology
ECTS	Method of grading	Only after succ. compl. of module(s)
5	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
Advances and current results of computational systems biology are explained and discussed, this includes results from functional genomics, dynamics of the transcriptome, of metabolism and metabolic networks as well as regulatory networks.		
Intended learning outcomes		
Understand recent results in systems biology. Discuss their implications. Have an advanced (Master) level knowledge of typical technologies and research questions of systems biology.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
Students will be informed about the method, length and scope of the assessment prior to the course. a) written examination (30 to 60 minutes, including multiple choice questions) or b) oral examination of one candidate each (30 to 60 minutes) or c) oral examination in groups of up to 3 candidates (30 to 60 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biology (2011) Master's degree (1 major) Biology (2014) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedicine (2012) Master's degree (1 major) Computational Mathematics (2012)		

Module title		Abbreviation
Microbiology 1 B		07-MM1-B-121-m01
Module coordinator		Module offered by
holder of the Chair of Microbiology		Faculty of Biology
ECTS	Method of grading	Only after succ. compl. of module(s)
5	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
Fundamentals of molecular microbiology and infection biology, mechanisms of adherence and invasion, bacterial pathogenicity factors, regulation of virulence, mechanisms of host defence and pathogen interference, current methods in infection biology.		
Intended learning outcomes		
The students are able to understand fundamental theories of molecular microbiology and infection biology, emergence of infectious diseases.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
a) written examination (30 to 60 minutes, including multiple choice questions) or b) oral examination of one candidate each (approx. 30 to 60 minutes) or c) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biology (2011) Master's degree (1 major) Biology (2014) Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedicine (2012)		

Module title		Abbreviation
Microbiology 2 B		07-MM2-B-121-m01
Module coordinator		Module offered by
holder of the Chair of Microbiology		Faculty of Biology
ECTS	Method of grading	Only after succ. compl. of module(s)
5	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
Fundamental principles of the mode of action of microbial pathogenicity factors will be presented using selected prokaryotic and eukaryotic pathogens as model organisms. In addition, current research methods in infection biology will be presented.		
Intended learning outcomes		
Students have gained fundamental knowledge in infection biology and pathogenicity research and the mechanisms behind infectious diseases.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
a) written examination (30 to 60 minutes, including multiple choice questions) or b) oral examination of one candidate each (approx. 30 to 60 minutes) or c) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biology (2011) Master's degree (1 major) Biology (2014) Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedicine (2012)		

Module title		Abbreviation
Cell- and Development-Biology Master 1 B		07-MZE1-B-121-m01
Module coordinator		Module offered by
holder of the Chair of Cell Biology and Developmental Biology		Faculty of Biology
ECTS	Method of grading	Only after succ. compl. of module(s)
3	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
The lecture <i>Zellpathologie (Cytopathology)</i> describes pathological states of the cell and unravels their biological causes and consequences, such as infection, apoptosis, senescence, metabolic disorders and cancer.		
Intended learning outcomes		
Participants possess scientific background knowledge on cytopathology and are able to put this into the broader context of cell biology research.		
Courses (type, number of weekly contact hours, language – if other than German)		
V (no information on language and number of weekly contact hours available)		
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
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Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biology (2011) Master's degree (1 major) Biology (2014) Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedicine (2012)		

Module title		Abbreviation
Cell- and Development-Biology Master 2 B		07-MZE2-B-121-m01
Module coordinator		Module offered by
holder of the Chair of Cell Biology and Developmental Biology		Faculty of Biology
ECTS	Method of grading	Only after succ. compl. of module(s)
3	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
<p>The lecture <i>Signale und Differenzierung (Signals and Differentiation)</i> is not designed to merely impart textbook knowledge to students. It will rather introduce students to particularly interesting and current topics in developmental biology. Topics covered in the lecture (subject to change): - Cooperation: Development and consequences of multicellularity. - Sex: More than just ? + ? =. - On the move: Morphogenetic migration. - All-rounders?: Opportunities and limitations of stem cell research. - Growing new hearts?: Animals and their ability to regenerate. - Disasters: What do we actually know about metamorphoses? - Always the same?: Plasticity and epigenetics. - Metaorganisms: We are never alone. - Development in changing environments: Ecology and polyphenism. - Developmental biology of behaviour: Everything is learned. Or isn't it? - Evo-devo: A fad? No, been around for ages.</p>		
Intended learning outcomes		
Participants possess a knowledge of the theoretical and molecular biological principles underlying developmental biology and are able to put this into the broader context of cell and developmental biology research.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (no information on language and number of weekly contact hours available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
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Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
<p>Master's degree (1 major) Biology (2011) Master's degree (1 major) Biology (2014) Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedicine (2012)</p>		

Module title		Abbreviation
Immunology 1 B		03-MIM1-B-121-m01
Module coordinator		Module offered by
holder of the Professorship of Immunogenetics		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
7	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
Familiarity with the fundamentals of molecular and cellular immunology that allow a deeper understanding of immune-mediated defence mechanisms. This incorporates common literature readings, presentations and tests on selected immunology book chapters and recent original literature in English language.		
Intended learning outcomes		
Students will gain a knowledge of fundamental concepts and methods in molecular and cellular immunology and will be able to present and discuss these.		
Courses (type, number of weekly contact hours, language – if other than German)		
V + S (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
a) written examination (approx. 30 to 60 minutes, including multiple choice questions) or b) log (10 to 30 pages) or c) oral examination of one candidate each (approx. 30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (approx. 20 to 45 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biology (2011) Master's degree (1 major) Biology (2014) Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedicine (2012)		

Module title		Abbreviation
Immunology 2 B		03-MIM2-B-121-m01
Module coordinator		Module offered by
holder of the Professorship of Immunogenetics		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
7	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
Recent progress in molecular and cellular immunology. Deeper insights into selected immunology chapters , such as autoimmunity and immune modulation, development of the immune system, immunogenetics, evolution, infection immunology, and more. This incorporates common literature readings, presentations and tests on selected immunology book chapters and recent original literature.		
Intended learning outcomes		
Students are able to understand current problems in immunology and to discuss these in detail.		
Courses (type, number of weekly contact hours, language – if other than German)		
S + V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
a) written examination (approx. 30 to 60 minutes, including multiple choice questions) or b) log (10 to 30 pages) or c) oral examination of one candidate each (approx. 30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (approx. 20 to 45 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biology (2011) Master's degree (1 major) Biology (2014) Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedicine (2012)		

Module title		Abbreviation
Immunology 1 BS		03-MIM1-BS-121-m01
Module coordinator		Module offered by
holder of the Professorship of Immunogenetics		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
5	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
Familiarity with the fundamentals of molecular and cellular immunology that allow a deeper understanding of immune-mediated defence mechanisms. This incorporates common literature readings, presentations and tests on selected immunology book chapters and recent original literature in English language.		
Intended learning outcomes		
Students will gain a knowledge of fundamental concepts and methods in molecular and cellular immunology and will be able to present and discuss these.		
Courses (type, number of weekly contact hours, language – if other than German)		
S (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
a) written examination (approx. 30 to 60 minutes, including multiple choice questions) or b) log (10 to 30 pages) or c) oral examination of one candidate each (approx. 30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (approx. 20 to 45 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biology (2011) Master's degree (1 major) Biology (2014) Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedicine (2012)		

Module title		Abbreviation
Immunology 2 BS		03-MIM2-BS-121-m01
Module coordinator		Module offered by
holder of the Professorship of Immunogenetics		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
5	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
Recent progress in molecular and cellular immunology. Deeper insights into selected immunology chapters , such as autoimmunity and immune modulation, development of the immune system, immunogenetics, evolution, infection immunology, and more. This incorporates common literature readings, presentations and tests on selected immunology book chapters and recent original literature.		
Intended learning outcomes		
Students are able to understand current problems in immunology and to discuss these in detail.		
Courses (type, number of weekly contact hours, language – if other than German)		
S (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
a) written examination (approx. 30 to 60 minutes, including multiple choice questions) or b) log (10 to 30 pages) or c) oral examination of one candidate each (approx. 30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (approx. 20 to 45 minutes)		
Allocation of places		
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Additional information		
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Workload		
--		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biology (2011) Master's degree (1 major) Biology (2014) Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedicine (2012)		

Module title		Abbreviation
Virology 1 B		03-MV1-B-121-m01
Module coordinator		Module offered by
holder of the Chair of Virology		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
7	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
This module will discuss contemporary topics in virology.		
Intended learning outcomes		
Students are able to understand current problems in virology and to discuss these in detail.		
Courses (type, number of weekly contact hours, language – if other than German)		
S (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
#REF!		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biology (2011) Master's degree (1 major) Biology (2014) Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedizin (2012)		

Module title		Abbreviation
Virology 2 B		03-MV2-B-121-m01
Module coordinator		Module offered by
holder of the Chair of Virology		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
7	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
This module will discuss contemporary topics in virology.		
Intended learning outcomes		
Students are able to understand current problems in virology and to discuss these in detail.		
Courses (type, number of weekly contact hours, language — if other than German)		
S (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
#REF!		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biology (2011) Master's degree (1 major) Biology (2014) Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedicine (2012)		

Module title		Abbreviation
Clinical Neurobiology		03-98-MVKN-122-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		
<p>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.</p>		
Intended learning outcomes		
<p>Students who successfully completed this module will have acquired insights into current theoretical concepts in neurobiology. They will have examined clinical aspects of neurobiology with a focus on the molecular, cellular and physiological mechanisms. Additionally, they will have learned how to evaluate and present data in oral form. The students will have learned to critically read scientific publications in the field of neurobiology and will have been trained in the ability to extract relevant information from the original literature.</p>		
Courses (type, number of weekly contact hours, language — if other than German)		
V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
<p>Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)</p>		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
<p>Master's degree (1 major) Biochemistry (2012) Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedicine (2012)</p>		
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Module title		Abbreviation
Cardiovascular Biology		03-98-MVKB-122-m01
Module coordinator		Module offered by
holder of the Chair of Experimental Biomedicine		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
Fundamental and specific knowledge of cardiovascular biology is taught based on selected questions from this field.		
Intended learning outcomes		
Students have developed the ability to approach, analyse and interpret general problems in cardiovascular biology and, in particular, in developmental biology, erythropoiesis, blood coagulation, myocardial diseases, diabetes, regulation of blood pressure, platelets and stroke.		
Courses (type, number of weekly contact hours, language – if other than German)		
V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biochemistry (2012) Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedicine (2012)		

Module title		Abbreviation
Molecular Oncology		03-98-MVMO-122-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 tumorigenesis; 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 (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biochemistry (2012) Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedicine (2012)		

Module title		Abbreviation
Stem Cell Biology		03-98-MVSZ-122-m01
Module coordinator		Module offered by
Institute of Medical Radiology and Cell Research (MSZ)		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		
In this module, current problems in the research areas of stem cell biology, cellular differentiation and regenerative medicine are discussed and specific solutions are taught.		
Intended learning outcomes		
Students have developed the ability to approach, analyse and critically interpret problems in stem cell biology, cellular differentiation and regenerative medicine, taking into account current literature.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biochemistry (2012) Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedicine (2012)		

Module title		Abbreviation
Tissue Engineering / Functional Materials		03-98-MVTF-122-m01
Module coordinator		Module offered by
holder of the Chair of Tissue Engineering (University Hospital)		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		
Cell culture techniques, fundamentals of tissue engineering, test systems as an alternative to animal experiments in skin, intestine, lung, trachea, kidney, blood-brain barrier, tumours and other diseases, development of cell-based transplants, regulatory fundamentals for approval of medical products and drugs. These are REACH (registration, evaluation, restriction and approval of drugs), medicine products law, GLP (good lab practice), GMP (good manufacturing practice), GCP (good clinical practice).		
Intended learning outcomes		
Students have developed a knowledge of cell biology, metabolism, differentiation, adhesion to surfaces, mechanobiology. They are familiar with the fundamental principles of tissue engineering and quality management.		
Courses (type, number of weekly contact hours, language – if other than German)		
V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biochemistry (2012) Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedicine (2012)		

Module title		Abbreviation
Nucleus Workshop		07-MKE-WO-121-m01
Module coordinator		Module offered by
degree programme coordinator Biologie (Biology)		Faculty of Biology
ECTS	Method of grading	Only after succ. compl. of module(s)
7	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
This course will use a combination of lectures (daily) and practical experiments. Topics to be covered in the lecture (subject to change): - nuclear envelope, nuclear pores and nuclear-cytoplasmic transport. - nuclear envelope, nuclear lamina and their role in chromatin organisation and genetic diseases. - DNA, chromatin and chromosomes. - structure and function of nucleoli. - nuclear-cytoskeletal interactions.		
Intended learning outcomes		
Students are able to perform practical experiments, applying their theoretical knowledge.		
Courses (type, number of weekly contact hours, language – if other than German)		
Ü + V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) oral examination of one candidate each (30 to 60 minutes) or c) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biology (2011) Master's degree (1 major) Biology (2014) Master's degree (1 major) Biomedicine (2013) Master's degree (1 major) Biomedicine (2012)		

Compulsory Electives II

(5 ECTS credits)

Module title		Abbreviation
Knowledge Transfer / Tutoring		03-98-MTUT2-122-m01
Module coordinator		Module offered by
Dean of Studies Biomedizin (Biomedicine)		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
2	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
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 (type, number of weekly contact hours, language – if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biomedicine (2013)		
Master's degree (1 major) Biomedicine (2012)		

Module title		Abbreviation
Knowledge Transfer / Tutoring		03-98-MTUT3-122-m01
Module coordinator		Module offered by
Dean of Studies Biomedizin (Biomedicine)		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
3	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
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 (type, number of weekly contact hours, language – if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biomedicine (2013)		
Master's degree (1 major) Biomedicine (2012)		

Module title		Abbreviation
Clinical Medicine		03-98-MKM2-122-m01
Module coordinator		Module offered by
Dean of Studies Biomedizin (Biomedicine)		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
2	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
Attending a lecture on the foundations of clinical medicine for medical students. Contents will vary according to the subject chosen.		
Intended learning outcomes		
Students will gain an insight into clinical practice and will improve their ability to link basic and experimental knowledge with corresponding clinical applications.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biomedicine (2013)		
Master's degree (1 major) Biomedicine (2012)		

Module title		Abbreviation
Clinical Medicine		03-98-MKM3-122-m01
Module coordinator		Module offered by
Dean of Studies Biomedizin (Biomedicine)		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
3	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
Attending a lecture on the foundations of clinical medicine for medical students. Contents will vary according to the subject chosen.		
Intended learning outcomes		
Students will gain an insight into clinical practice and will improve their ability to link basic and experimental knowledge with corresponding clinical applications.		
Courses (type, number of weekly contact hours, language — if other than German)		
V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)		
Students will be informed about the method, length and scope of the assessment prior to the course. Usually, one of the following options will be chosen: a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biomedicine (2013)		
Master's degree (1 major) Biomedicine (2012)		

Thesis

(30 ECTS credits)

Thesis and colloquium.

Module title		Abbreviation
Final Oral Examination		03-98-MTH-122-m01
Module coordinator		Module offered by
chairperson of examination committee Biomedizin (Biomedicine)		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
30	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	graduate	--
Contents		
Students conduct a scientific research project, using appropriate methods and adhering to the principles of good scientific practice. They document and discuss their work in a thesis and defend it in a final colloquium.		
Intended learning outcomes		
Students are able to independently carry out scientific work according to the rules of good scientific practice. They are able to document and, where necessary, adjust their research as well as 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)		
This module has 2 components; information on courses listed separately for each component. <ul style="list-style-type: none"> • 03-98-MTH-2-122: K (no information on language and number of weekly contact hours available) • 03-98-MTH-1-122: A (no information on language and number of weekly contact hours available) 		
Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus)		
This module has the following 2 assessment components. Unless stated otherwise, students must pass all of these assessment components to pass the module as a whole..		
Assessment component to module component 03-98-MTH-2-122: Abschlusskolloquium <ul style="list-style-type: none"> • 5 ECTS credits, method of grading: numerical grade • Abschlusskolloquium (approx. 45 minutes) • Language of assessment: English 		
Assessment component to module component 03-98-MTH-1-122: Masterthesis <ul style="list-style-type: none"> • 25 ECTS credits, method of grading: numerical grade • written thesis • Language of assessment: English 		
Allocation of places		
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Additional information		
Additional information listed separately for each module component. <ul style="list-style-type: none"> • 03-98-MTH-1-122: Additional information on module duration: 6 months. • 03-98-MTH-2-122: -- 		
Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Master's degree (1 major) Biomedicine (2013)		
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