Excerpt from Module Descriptions

Master of Science Biochemistry

Examination Regulations in the Version of: 2015

Sub-Section: Subsidiary Subject
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Immunologie MSc Biologie
Modules referring to Subsidiary Subject Immunology

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<td>Allocation of study programmes</td>
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<td>Learning objectives</td>
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<td>Syllabus</td>
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<td>Literature</td>
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<td>Teaching and learning methods</td>
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<tr>
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## Medical Neuroscience II

Modules referring to Subsidiary Subject Medical Neuroscience

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<tr>
<td>Coordinator</td>
<td>PD Dr. Petra Steinacker</td>
</tr>
<tr>
<td>Instructor(s)</td>
<td>PD Dr. Petra Steinacker and further lecturers.</td>
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### Allocation of study programmes

Biology MSc, start of studies: winter semester, compulsory elective module, 1\(^{st}\) to 2\(^{nd}\) study semester recommended

### Recommended prerequisites

Formally: Refer to the subject-specific examination regulations of the respective study course, in the version effective when taking up the study program.

Contentually: None.

### Learning objectives

Module 1 “Clinical Neurosciences - Basic and special lectures”

This module gives students theoretical insight into current knowledge about principle mechanisms common to neurological and in particular neurodegenerative human diseases. Specific contributing pathomechanisms, recently used therapeutical approaches, and areas of experimental neurology research in Ulm will be main issues.

The lecture block is followed by a written exam which is a prerequisite for the internship of module part 2.

After successful accomplishment of this module the students have knowledge about

- clinical classification of neurological/neurodegenerative diseases.
- basic mechanisms (e.g. excitotoxicity, oxidative and metabolic stress, failure of protein quality control, etc.) contributing to and specific pathophysiological mechanisms involved in the pathogenesis of neurological / neurodegenerative diseases including e.g. Alzheimer’s, Parkinson’s disease, Amyotrophic lateral sclerosis, genetic neurodegenerative diseases, and stroke.
Module part 2

Weekly Seminar “Neurological Diseases” (MEDex22), active participation starting from beginning of winter semester

“Clinical Neurosciences - Practical training” (registration necessary; maximum number of attendees 12)

This module gives students theoretical and practical insight into current methods used in neuroscience research in general and at the various research groups participating in the program in particular. Students will learn how these methods work in principle, what they are used for, what their potential is and what their limitations are. During the practical courses in our laboratories there will be hand on training in selected approaches of the neurobiological and behavioral sciences to study neural function in systems from basic molecular processes to the whole organism. Additionally demonstrations of complex approaches will be given. Opportunities for both basic and clinical research are included.

After successful accomplishment of this module the students have learned

• to interpret and presentate published data
• to plan own experiments
• to document own experimentally obtained data.
• to present own data in written form (“mini-paper”) and oral presentations.
• to discuss own results in the context of published data

Syllabus

Module 1 - Basic and special lectures:

In the winter semester (December) a 3-day block with 18 hours of lectures will teach the students basics of clinical neuroscience and current knowledge of disease characteristics and recent research on the pathological conditions of the most frequent neurological / neurodegenerative human diseases. Experimental approaches used in this field as biomarker discovery or transgenic animal research will complete the topics listed above. In the second half of January a written exam about the contents of the lecture series will take place.

Module 2 - Practical training:

For this module it is obligatory to pass the written exam mentioned above.

Each student has to complete 4 weeks practical courses in the labs of the neurology department (period: 01.02. – 31.03.). Depending on the lab the spectrum of matters reaches from cell culture / animal models of neurodegenerative diseases, diagnostic analysis of human body fluids, imaging, and behavioral examination. Students have to present their work in lab meetings and write a report about their internship project in form of a minipaper.

Literature

• Principles of Neural Science, Eric R. Kandel (new edition 2012)
• Additional literature will be provided in the beginning of the semester.

Teaching and learning methods

• From basic to clinical neuroscience (lecture), 2 credit hours [SWS], 3 credit points [LP], winter semester
• Neurological Diseases (seminar), 1 credit hour [SWS], 2 credit points [LP], winter semester
• Clinical neurosciences part 2 - practical training (laboratory course), 11 credit hours [SWS], 10 credit points [LP], winter semester
| **Workload** | Attendance: 210 h  
|             | Private study: 240 h  
|             | Sum: 450 h |
| **Assessment** | Laboratory course report in the form of a mini-paper; oral exam |
| **Grading procedure** | Weighing: laboratory course report 1/2 and oral exam 1/2. |
| **Basis for** | - |
Pharmacology and Toxicology
Modules referring to Subsidiary Subject Pharmacology and Toxicology

Code 8802570699

ECTS credits 15

Attendance time 12

Language of instruction German

Duration 2 Semester

Cycle each Winter Semester

Coordinator PD Dr. Barbara Möpps, apl. Prof. Dr. Tatiana Syrovets

Instructor(s) Prof. Dr. Holger Barth, Dr. Christina Förtsch, Prof. Dr. Peter Gierschik, Susanne Hafner, PD Dr. Barbara Möpps, Dr. Christoph Schmidt, Michael Schmiech, Prof. Dr. Thomas Simmet, apl. Prof. Dr. Tatiana Syrovets, Prof. Dr. Heike A. Wieland

Allocation of study programmes Biochemistry MSc, start of studies: winter semester, compulsory elective module, 1st – 2nd study semester;

Biology MSc, start of studies: winter semester, compulsory elective module, 1st – 4th study semester

Recommended prerequisites Formally: Refer to the subject-specific examination regulations of the respective study course, in the version effective when taking up the study program.

Contentually: Lecture “Pharmacology and Toxicology” [Pharmakologie und Toxikologie I] (Bachelor).

Learning objectives Students who have successfully completed this module

• know the main features of drug development, may define pharmacologically relevant aspects of a medicament (e.g. pharmacokinetics, drug interactions, adverse effects...) and know about the characteristics of pharmacotherapy during special circumstances (e.g. old age or renal-/liver failure).
• may name pharmacotherapeutic options for treatment of important diseases as well as their pathogenetic and molecular basics.
• cope with the fundamentals in the subject toxicology.
• got to know the spectrum of experimental questions in the area of pharmacological/toxicological research and have the ability to develop own strategies for scientific handling of pharmacological/toxicological questions.
• are able to work independently and scientifically, i.e. to read up on a topic, to plan, conduct and analyze adequate experiments and to critically interpret, discuss and present own and published results.

Syllabus

The module is cooperatively offered by the Institute of Pharmacology and Toxicology (coordinator: PD Dr. Möpps) and the Institute of Naturopathy and Clinical Pharmacology (coordinator: apl. Prof. Dr. Syrovets). It extends over 2 semesters and contains 160 course hours which are composed as follows (all two-hour courses): 14 lecture dates “Pharmacology for Natural Scientists II” (winter semester), 14 lecture dates “Toxicology for Natural Scientists” (Prof. Dr. Barth), 2 seminars at 14 dates, respectively, and a one-week laboratory course (40 h) following the winter semester in the free period. The seminars and the laboratory course are offered by both involved institutes and may be selected. For the laboratory course the participants get divided in 6 groups, with 10 students maximum each. Each group passes a one-week laboratory course (see above). In case of less than 30 participants there is the opportunity to pass a two-week laboratory course (6 credit points [LP]).

This module covers the following subject-specific topics:

The lecture “Pharmacology” comprises the description of mechanisms of pharmaceutics for therapy on important diseases as well as corresponding anatomical and physiological basics:

• Drug development: safety of pharmaceutical products; pharmaceutical law & drug study; clinical studies; regulation of pharmaceutics
• Pharmacological properties of frequently applied pharmaceuticals: effects; indications, contraindications; pharmacokinetics; undesirable effects of pharmaceuticals; drug interactions
• Main features of pharmacokinetics
• Pharmacotherapy during special circumstances: pregnancy/lactation; childhood; old age; renal- and/or liver failure
• Therapy of cardiovascular diseases: coronary heart disease; chronic heart failure; hypertension; cardiac dysrhythmia
• Therapy of bronchopulmonary diseases: asthma; COPD
• Therapy of gastrointestinal diseases: gastroesophageal reflux disease; peptic ulcer; inflammatory bowel disease; diseases of the liver and bile duct; acute/chronic pancreatitis
• Therapy of endocrinial diseases: functional disorders of the thyroid gland; osteoporosis
• Therapy of metabolic disorders: diabetes mellitus; dyslipidemia
• Basics of antiinfectious therapy: bacterial infections; mycosis; viral infections; infections with protozoans
• Therapy of rheumatic disorders: rheumatoid arthritis
• Pain management: acute and chronic pains
• Therapy of neurological disorders: idiopathic parkinsonism; epilepsy; insomnia
• Pharmacotherapy of mental disorders: mood disorders; schizophrenia; anxiety disorders

The lecture “Toxicology” comprises:

• Regulatory toxicology (important safety values, REACH, chemical law)
• Cause and therapy of acute intoxications
• Toxins from animals, plants, fungi and bacteria
• Toxicology of the lung (gases, fibers, dust)
• Toxicology of metals
• Toxicology of pesticides
• Chemical cancer genesis
The spectrum of activities within the laboratory courses ("Pharmacology") covers separation processes of natural materials, investigations of molecular mechanisms of cellular signal transduction and clinical/pharmacological studies. Successful participation results in 3 credit points.

Laboratory course “Toxicology” gives training (a) to conduct investigations on mechanisms of bacterial toxins to cultivated mammalian cells and (b) on scientific documentation, analysis and interpretation of the results. Successful participation results in 3 credit points.

In seminars of both departments the students shall acquire and present molecular basics of pharmacotherapeutic research. Based on special diseases (e.g. HIV infection) or substance classes of pharmaceutics (e.g. antibiotics), pathogenically relevant mechanisms get described and various approaches of pharmacotherapeutic research get illustrated in the form of 30-45-minutes talks. Successful participation results in 3 credit points.

In the seminar “Toxicology” the students (a) acquire knowledge from literature about various current toxicological subjects such as toxicology of pharmaceutics, substances causing addiction, intoxicants, cancer genesis, toxicology of natural materials or toxicology of organs and (b) present it in the form of 20-minutes talks. Successful participation results in 3 credit points.

The seminar “Development, Regulation and Monitoring of Medical Products“ communicates insights from pharmaceutical research by lecturers with applied knowledge. Successful participation results in 3 credit points.

**Literature**


**Teaching and learning methods**

Compulsory (two lectures, a total of 6 credit points [LP]):

- Pharmacology for Natural Scientists II [Pharmakologie für Naturwissenschaftler II] (lecture), 2 credit hours [SWS], 3 credit points [LP], winter semester
- Toxicology for Natural Scientists [Toxikologie für Naturwissenschaftler] (lecture), 2 credit hours [SWS], 3 credit points [LP], winter semester

Elective (One laboratory course must be attended, 3 or 6 credit points [LP]):

- Laboratory Courses, Pharmacology and Toxicology as Subsidiary Subject [Laborpraktika, Pharmakologie und Toxikologie als Nebenfach] (laboratory course in one block), each with 2 credit hours [SWS] and 3 credit points [LP], summer semester (selectable)
  or Laboratory Courses, Pharmacology and Toxicology as Subsidiary Subject [Laborpraktika, Pharmakologie und Toxikologie als Nebenfach] (laboratory course in one block), each with 4 credit hours [SWS] and 6 credit points [LP], summer semester (selectable)
Elective (Two seminars must be attended, a total of 6 credit points [LP]):

- Seminars, Pharmacology and Toxicology as Subsidiary Subject [Seminare, Pharmakologie und Toxikologie als Nebenfach] (seminar), each with 2 credit hours [SWS] and 3 credit points [LP], winter+summer semester (selectable)

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<th>Workload</th>
<th>Attendance: 160 h</th>
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<td>Private study: 270 h</td>
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Assessment

The module certificate is allocated by the responsible module coordinator for continuous and successful participation. Continuous participation is given if the student attended at least 85% of the courses. The passing of an exam (lectures: written form; seminars and laboratory courses: oral form) confirms the successful participation.

Grading procedure

The grade results from the overall and final oral exam at the end of the module.

Basis for

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## Virology II

Modules referring to Subsidiary Subject Virology

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<td>Language of instruction</td>
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<td>Duration</td>
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<tr>
<td>Coordinator</td>
<td>Jun.-Prof. Dr. Jens von Einem, Prof. Dr. Jan Münch</td>
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<tr>
<td>Instructor(s)</td>
<td>Dr. Giada Frascaroli, Jun.-Prof. Dr. Daniel Sauter, Prof. Dr. Frank Kirchhoff, Prof. Dr. Thomas Mertens, Prof. Dr. Detlef Michel, Prof. Dr. Jan Münch, Prof. Dr. Reinhold Schirmbeck, Prof. Dr. Christian Sinzger, Jun.-Prof. Dr. Jens von Einem</td>
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### Allocation of study programmes

- Biochemistry MSc, start of studies: winter semester, compulsory elective module, 1<sup>st</sup> to 3<sup>rd</sup> study semester;
- Biology MSc, start of studies: winter semester, compulsory elective module, 1<sup>st</sup> to 4<sup>th</sup> study semester

### Recommended prerequisites

Formally: Refer to the subject-specific examination regulations of the respective study course, in the version effective when taking up the study program.

Contentually: Lecture General Virology for Natural Scientists [Allgemeine Virologie für Naturwissenschaftler] or knowledge of general principles of virology.

### Learning objectives

- Students who have successfully completed this module
  - understand molecular mechanisms of virus entry, replication and egress.
  - know the role of viruses in the transformation of cells and oncogenesis.
  - understand the interaction of viruses with the immune system and viral immune evasion strategies.
  - understand general aspects of vaccine development (targets, mechanisms, application).
  - know the basics principles of diagnostic methods and their use.
  - know the problem of emerging viruses.
  - understand details of Influenza and HIV biology.
  - are capable to work on and to present scientific topics with the help of actual literature.
Syllabus

This module covers the following subject-specific topics:

• Molecular mechanisms of virus host interactions
• Viral oncogenesis
• Viruses and the immune system
• Diagnosis, prevention, and treatment of viral diseases
• Vaccine development
• Emerging viruses
• Viral vectors and viral gene therapy

Literature

• Flint, Enquist, Racaniello, Skalka “Principles of Virology” 3rd Edition
• Current literature suggested by the lecturers

Teaching and learning methods

• Virology II (part 1) (lecture/seminar), 2 credit hours [SWS], 3 credit points [LP], winter semester
• Virology II (part 2) (lecture/seminar), 2 credit hours [SWS], 3 credit points [LP], summer semester
• Virology (practical course) (laboratory course), 9 credit hours [SWS], 9 credit points [LP], summer semester

Workload

Attendance time: 195 h
Private study: 255 h
Sum: 450 h

Assessment

No english version available yet.

Grading procedure

No english version available yet.

Basis for

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