Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

Module Catalogue
for the Subject

Biochemistry

as a Bachelor's with 1 major

with the degree "Bachelor of Science"

(180 ECTS credits)

Examination regulations version: 2013
Responsible: Faculty of Chemistry and Pharmacy

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Content and Objectives of the Programme

No translation available.

Abbreviations used

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

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

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

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

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

Conventions

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

Notes

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

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

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

In accordance with

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

ASPO2009

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

23-Sep-2013 (2013-110) except for mandatory electives added in Fast Track procedure at a later time

09-Dec-2014 (2014-81)

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 Electives

(30 ECTS credits)

Module title			Abbreviation
Immunology for students of biochemistry			03-4S1IMM-BC-132-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	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module gives an introduction to immunology. The following questions will be addressed: How does the body recognise and eliminate pathogens and tumour cells? How can the immune system damage its own body (allergies, autoimmunity)? Organs, cells and molecules of the immune system will be presented with an emphasis on genetic and molecular mechanisms of recognition and elimination of foreign substances by the immune system. The most important immunological techniques will be introduced and applied.

Intended learning outcomes

The students acquire a practical knowledge of cellular and molecular techniques for the analysis of the immune system. The are familiar with the mechanisms of self and non-self discrimination by the adaptive and innate immune systems. They acquire a fundamental knowledge of lymphocyte development as well as major immune effector cell functions and molecules.

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

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

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

written examination (approx. 45 minutes)
Assessment offered: once a year, summer semester
Language of assessment: German or English

Allocation of places

Biochemie (Biochemistry) Bachelor's: 16 places. Selection process Biochemie (Biochemistry) Bachelor's: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places) number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

Additional information

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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

Bachelor' degree (1 major) Biochemistry (2013)

Module title	Abbreviation
Virology for students of biochemistry	03-4S1VIR-BC-132-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)
5	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Introduction to virology; the infectious cycle; virus structure and assembly; adsorption and entry; genomes and genetics; RNA-viruses: mRNA-synthesis and RNA-genome replication; retroviruses: reverse transcription and integration; DNA-viruses: transcription and genome replication. Foundations of cell biology. Introduction to the scientific method and scientific approach; principles of antiviral therapy and vaccination; introduction to clinical virology; HIV and AIDS. Safe work in a BSL-2 laboratory; cell culture; virus production, titre test; virus sequencing, phylogenetic analysis of viral quasispecies.

Intended learning outcomes

Fundamental knowledge of molecular virology, the structure and replication of viruses and virus-host interactions; principles of antiviral vaccines and chemotherapeutics; principal techniques in cell and molecular biology for virological research.

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

V + 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)

a) written examination (approx. 45 to 60 minutes) or b) log (approx. 10 to 20 pages) or c) oral examination of one candidate each (approx. 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (approx. 20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete varies according to subject area but will not exceed a maximum of 4 hours). Students will be informed about the method and length of the assessment prior to the course.
Assessment offered: once a year, summer semester
Language of assessment: German or English

Allocation of places

Biochemie (Biochemistry) Bachelor's: 18 places. Selection process Biochemie (Biochemistry) Bachelor's: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places) number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

Additional information

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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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Human genetics for students of biochemistry			03-4S1HUG-BC-132-m01
Module coordinator		**Module offered by**	
holder of the Chair of of Human Genetics		Faculty of Medicine	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Fundamentals of and analytical methods in human and vertebrate cytogenetics. Characterisation of the normal human karyotype and chromosome aberrations. Introduction to chromosome evolution.

Intended learning outcomes

Students who complete this module will acquire the theoretical basis of and practical experience in human cytogenetics. They will learn how to prepare and identify human chromosomes and critically interpret cytogenetic findings.

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

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

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

written examination (approx. 30 minutes)

Allocation of places

Biochemie (Biochemistry) Bachelor's: 5 places. Selection process Biochemie (Biochemistry) Bachelor's: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places) number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

Additional information

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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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Pathobiochemistry			03-PBC-132-m01
Module coordinator		**Module offered by**	
holder of the Chair of Clinical Biochemistry and Pathobiochemistry		Faculty of Medicine	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Fundamentals of selected topics in pathobiochemistry and pathophysiology.

Intended learning outcomes

Students are familiar with the fundamentals of pathobiochemistry and pathophysiology.

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

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

- 03-PBC-1-092: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 03-PBC-2-132: 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)

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

Assessment in module component 03-PBC-1-092: Basics in Pathobiochemistry Basics in Pathobiochemistry

- 2 ECTS, Method of grading: numerical grade
- written examination (approx. 90 minutes)
- Language of assessment: German or English

Assessment in module component 03-PBC-2-132: Pathobiochemistry Practical Course

- 3 ECTS, Method of grading: (not) successfully completed
- assessment of practical performance, Nachtestate (post-experiment exams: examination talks, approx. 15 minutes each), logs (approx. 20 pages)
- Assessment offered: once a year, summer semester
- Language of assessment: German or English

Allocation of places

Information on the allocation of places will be listed separately for each module component.

- 03-PBC-2-132: Biochemie (Biochemistry) Bachelor's: 6 places. Selection process Biochemie (Biochemistry) Bachelor's: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places) number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.
- 03-PBC-1-092: --

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
Bachelor' degree (1 major) Biochemistry (2013)

Module title	Abbreviation
Molecular Biology Lab	08-BC-MOLP-111-m01

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

ECTS	Method of grading	Only after succ. compl. of module(s)
10	numerical grade	08-BC (module component 08-BC-1 only)

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

This module equips students with practical skills in the areas of recombinant engineering and characterisation of macromolecular complexes, modern biomolecular techniques, in vivo analysis of biochemical processes, and modern imaging techniques.

Intended learning outcomes

Students have developed a knowledge of molecular biology and are able to apply it to practical experiments.

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

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

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

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

Allocation of places

Biochemie (Biochemistry) Bachelor's: 24 places. Chemie (Chemistry) Master's: 6 places. Selection process Biochemie (Biochemistry) Bachelor's: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places) number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available. Selection process Chemie (Chemistry) Master's: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): grade of module 08-BC; among applicants with the same grade, places will be allocated by lot. Quota 2 (one third of places) number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

Additional information

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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

Bachelor' degree (1 major) Biochemistry (2011)

Bachelor' degree (1 major) Biochemistry (2013)
Master's degree (1 major) Chemistry (2013)

Module title			Abbreviation
Cell biology			03-ZBP-132-m01
Module coordinator		**Module offered by**	
holder of the Chair of Medical Radiation and Cell Research		Faculty of Medicine	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	08-BC (module component 08-BC-1 only)	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Becoming familiar with basic cell biological principles via hands-on training and seminars. Major topics are the structural organisation of eukaryotic cells, cell-cell and cell-matrix interactions, proliferation, differentiation and apoptosis.

Intended learning outcomes

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

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

P + 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)

written examination (approx. 60 minutes)
Language of assessment: German or English

Allocation of places

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

Additional information

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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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Molecular Tumor Biology			03-MTUB-132-m01
Module coordinator		**Module offered by**	
holder of the Chair of Physiological Chemistry		Faculty of Medicine	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	08-BC (module component 08-BC-1 only)	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

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

Intended learning outcomes

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

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

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

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

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

Allocation of places

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

Additional information

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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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Specific Microbiology 2 for Students of Biochemistry			07-5S2MiZ2-BC-132-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)**	
10	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

In this module, students will acquire an in-depth insight into approaches and methods in microbiology.

Intended learning outcomes

Students have acquired knowledge about general strategies and methods of microbiology. They are able to independently perform scientific laboratory work.

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

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

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

a) written examination (approx. 45 to 60 minutes) or b) log (approx. 10 to 20 pages) or c) oral examination of one candidate each (approx. 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (approx. 20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete varies according to subject area but will not exceed a maximum of 4 hours). Students will be informed about the method and length of the assessment prior to the course.

Allocation of places

Biochemie (Biochemistry) Bachelor's: 6 places. Selection process Biochemie (Biochemistry) Bachelor's: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places) number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

Additional information

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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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Organic Chemistry 4			08-OC4-102-m01
Module coordinator		**Module offered by**	
holder of the Chair of Organic Chemistry II		Institute of Organic Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
10	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	By way of exception, additional prerequisites are listed in the section on assessments.	

Contents

This module focuses on heterocyclic compounds, dyes, naturally occurring substances, biopolymers and protecting group techniques. Students enhance their experimental skills by working with special hazardous substances, using complicated working and synthesis techniques as well as extensive purification methods and performing elaborate product analyses.

Intended learning outcomes

Students are able to name important heteroaromatics and to formulate their reactions and syntheses. They are able to characterise and categorise dyes. Students are able to describe the structure and selective synthesis of proteins. In addition, they are able to describe the structure of the DNA, carbohydrates, fats, terpenes and steroids. Students know how to safely and responsibly handle special hazardous substances. They are able to perform complex syntheses, purification methods and product analyses. They are able to use specialist literature to plan experiments.

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

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

- 08-OC4-1-102: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 08-OC4-2-102: 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)

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

Assessment in module component 08-OC4-1-102: Organic Chemistry 4 Organic Chemistry 4

- 5 ECTS, Method of grading: numerical grade
- a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German or English
- Only after successful completion of module components: 08-OC1 or 08-OC1-GHR
- Other prerequisites: Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).

Assessment in module component 08-OC4-2-102: Organic Chemistry - advanced laboratory course for students of chemistry

- 5 ECTS, Method of grading: (not) successfully completed
- pre/post-experiment examination talks (Vor-/Nachtestate, approx. 15 minutes each), log (approx. 5 to 10 pages)
- Assessment offered: once a year, winter semester
- Language of assessment: German, English

- Only after successful completion of module components: 08-OC3 (module component 08-OC3-2 only) or 08-OC3P

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)

§ 62 (1) 2. Chemie "Organische und Bioorganische Chemie"

Module appears in

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)
Bachelor' degree (1 major) Chemistry (2010)
Bachelor' degree (1 major) FOKUS Chemistry (2011)

Module title			Abbreviation
Bioinformatics for Advanced Students in Biochemistry			07-4BFMZ4-BC-132-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	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

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

Intended learning outcomes

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

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

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

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

log (approx. 10 to 20 pages)
Language of assessment: German or English

Allocation of places

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

Additional information

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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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Advanced lab (abridged)			08-AVP5-BC-132-m01
Module coordinator			**Module offered by**
chairperson of examination committee Biochemie (Biochemistry)			Chair of Biochemistry
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module gives students the opportunity to explore a specific research topic and present the results of their work in a written report.

Intended learning outcomes

Students are able to explore a specific research topic and present the results of their work in a written report.

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

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

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

log (approx. 20 pages)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 3 weeks.

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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Advanced lab			08-AVP10-BC-132-m01
Module coordinator			**Module offered by**
chairperson of examination committee Biochemie (Biochemistry)			Chair of Biochemistry
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
10	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module gives students the opportunity to explore a specific research topic and present the results of their work in a written report.

Intended learning outcomes

Students are able to explore a specific research topic and present the results of their work in a written report.

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

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

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

log (approx. 30 pages)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 6 weeks.

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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Introductory Neurobiology for students of biomedicine			03-98-PGN-092-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	undergraduate	Admission prerequisite to assessment: regular attendance of courses (lectures excluded) as specified at the beginning of the course.	

Contents

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

Intended learning outcomes

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

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

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

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

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

Allocation of places

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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

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)
Bachelor' degree (1 major) Biochemistry (2009)
Bachelor' degree (1 major) Biomedicine (2009)
Bachelor' degree (1 major) Biomedicine (2013)

Module title			Abbreviation
Current Methods of Protein Chromatography			08-BC-AMP-141-m01
Module coordinator		**Module offered by**	
holder of the Chair of Biochemistry		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Comprising practical experiments, this module equips students with the theoretical principles of, and methodological skills for, protein purification using modern chromatographic techniques.

Intended learning outcomes

Students have become familiar with the tools used for chromatographic protein purification. They have become familiar with the relevant parameters and are able to transfer what they have learned to new problems. They are able to evaluate their results, produce written reports detailing those results as well as to discuss them.

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

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

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

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

Allocation of places

Biochemie (Biochemistry) Bachelor's: 24 places. Selection process Biochemie (Biochemistry) Bachelor's: Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places) number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

Additional information

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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

Bachelor' degree (1 major) Biochemistry (2013)

Compulsory Courses

(118 ECTS credits)

Module title			Abbreviation
Structural Biology			03-5S2ST-BC-132-m01
Module coordinator		**Module offered by**	
holder of the Chair of Structural Biology		Faculty of Medicine	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
10	numerical grade	08-BC (module component 08-BC-1 only)	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module provides a brief introduction to crystallography and commonly used biophysical techniques as well as the fundamental principles of macromolecular architectures. Building on this, the structure and function of selected biological macromolecules are presented. In small groups, participants will analyse one specific macromolecule in silico with respect to its structure and biological function and will present their results in a talk. The various macromolecules in their entirety reflect a number of important biological problems.

Intended learning outcomes

On the basis of individually assigned model proteins, the students will acquire the ability to explore common problems in structural biology and to analyse structure-function relationships. They will also acquire skills in the oral presentation of scientific results as well as in the in silico analysis of biological macromolecules.

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

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

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

a) written examination (approx. 45 to 60 minutes) or b) log (approx. 10 to 20 pages) or c) oral examination of one candidate each (approx. 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 20 minutes per candidate) or e) presentation (approx. 20 to 30 minutes) or f) practical examination (on average approx. 2 hours; time to complete varies according to subject area but will not exceed a maximum of 4 hours). Students will be informed about the method and length of the assessment prior to the course.
Language of assessment: German or English

Allocation of places

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Additional information

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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

Bachelor' degree (1 major) Biochemistry (2013)

Module title	Abbreviation
General Biology for students of biochemistry	07-1A1ZO-BC-132-m01

Module coordinator	Module offered by
Dean of Studies Biologie (Biology)	Faculty of Biology

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

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

Intended learning outcomes

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

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

V + V + V + 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)

4 written examinations (including multiple choice questions): 3 examinations: 60 minutes each (graded); 1 examination: 30 minutes (ungraded); weighted 1:1:1:1

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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Inorganic Chemistry 1			08-AC1-BC-111-m01
Module coordinator		**Module offered by**	
lecturer of lecture "Experimentalchemie" (Experimental Chemistry)		Institute of Inorganic Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
16	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	By way of exception, additional prerequisites are listed in the section on assessments.	

Contents

This module provides students with an overview of the fundamental principles of chemistry. It focuses on particles, metals, acid-base reactions, the periodic table, chemical equilibrium and complexometry. In addition, the module introduces fundamental models of chemistry and principles of inorganic chemistry. It includes practical exercises based on the lecture on experimental chemistry and its extension. After a safety briefing, the students autonomously conduct experiments in the laboratory. The course focuses on laboratory safety, simple lab techniques, the synthesis of simple substances and analyses of unknown substances. In addition, students have the opportunity to advance their laboratory knowledge.

Intended learning outcomes

Students are able to explain the principles of the periodic table and to extract information from it. They are able to explain basic models of the structure of matter. They have developed the ability to use the language of chemical formulas to describe chemical reactions and to interpret them by identifying the type of reaction. Students are able to describe the main quantitative and qualitative analytical methods and their application areas. They are able to identify fundamental problems in chemistry and perform experiments to solve them. They have developed the ability to perform the necessary stoichiometric calculations and describe the chemical processes in an appropriate manner, both in written and oral form.

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

This module comprises 3 module components. Information on courses will be listed separately for each module component.

- 08-AC1-BC-2-092: P (no information on SWS (weekly contact hours) and course language available)
- 08-AC1-BC-3-092: V (no information on SWS (weekly contact hours) and course language available)
- 08-AC1-1-102: V + V + Ü (no information on SWS (weekly contact hours) and course language available)

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

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

Assessment in module component 08-AC1-BC-2-092: Practical course of Inorganic Chemistry 1 for Biochemistry Majors

- 4 ECTS, Method of grading: (not) successfully completed
- Vortestate (pre-experiment exams, approx. 15 minutes each), assessment of practical performance (log approx. 5 to 10 pages), Nachtestate (post-experiment exams, approx. 15 minutes each)
- Assessment offered: once a year, winter semester

Assessment in module component 08-AC1-BC-3-092: Accompanying lecture to the practical course of Inorganic Chemistry 1 for Biochemistry Majors

- 2 ECTS, Method of grading: numerical grade
- 2 written examinations (approx. 45 minutes each), weighted 1:1

Assessment in module component 08-AC1-1-102: Principles of Inorganic Chemistry Principles of Inorganic Chemistry Principles of Inorganic Chemistry

- 10 ECTS, Method of grading: numerical grade

- a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: 60 or 90 minutes each; 3 written examinations: 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German or English
- Other prerequisites: Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).

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)

§ 42 (1) 1. Chemie "Allgemeine und Anorganische Chemie" und "Physikalische und Analytische Chemie"
§ 62 (1) 1. Chemie "Allgemeine und Anorganische Chemie"; "Physikalische und Analytische Chemie"

Module appears in

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Organic Chemistry 1			08-OC1-092-m01
Module coordinator		**Module offered by**	
holder of the Professorship of Organic Chemistry		Institute of Organic Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).	

Contents

This module provides students with an overview of the fundamental principles of organic chemistry. It examines the bonding situation of carbon and introduces students to the nomenclature of simple and moderately complex organic compounds. The module also discusses the fundamental principles of stereochemistry, substitution, addition and elimination reactions as well as synthesis planning.

Intended learning outcomes

Students know important categories of substances in organic chemistry. They are able to use different systems of nomenclature to determine simple substance names. Students are able to analyse the stereochemistry of molecules. They are able to describe and formulate some of the most important reactions in organic chemistry. For that purpose, they can analyse and categorise the characteristic reaction conditions and can use them for simple syntheses.

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

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

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

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

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)

§ 62 (1) 2. Chemie "Organische und Bioorganische Chemie"

Module appears in

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)
Bachelor' degree (1 major) Biochemistry (2009)
Bachelor' degree (1 major) Chemistry (2010)
Bachelor' degree (1 major) Chemistry (2009)
Bachelor' degree (1 major) Mathematics (2012)

Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor' degree (1 major) FOKUS Chemistry (2011)
First state examination for the teaching degree Gymnasium Chemistry (2009)

Module title			Abbreviation
Organic Chemistry 2			08-OC2-102-m01
Module coordinator		**Module offered by**	
holder of the Chair of Physically Organic Chemistry		Institute of Organic Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
9	numerical grade	08-OC1	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).	

Contents

This module introduces students to the rules of aromaticity and discusses specific reactions of aromatics. Using the example of carbonyl compounds, it extends the students' knowledge of substitution, elimination and addition reactions to complex reaction mechanisms. The course also focuses on oxidation and reduction reactions as well as rearrangement. In addition, it introduces students to the spectroscopic methods of infrared spectroscopy, mass spectrometry and NMR spectroscopy.

Intended learning outcomes

Students have become familiar with the criteria for aromaticity. They can analyse the varying reactivity of carbonyl compounds. They are able to describe specific reactions of carbonyls and aromatics. For that purpose, they can plan and formulate multi-stage syntheses with complex reaction mechanisms and can transfer them to unknown reactions. Students are able to describe important spectroscopic methods, to evaluate a spectrum and to draw conclusions regarding the molecular structure.

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

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

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

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

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)
Bachelor' degree (1 major) Chemistry (2010)
Bachelor' degree (1 major) Mathematics (2012)

Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor' degree (1 major) FOKUS Chemistry (2011)

Module title			Abbreviation
Organic Chemistry - laboratory course for students of biochemistry			08-OC3P-112-m01
Module coordinator		**Module offered by**	
holder of the Chair of Organic Chemistry II		Institute of Organic Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
7	(not) successfully completed	08-OC1 and 08-AC1-BC (module component 08-AC1-BC-2 only)	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module gives students the opportunity to apply in practice the knowledge they have gained through the related lecture(s). After a safety briefing, the students autonomously conduct experiments in the laboratory. In addition to those experiments, students will be expected to take oral tests and write lab reports to demonstrate their knowledge. The course focuses on the safe handling of hazardous substances, simple experimental unit operations of organic chemistry, simple to multi-level syntheses and the analysis of the products.

Intended learning outcomes

Students know how to safely handle hazardous substances. They are able to conduct simple experimental operations of organic chemistry. They are able to analyse the yield and purity of the products and identify possible error sources. They are able to connect the theoretical aspects covered in the lecture with practical experiments in the laboratory.

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)

Vortestate (pre-experiment exams, approx. 15 minutes each), assessment of practical performance (log approx. 5 to 10 pages), Nachtestate (post-experiment exams, approx. 15 minutes each)
Assessment offered: once a year, summer semester

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

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)

Module title	Abbreviation
Physical Chemistry 1	08-PC1-092-m01

Module coordinator	Module offered by
lecturer of lecture "Grundlagen der Quantenmechanik and Spektroskopie" (Principles of Quantum Mechanics and Spectroscopy)	Institute of Physical and Theoretical Chemistry

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).

Contents

This module introduces students to the fundamental principles of quantum mechanics. It analyses molecules on the basis of the following models: particle in a box, harmonic oscillator and rigid rotor. As regards spectroscopy, the module focuses on vibrational spectroscopy, angular momentum quantisation, microwave spectroscopy and UV-VIS spectroscopy. In addition, the module discusses linear operators, eigenvalue problems, matrix representation, differential equations, Fourier transform and orthogonal functions as mathematical bases of the topics listed above.

Intended learning outcomes

Students are able to explain key models of quantum mechanics and to apply them to molecules. They are able to describe different spectroscopic methods. In addition, students know how to apply the mathematical bases of quantum mechanics.

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

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

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

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

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

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)
Bachelor' degree (1 major) Biochemistry (2009)
Bachelor' degree (1 major) Chemistry (2010)

Bachelor' degree (1 major) Chemistry (2009)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor' degree (1 major) FOKUS Chemistry (2011)

Module title			Abbreviation
Physical Chemistry 2 for Biochemistry Majors			08-PC2V-BC-132-m01
Module coordinator		**Module offered by**	
lecturer of lecture "Thermodynamik, Kinetik, Elektrochemie"		Institute of Physical and Theoretical Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
9	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).	

Contents

This module introduces students to the principles of thermodynamics. It focuses on the laws of thermodynamics, chemical equilibria, ideal and real gasses/solutions/mixed phases and electrochemistry. In addition to thermodynamic processes, it discusses the fundamental principles of kinetics.

Intended learning outcomes

Students are able to explain the laws of thermodynamics. They are able to describe thermodynamic aspects of solutions, gases, mixed phases and electrochemical reactions. Students are able to interpret the kinetic aspects of chemical reactions.

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

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

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

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

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)

§ 62 (1) 1. Chemie "Allgemeine und Anorganische Chemie"; "Physikalische und Analytische Chemie"

Module appears in

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Practical course of Physical Chemistry for Biochemistry Majors			08-PC2P-132-m01
Module coordinator		**Module offered by**	
lecturer of lecture "Thermodynamik, Kinetik, Elektrochemie"		Institute of Physical and Theoretical Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
6	(not) successfully completed	08-PC1 (module component 08-PC1-1 only)	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module gives students the opportunity to apply in practice the knowledge they have gained through the related lecture(s). After a safety briefing, the students autonomously conduct experiments in the laboratory. In addition to those experiments, students will be expected to take oral tests and write lab reports to demonstrate their knowledge.

Intended learning outcomes

Students are able to connect the theoretical principles of thermodynamics, kinetics, electrochemistry and spectroscopy with practical laboratory experiments. They are able to analyse the resulting measurements.

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)

Vortestate (pre-experiment exams), assessment of practical performance, Nachtestate (post-experiment exams), examination talks (approx. 15 minutes each), logs (approx. 5 to 10 pages)
Assessment offered: once a year, winter semester

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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Bioanalytics			08-BAN-092-m01
Module coordinator		**Module offered by**	
holder of the Chair of Biochemistry		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
8	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Comprising lectures as well as theoretical and practical exercises, this module introduces students to the theoretical principles of, and essential methods in, bioanalysis.

Intended learning outcomes

Students have developed a knowledge of the fundamental principles of bioanalysis and are able to apply it to practical experiments.

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

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

- 08-BAN-1-092: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 08-BAN-2-092: Ü (no information on SWS (weekly contact hours) and course language available)

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

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

Assessment in module component 08-BAN-1-092: Principles of Bioanalytics Principles of Bioanalytics

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

Assessment in module component 08-BAN-2-092: Bioanalytics (practical course)

- 5 ECTS, Method of grading: (not) successfully completed
- a) log (approx. 20 pages) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes) Students will be informed about the method and length 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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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
Bachelor' degree (1 major) Biochemistry (2011) Bachelor' degree (1 major) Biochemistry (2013) Bachelor' degree (1 major) Biochemistry (2009)

Module title			Abbreviation
Principles of Biochemistry			08-BC-132-m01
Module coordinator		**Module offered by**	
holder of the Chair of Biochemistry		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
6	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Comprising lectures and exercises, this module acquaints students with the fundamental principles of biochemistry.

Intended learning outcomes

Students have become familiar with the fundamental principles of biochemistry. They are able to describe the key biochemical processes in cellular systems.

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

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

- 08-BC-1-132: V + Ü (no information on SWS (weekly contact hours) and course language available)
- 08-BC-2-132: V + Ü (no information on SWS (weekly contact hours) and course language available)

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

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

Assessment in module component 08-BC-1-132: Principles of Biochemistry 1 Principles of Biochemistry 1

- 3 ECTS, Method of grading: numerical grade
- written examination (approx. 60 to 90 minutes)

Assessment in module component 08-BC-2-132: Principles of Biochemistry 2 Principles of Biochemistry 2

- 3 ECTS, Method of grading: numerical grade
- written examination (approx. 60 to 90 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

Bachelor' degree (1 major) Biochemistry (2013)
Bachelor' degree (1 major) Physics (2010)
Master's degree (1 major) Chemistry (2013)

Module title			Abbreviation
Biochemistry for Biochemistry Majors (Exercises)			08-BCBCP-132-m01
Module coordinator		**Module offered by**	
holder of the Chair of Biochemistry		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Practical exercises give students the opportunity to learn the fundamental principles of conducting biochemical experiments.

Intended learning outcomes

Students have become proficient in essential methods in biochemistry.

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

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

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

a) log (approx. 20 pages) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes) Students will be informed about the method and length of the assessment prior to the course. Assessment offered: once a year, summer semester

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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Molecular Biology for Biochemistry students			08-BC-MOL-122-m01
Module coordinator		**Module offered by**	
holder of the Chair of Biochemistry		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
6	numerical grade	08-BC (module component 08-BC-1 only)	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Comprising a lecture and an exercise, this module discusses advanced topics in molecular physiology and functional biochemistry. Another lecture discusses the fields of genetic engineering and biosafety.

Intended learning outcomes

Students have developed a sound knowledge of molecular biology. They know what infrastructure is needed for each of the four safety levels into which genetic engineering facilities are categorised and are familiar with the usage rules for them. They have developed a knowledge and understanding of the theoretical principles of genetic engineering and are able to describe relevant examples of applications of genetic engineering as well as to discuss the associated safety issues.

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

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

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

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

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

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

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

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

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

Allocation of places

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Additional information

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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
Bachelor' degree (1 major) Biochemistry (2013)
Master's degree (1 major) Biochemistry (2012)

Module title			Abbreviation
Mathematics for students in Chemistry and Biology			10-M-MCB-132-m01
Module coordinator		**Module offered by**	
Dean of Studies Mathematik (Mathematics)		Institute of Mathematics	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	Admission prerequisite to assessment: successful completion of exercises (approx. 25 to 30 hours).	

Contents

Functional relations, differentiation and integration of functions in one variable, curve sketching, differentiation of functions in several variables, power series, ordinary differential equations, systems of linear equations, basic notions in statistics.

Intended learning outcomes

The student is able to recognise and phrase simple questions from natural sciences as mathematical problems, apply basic mathematical methods to them and interpret the results.

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

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

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

written examination (approx. 90 to 120 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

Bachelor' degree (1 major) Biochemistry (2013)
Bachelor' degree (1 major) Biology (2013)

Module title	Abbreviation
Introduction to Physics for Students of Non-physics-related Minor Subjects	11-EFNF-072-m01

Module coordinator	Module offered by
Managing Director of the Institute of Applied Physics	Faculty of Physics and Astronomy

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

Duration	Module level	Other prerequisites
2 semester	undergraduate	--

Contents

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

Intended learning outcomes

The students have knowledge of the principles of Physics.

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

V + 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)

written examination (approx. 120 minutes)

Allocation of places

Only as part of pool of general key skills (ASQ): 10 places. Places will be allocated by lot.

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

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)
Bachelor' degree (1 major) Biochemistry (2009)
Bachelor' degree (1 major) Biology (2011)
Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Biology (2010)
Bachelor' degree (1 major) Chemistry (2007)
Bachelor' degree (1 major) Chemistry (2008)
Bachelor' degree (1 major) Chemistry (2010)
Bachelor' degree (1 major) Chemistry (2009)
Bachelor' degree (1 major) Geography (2007)
Bachelor' degree (1 major) Geography (2008)
Bachelor' degree (1 major) Geography (2010)
Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Computer Science (2014)
Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Food Chemistry (2009)
Bachelor' degree (1 major) Mathematics (2008)

Bachelor' degree (1 major) Mathematics (2014)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Mathematics (2007)
Bachelor' degree (1 major) Biomedicine (2009)
Bachelor' degree (1 major) Biomedicine (2013)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor' degree (1 major) Computational Mathematics (2014)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor' degree (1 major) FOKUS Chemistry (2011)

Module title			Abbreviation
Practical Course Physics for Students of Non-physics-related Minor Subjects			11-PFNF-072-m01
Module coordinator		**Module offered by**	
Managing Director of the Institute of Applied Physics		Faculty of Physics and Astronomy	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
3	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Mechanics, vibration theory, thermodynamics, optics, X-rays, nuclear magnetic resonance, Atomic and Nuclear Physics.

Intended learning outcomes

The students have knowledge of the principles of Physics.

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

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)

a) oral test (approx. 15 minutes) during experiment and b) ungraded written examination (approx. 90 minutes)

Allocation of places

Only as part of pool of general key skills (ASQ): 10 places. Places will be allocated by lot.

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

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)
Bachelor' degree (1 major) Biochemistry (2009)
Bachelor' degree (1 major) Biology (2011)
Bachelor' degree (1 major) Biology (2007)
Bachelor' degree (1 major) Biology (2010)
Bachelor' degree (1 major) Chemistry (2007)
Bachelor' degree (1 major) Chemistry (2008)
Bachelor' degree (1 major) Chemistry (2010)
Bachelor' degree (1 major) Chemistry (2009)
Bachelor' degree (1 major) Geography (2007)
Bachelor' degree (1 major) Geography (2008)
Bachelor' degree (1 major) Geography (2010)
Bachelor' degree (1 major) Computer Science (2007)
Bachelor' degree (1 major) Computer Science (2014)
Bachelor' degree (1 major) Computer Science (2010)
Bachelor' degree (1 major) Food Chemistry (2009)

Bachelor' degree (1 major) Biomedicine (2009) Bachelor' degree (1 major) Biomedicine (2013) Bachelor' degree (1 major) FOKUS Chemistry (2011)

Module title			Abbreviation
Consolidation Seminar			08-VS-BC-132-m01
Module coordinator		**Module offered by**	
chairperson of examination committee Biochemie (Biochemistry)		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
3	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Students deliver a presentation on the findings of their practical research projects and critically discuss them with their audience.

Intended learning outcomes

Students are able to present the findings of their projects. They can defend their choice of experimental methods, their findings as well as the evaluation and interpretation of those findings in a scientific discussion.

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

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)

oral examination (approx. 30 minutes) on a paper written by the candidate
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

Bachelor' degree (1 major) Biochemistry (2013)

Thesis

(12 ECTS credits)

Module title			Abbreviation
Bachelor Thesis in Biochemistry			08-BA-BC-132-m01
Module coordinator		**Module offered by**	
chairperson of examination committee Biochemie (Biochemistry)		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
12	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module gives students the opportunity to research and write on a defined problem within a given time frame and using the scientific methods they have learned during the programme.

Intended learning outcomes

Students are able to conduct research on a defined problem/topic, adhering to the principles of good scientific practice, and to present the results of their work in written form.

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

no courses assigned

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 thesis (50 to 70 pages)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 10 weeks.

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

Bachelor' degree (1 major) Biochemistry (2013)

Subject-specific Key Skills

(ECTS credits)

Module title			Abbreviation
Mathematical Biology and Biostatistics			07-M-BST-132-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)**	
4	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Fundamental principles of the most important mathematical and statistical methods in biology.

Intended learning outcomes

Students will have acquired fundamental skills in the evaluation of experiments, the interpretation of readings and numbers as well as the mathematical description of biological processes.

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

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

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

written examination (approx. 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

Bachelor' degree (1 major) Biochemistry (2013)
Bachelor' degree (1 major) Biology (2013)
Bachelor' degree (1 major) Computer Science (2014)
Bachelor' degree (1 major) Mathematics (2014)
Bachelor' degree (1 major) Computational Mathematics (2014)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2013)

Module title	Abbreviation
Information Literacy for Students of the Natural Sciences (Basic Level)	41-IK-NW1-101-m01

Module coordinator	Module offered by
head of University Library	University Library

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

Information literacy in an academic context:
- Search strategies and tools.
- Using the library's electronic resources.
- Resources for natural sciences: databases and journals.
- Online searches and search engines.
- Overview of additional resources (eLearning etc.).
- Reference management. Some sections of the module will focus on particular disciplines (wherever possible, on disciplines in the natural sciences).

Intended learning outcomes

Students know what information is needed for what purpose. They are able to locate information that is relevant within their discipline and beyond in a variety of resources and to evaluate this information. They recognise the difference in quality between information they have retrieved from specific, restricted access resources (databases) and information they have found on the free web. Students are able to manage and process the information they have found, using reference management software and eLearning tools. The module aims to equip students with the skills needed to find information and literature that is relevant to the topics of their Bachelor's theses.

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

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

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

a) written examination (approx. 60 minutes) or b) preparing and delivering a presentation with slides (approx. 10 minutes or approx. 5 minutes and approx. 1 page) or c) completing exercises (approx. 10 exercises) or d) presentation without slides (approx. 20 to 30 minutes) or e) preparing and delivering a presentation with slides (approx. 5 minutes) and completing exercises (approx. 5 exercises) or f) presentation without slides (approx. 10 to 15 minutes) and completing exercises (approx. 5 exercises)

Allocation of places

Number of places: 5-50. There is a restricted number of places. If necessary, places will be allocated as follows: Students of the degree programmes of the respective subject-specific focuses will be given preferential consideration. The remaining places, if and when any become available, will be allocated to students of the other natural sciences degree programmes. In each of the above-mentioned groups, 30% of places will be allocated according to the number of subject semesters. Among applicants with the same number of subject semesters, places will be allocated by lot. The remaining 70% of places will each be allocated by lot.

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
Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)
Bachelor' degree (1 major) Biochemistry (2009)
Master's degree (1 major) Nanostructure Technology (2011)
Master's degree (1 major) Nanostructure Technology (2010)
Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)
No final examination Special study offering (2010)

Module title	Abbreviation
Information Literacy for Students of the Natural Sciences (Advanced Level)	41-IK-NW2-101-m01

Module coordinator	Module offered by
head of University Library	University Library

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	Knowledge and skills equivalent to those achieved in the basic module desirable.

Contents

Information literacy in an academic context:
- More in-depth discussion of selected topics that were covered in the level one module, e. g. searching subject-specific databases.
- Publishing and information practices in the natural sciences.
- Subject-specific information retrieval tools, e. g. classifications and thesauri.
- New web-based information and communication technologies.
- Searching for subject-specific facts (e. g. substances and physical data).
- Information search skills for the workplace.
- Copyright and citations.
- Electronic publishing. Some sessions will focus on particular disciplines (wherever possible, on disciplines in the natural sciences).

Intended learning outcomes

Students have developed a differentiated understanding of the publishing and information practices in their discipline and are familiar with the possibilities offered by electronic publishing. They are able to use electronic tools to locate subject-specific facts in a variety of resources. Students are able to work with subject-specific information retrieval tools as well as to use new web-based technologies to share information. They have developed an understanding of the legal framework surrounding publications, information, and communication in an academic context and are able to use information responsibly.

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

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

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

a) written examination (approx. 60 minutes) or b) preparing and delivering a presentation with slides (approx. 10 minutes or approx. 5 minutes and approx. 1 page) or c) completing exercises (approx. 10 exercises) or d) presentation without slides (approx. 20 to 30 minutes) or e) preparing and delivering a presentation with slides (approx. 5 minutes) and completing exercises (approx. 5 exercises) or f) presentation without slides (approx. 10 to 15 minutes) and completing exercises (approx. 5 exercises)

Allocation of places

Number of places: 10 to 50. There is a restricted number of places. If necessary, places will be allocated as follows: Students of the degree programmes of the respective subject-specific focuses will be given preferential consideration. The remaining places, if and when any become available, will be allocated to students of the other natural sciences degree programmes. In each of the above-mentioned groups, 30% of places will be allocated according to the number of subject semesters. Among applicants with the same number of subject semesters, places will be allocated by lot. The remaining 70% of places will each be allocated by lot.

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
Bachelor' degree (1 major) Biochemistry (2011) Bachelor' degree (1 major) Biochemistry (2013) Bachelor' degree (1 major) Biochemistry (2009) Master's degree (1 major) Nanostructure Technology (2011) Master's degree (1 major) Nanostructure Technology (2010) Master's degree (1 major) FOKUS Physics - Nanostructuring Technology (2010)

Module title			Abbreviation
Philosophy 2			06-B-P2TF2-102-m01
Module coordinator		**Module offered by**	
holder of the Chair of Theoretical Philosophy		Institute of Philosophy	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	Admission prerequisite to assessment: regular attendance of seminar (a maximum of 2 incidents of unexcused absence).	

Contents

Introduction to the theory of intellectual disciplines; philosophical bases of the humanities and the social sciences.

Intended learning outcomes

Intended learning outcomes: Content-related outcomes: - insight into the relationship of philosophy to individual intellectual disciplines - ability to reflect on the historical and intellectual origins of our knowledge culture - ability to organise topics into overarching historical, social, and political schemata - insight into the scope and limits of various intellectual disciplines - knowledge of, and ability to criticise, basic assumptions in systems of thought, culture, and knowledge Formal outcomes (skills to be tested in the assessment): - ability to analyse philosophical texts and issues - ability to organise concepts and philosophical positions into overarching intellectual schemata - ability to present philosophical positions in a structured and linguistically appropriate manner

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)

written examination (approx. 90 minutes)

Allocation of places

Only as part of pool of general key skills (ASQ): maximum 20 places. Places will be allocated according to the number of subject semesters. Among applicants with the same number of subject semesters, places will be allocated by lot.

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

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)
No final examination Special study offering (2010)

Module title			Abbreviation
Bioinformatics			07-3A3BI-132-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)**	
2	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Fundamental principles of bioinformatics.

Intended learning outcomes

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

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

V + 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)

written examination (approx. 20 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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Toxicology and legal studies			03-TR-072-m01
Module coordinator		**Module offered by**	
lecturer of lecture "Toxikologie und Rechtskunde"		Faculty of Medicine	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
3	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Basics of legal regulations for chemists (handling and transportation of hazardous materials), fundamentals of toxicology.

Intended learning outcomes

The students master the basics of legal regulations for chemists (handling and transport of hazardous substances) as well as the fundamentals of toxicology.

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

V + 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)

written examination (approx. 90 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

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)
Bachelor' degree (1 major) Biochemistry (2009)
Bachelor' degree (1 major) Chemistry (2007)
Bachelor' degree (1 major) Chemistry (2008)
Bachelor' degree (1 major) Chemistry (2010)
Bachelor' degree (1 major) Chemistry (2009)
Bachelor' degree (1 major) Food Chemistry (2009)
Bachelor' degree (1 major) FOKUS Chemistry (2011)
Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
First state examination for the teaching degree Grundschule Chemistry (2009)
First state examination for the teaching degree Hauptschule Chemistry (2009)
First state examination for the teaching degree Realschule Chemistry (2009)
First state examination for the teaching degree Gymnasium Chemistry (2009)

First state examination for the teaching degree Mittelschule Chemistry (2013)

Module title			Abbreviation
Contemporary Research in Biochemistry			03-FOR-BC-092-m01
Module coordinator		**Module offered by**	
holder of the Chair of Biochemistry		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
2	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
2 semester	undergraduate	--	

Contents

Presentation of current research results in the Biocentre colloquium and discussion of recent literature.

Intended learning outcomes

Students are introduced to the topics of current research in the life sciences.

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)

attendance of 80% of talks

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

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)
Bachelor' degree (1 major) Biochemistry (2009)

Module title			Abbreviation
Physiology			03-Phys-092-m01
Module coordinator		**Module offered by**	
Managing Director of the Institute of Physiology		Faculty of Medicine	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
3	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Neurophysiology, cardiac/circulatory function, kidney, blood, respiration, acid/base homeostasis, endocrinology, nutrition and digestion, liver function.

Intended learning outcomes

Students are familiar with the fundamental principles of human physiology.

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)

written examination (30 multiple choice questions)

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

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)
Bachelor' degree (1 major) Biochemistry (2009)

Module title			Abbreviation
Practical Course - external			08-EP-132-m01
Module coordinator		**Module offered by**	
chairperson of examination committee Biochemie (Biochemistry)		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
10	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

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

Intended learning outcomes

Students have become familiar with the structures of non-university research institutions and have developed skills which qualify them to work in their profession.

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. 30 pages) or talk (approx. 20 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 6 weeks.

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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Practical Course - external, abridged			08-EPK-132-m01
Module coordinator			**Module offered by**
chairperson of examination committee Biochemie (Biochemistry)			Chair of Biochemistry
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

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

Intended learning outcomes

Students have become familiar with the structures of non-university research institutions and have developed skills which qualify them to work in their profession.

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 pages) or talk (approx. 15 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 3 weeks.

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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Practical Course - abroad			08-AP-132-m01
Module coordinator		**Module offered by**	
chairperson of examination committee Biochemie (Biochemistry)		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
10	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Practical course to be completed at universities abroad. Students may complete this course in the context of exchange programmes such as Erasmus etc. The contents of the course should correspond to the contents of a lab course offered in the context of the Bachelor's programme in Biochemistry (180 ECTS credits); please consult with the competent coordinator in advance.

Intended learning outcomes

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

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

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

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

log (approx. 30 pages) or talk (approx. 20 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 6 weeks.

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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Practical Course - abroad			08-APK-132-m01
Module coordinator		**Module offered by**	
chairperson of examination committee Biochemie (Biochemistry)		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Practical course to be completed at universities abroad. Students may complete this course in the context of exchange programmes such as Erasmus etc. The contents of the course should correspond to the contents of a lab course offered in the context of the Bachelor's programme in Biochemistry (180 ECTS credits); please consult with the competent coordinator in advance.

Intended learning outcomes

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

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

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

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

log (approx. 20 pages) or talk (approx. 15 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 3 weeks.

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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Practical lab course			08-LP-132-m01
Module coordinator		**Module offered by**	
chairperson of examination committee Biochemie (Biochemistry)		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
10	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This lab course is based in a biochemistry and/or molecular biology research group at the University of Würzburg. Please consult with the competent coordinator in advance regarding contents to be covered. The course gives students the opportunity to actively engage with methods in biochemistry, molecular biology and/or bioinformatics. Students will be expected to write a lab report documenting their experiments and findings.

Intended learning outcomes

Students have consolidated and enhanced their proficiency in research methods. They have developed the ability to apply those methods to new problems and to determine whether they are suitable for those problems. They have learned how to document and discuss experimental procedures and findings according to best scientific practice.

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. 30 pages) or talk (approx. 20 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 6 weeks.

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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Practical lab course, abridged			08-LPK-132-m01
Module coordinator		**Module offered by**	
chairperson of examination committee Biochemie (Biochemistry)		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This lab course is based in a biochemistry and/or molecular biology research group at the University of Würzburg. Please consult with the competent coordinator in advance regarding contents to be covered. The course gives students the opportunity to actively engage with methods in biochemistry, molecular biology and/or bioinformatics. Students will be expected to write a lab report documenting their experiments and findings.

Intended learning outcomes

Students have consolidated and enhanced their proficiency in research methods. They have developed the ability to apply those methods to new problems and to determine whether they are suitable for those problems. They have learned how to document and discuss experimental procedures and findings according to best scientific practice.

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 pages) or talk (approx. 15 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 3 weeks.

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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Scientific lecturing 1			08-WIRE1-132-m01
Module coordinator		**Module offered by**	
chairperson of examination committee Biochemie (Biochemistry)		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module gives students the opportunity to teach a tutorial accompanying a lecture offered by the Faculty of Chemistry and Pharmacy and learn how to present and teach topics in an appropriate manner.

Intended learning outcomes

Students are able to teach students in earlier stages of their degrees and tailor their teaching to those students' needs.

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

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

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

preparation of materials for demonstrations and exercises (approx. 120 hours total)
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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Scientific lecturing 2			08-WIRE2-132-m01
Module coordinator		**Module offered by**	
chairperson of examination committee Biochemie (Biochemistry)		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module gives students the opportunity to teach a tutorial accompanying a lecture offered by the Faculty of Chemistry and Pharmacy and learn how to present and teach topics in an appropriate manner.

Intended learning outcomes

Students are able to teach students in earlier stages of their degrees and tailor their teaching to those students' needs.

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

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

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

preparation of materials for demonstrations and exercises (approx. 120 hours total)
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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Contemporary Research in Biochemistry 1			08-AFBC1-111-m01
Module coordinator		**Module offered by**	
holder of the Chair of Biochemistry		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
3	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
2 semester	undergraduate	--	

Contents

A series of lectures discussing recent findings from local, national or international research. The lectures will describe the research methods used and will discuss the findings in the context of recent literature.

Intended learning outcomes

Students have become familiar with recent findings from biochemical research. They have developed an understanding of the problems discussed in the module and are able to deliver a short presentation on those problems.

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)

presentation (approx. 10 minutes)
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

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Contemporary Research in Biochemistry 2			08-AFBC2-111-m01
Module coordinator		**Module offered by**	
holder of the Chair of Biochemistry		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
3	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
2 semester	undergraduate	--	

Contents

A series of lectures discussing recent findings from local, national or international research. The lectures will describe the research methods used and will discuss the findings in the context of recent literature.

Intended learning outcomes

Students have become familiar with recent findings from biochemical research. They have developed an understanding of the problems discussed in the module and are able to deliver a short presentation on those problems.

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)

presentation (approx. 10 minutes)
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

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Contemporary Research in Biochemistry 3			08-AFBC3-111-m01
Module coordinator		**Module offered by**	
holder of the Chair of Biochemistry		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
3	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
2 semester	undergraduate	--	

Contents

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

Intended learning outcomes

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

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

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)

presentation (approx. 10 minutes)
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

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Biochemistry (practical course) 1			08-BPS1-111-m01
Module coordinator			**Module offered by**
chairperson of examination committee Biochemie (Biochemistry)			Chair of Biochemistry
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
1	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Students participate in a project in the field of biochemistry they have selected in consultation with the module coordinator and write a report about that project.

Intended learning outcomes

Students have developed advanced subject-specific knowledge and skills and are able to write a report reflecting upon what they have learned.

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)

short log (approx. 1 page)
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

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Biochemical Practical Seminar 2			08-BPS2-111-m01
Module coordinator		**Module offered by**	
chairperson of examination committee Biochemie (Biochemistry)		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
1	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Students participate in a project in the field of biochemistry they have selected in consultation with the module coordinator and write a report about that project.

Intended learning outcomes

Students have developed advanced subject-specific knowledge and skills and are able to write a report reflecting upon what they have learned.

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)

short log (approx. 1 page)
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

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Biochemical Practical Seminar 3			08-BPS3-111-m01
Module coordinator		**Module offered by**	
chairperson of examination committee Biochemie (Biochemistry)		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
1	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

Students participate in a project in the field of biochemistry they have selected in consultation with the module coordinator and write a report about that project.

Intended learning outcomes

Students have developed advanced subject-specific knowledge and skills and are able to write a report reflecting upon what they have learned.

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)

short log (approx. 1 page)
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

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Guidance in scientific practice			08-AWA-132-m01
Module coordinator			**Module offered by**
chairperson of examination committee Biochemie (Biochemistry)			Chair of Biochemistry
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	(not) successfully completed	08-BAN	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module gives students the opportunity to guide students in earlier stages of their degrees through a practical experiment and learn how to organise scientific experiments, perform those experiments in a responsible manner and instruct others in the lab.

Intended learning outcomes

Students are able to guide students in earlier stages of their degrees through practical experiments and have learned how to instruct others in the lab.

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)

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

Allocation of places

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Additional information

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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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Inorganic Chemistry 3 for Biochemistry Majors			08-AC3-BC-131-m01
Module coordinator		**Module offered by**	
lecturer of lecture "Elementorganische Chemie" (Elemental Organic Chemistry)		Institute of Inorganic Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
9	numerical grade	08-OC3P	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	By way of exception, additional prerequisites are listed in the section on assessments.	

Contents

This module equips students with an advanced knowledge of organometallics. It focuses on their structures and properties, special material classes, reactivity and technical processes. The module gives students the opportunity to do some autonomous research and plan and conduct complex syntheses. The course focuses on the handling of organometallic compounds, their synthesis and working with protective atmospheres. Spectroscopy is used for the exact determination of products.

Intended learning outcomes

Students are able to describe the structure and properties of organometallics in an appropriate manner. They are able to systemise them and characterise their structure and reactivity. In addition, they are able to develop and explain principles for the synthesis of elementary organic compounds. Students are able to conduct autonomous research and perform experiments to solve complex problems. They are able to describe the technical principles in oral and written form using appropriate scientific terminology. They are able to independently plan and carry out the synthesis of a substance using advanced lab techniques.

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

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

- 08-AC3-BC-2-131: P (no information on SWS (weekly contact hours) and course language available)
- 08-AC3-1-102: V + Ü (no information on SWS (weekly contact hours) and course language available)

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

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

Assessment in module component 08-AC3-BC-2-131: Inorganic Chemistry 2 (lab) for Biochemistry Majors

- 5 ECTS, Method of grading: (not) successfully completed
- pre/post-experiment examination talks (Vor-/Nachtestate, approx. 15 minutes each), log (approx. 5 to 10 pages)
- Language of assessment: German or English

Assessment in module component 08-AC3-1-102: Elemental Organic Chemistry Elemental Organic Chemistry

- 4 ECTS, Method of grading: numerical grade
- a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German, English
- Other prerequisites: Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).

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
Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Physical and Theoretical Chemistry 3: Symmetry and Quantum Chemistry			08-PC3-092-m01

Module coordinator	Module offered by
lecturer of lecture "Quantenchemie"	Institute of Physical and Theoretical Chemistry

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).

Contents

This module discusses the fundamental principles of quantum chemistry and symmetry in chemistry.

Intended learning outcomes

Students have become familiar with the fundamental principles of quantum chemistry and symmetry in chemistry and are able to apply the knowledge they have developed.

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

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

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

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

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

Bachelor' degree (1 major) Biochemistry (2013)
Bachelor' degree (1 major) Chemistry (2010)
Bachelor' degree (1 major) Chemistry (2009)
Bachelor' degree (1 major) Mathematics (2012)
Bachelor' degree (1 major) Mathematics (2013)
Bachelor' degree (1 major) Computational Mathematics (2009)
Bachelor' degree (1 major) Computational Mathematics (2012)
Bachelor' degree (1 major) Computational Mathematics (2013)
Bachelor' degree (1 major) FOKUS Chemistry (2011)
First state examination for the teaching degree Grundschule Chemistry (2009)
First state examination for the teaching degree Hauptschule Chemistry (2009)

First state examination for the teaching degree Realschule Chemistry (2009)
First state examination for the teaching degree Gymnasium Chemistry (2009)
First state examination for the teaching degree Mittelschule Chemistry (2013)

Module title	Abbreviation
Chemistry of the Elements and Analytical Chemistry for Biochemistry Majors	08-AS1-BC-132-m01

Module coordinator	Module offered by
lecturer of lecture "Chemie der Hauptgruppenelemente" (Chemistry of Main-group Elements)	Institute of Inorganic Chemistry

ECTS	Method of grading	Only after succ. compl. of module(s)
11	numerical grade	08-AC1 (module component 08-AC1-4 only) and 08-OC3 (module component 08-OC3-2 only)

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

This module equips students with an advanced knowledge of the periodic table and selected elements. It focuses on bonding conditions, trends in the periodic table and the description and structure of elements. In addition, it introduces students to elementary organic chemistry, coordination chemistry and complex chemistry. The module gives students the opportunity to apply in practice the knowledge they have gained through the related lecture(s). After a safety briefing, the students autonomously conduct experiments in the laboratory. These experiments focus on different methods for the analysis of unknown substances.

Intended learning outcomes

Students are able to characterise main group elements and transition metal elements in terms of their structure, reactivity and fabrication. They are able to identify the coordination of the atoms. In addition, they have learned how to use the periodic table, an essential tool for chemists. Students are able to use different methods to analyse unknown substances. In addition, they are able to separate and analyse mixtures.

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

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

- 08-AN1-BC-2-132: P (no information on SWS (weekly contact hours) and course language available)
- 08-AS1-1-102: V + 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)

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

Assessment in module component 08-AN1-BC-2-132: Analytical Chemistry (lab) for Biochemistry Majors

- 5 ECTS, Method of grading: (not) successfully completed
- pre/post-experiment examination talks (Vor-/Nachtestate, approx. 15 minutes each), log (approx. 5 to 10 pages)
- Assessment offered: once a year, summer semester
- Language of assessment: German or English

Assessment in module component 08-AS1-1-102: Chemistry of the elements Chemistry of the elements

- 6 ECTS, Method of grading: numerical grade
- a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)
- Language of assessment: German or English

Allocation of places

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Additional information

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Workload
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Teaching cycle
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Referred to in LPO I (examination regulations for teaching-degree programmes)
§ 62 (1) 1. Chemie "Allgemeine und Anorganische Chemie"; "Physikalische und Analytische Chemie"
Module appears in
Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Organic Chemistry 4 - lecture			08-OC4-VL-141-m01
Module coordinator		**Module offered by**	
holder of the Chair of Organic Chemistry II		Institute of Organic Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module discusses biologically important bonding classes, their reactions and syntheses, working with special hazardous substances, complicated working and synthesis techniques, purification methods and product analysis.

Intended learning outcomes

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

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

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

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of 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

Bachelor' degree (1 major) Biochemistry (2011)
Bachelor' degree (1 major) Biochemistry (2013)

Module title	Abbreviation
Additional Qualification in Natural Sciences 3	08-BC-ZQN3-141-m01

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

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	Please consult with academic advisory service in advance.

Contents

A course in the natural sciences not offered as part of the degree programme in Biochemistry that equips students with advanced knowledge in the natural sciences that is related to their discipline. That course may be offered by the University of Würzburg or by external institutions. Decision on credit transfer to be made by examination committee.

Intended learning outcomes

Students have developed an improved scientific knowledge and have thus enhanced their specific qualifications. They have acquired additional expertise that will help them specialise in their field.

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 (approx. 60 to 90 minutes) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes) or f) successful completion as certified by lecturer. Students will be informed about the method and length of the assessment prior to the course.
Language of assessment: German or English

Allocation of places

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Additional information

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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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Additional Qualification in Natural Sciences 5			08-BC-ZQN5-141-m01
Module coordinator		**Module offered by**	
chairperson of examination committee Biochemie (Biochemistry)		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	Please consult with academic advisory service in advance.	

Contents

A course in the natural sciences not offered as part of the degree programme in Biochemistry that equips students with advanced knowledge in the natural sciences that is related to their discipline. That course may be offered by the University of Würzburg or by external institutions. Decision on credit transfer to be made by examination committee.

Intended learning outcomes

Students have developed an improved scientific knowledge and have thus enhanced their specific qualifications. They have acquired additional expertise that will help them specialise in their field.

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 (approx. 60 to 90 minutes) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes) or f) successful completion as certified by lecturer. Students will be informed about the method and length of the assessment prior to the course.
Language of assessment: German or English

Allocation of places

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Additional information

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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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Completive Qualification in Natural Sciences 3			08-BC-EQN3-141-m01
Module coordinator			**Module offered by**
chairperson of examination committee Biochemie (Biochemistry)			Chair of Biochemistry
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
3	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	Please consult with academic advisory service in advance.	

Contents

A course in the natural sciences not offered as part of the degree programme in Biochemistry that equips students with advanced knowledge in the natural sciences that is related to their discipline. That course may be offered by the University of Würzburg or by external institutions. Decision on credit transfer to be made by examination committee.

Intended learning outcomes

Students have developed an improved scientific knowledge and have thus enhanced their specific qualifications. They have acquired additional expertise that will help them specialise in their field.

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 (approx. 60 to 90 minutes) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes) or f) successful completion as certified by lecturer. Students will be informed about the method and length of the assessment prior to the course.
Language of assessment: German or English

Allocation of places

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Additional information

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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

Bachelor' degree (1 major) Biochemistry (2013)

Module title			Abbreviation
Completive Qualification in Natural Sciences 5			08-BC-EQN5-141-m01
Module coordinator		**Module offered by**	
chairperson of examination committee Biochemie (Biochemistry)		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	Please consult with academic advisory service in advance.	

Contents

A course in the natural sciences not offered as part of the degree programme in Biochemistry that equips students with advanced knowledge in the natural sciences that is related to their discipline. That course may be offered by the University of Würzburg or by external institutions. Decision on credit transfer to be made by examination committee.

Intended learning outcomes

Students have developed an improved scientific knowledge and have thus enhanced their specific qualifications. They have acquired additional expertise that will help them specialise in their field.

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 (approx. 60 to 90 minutes) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes) or f) successful completion as certified by lecturer. Students will be informed about the method and length of the assessment prior to the course.
Language of assessment: German or English

Allocation of places

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Additional information

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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

Bachelor' degree (1 major) Biochemistry (2013)