Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

Module Catalogue

for the Subject

Chemistry

as a Bachelor's with 1 major

with the degree "Bachelor of Science"

(180 ECTS credits)

Examination regulations version: 2017
Responsible: Faculty of Chemistry and Pharmacy

Contents

The subject is divided into

Learning Outcomes

German contents and learning outcome available but not translated yet.

Wissenschaftliche Befähigung

- Die Absolvent/innen beherrschen die grundlegenden Kenntnisse der Basis-Wissenschaften, vor allem der Allgemeinen, Anorganischen, Organischen, Physikalischen und Theoretischen Chemie, der Biochemie sowie der Mathematik und Physik. Die Grundlagen hierfür werden in den entsprechenden Vorlesungen und Übungen der verschiedenen Fächer vermittelt und in Klausuren überprüft.
- Die Absolvent/innen können unter Anleitung Experimente durchführen, analysieren und die erhaltenen Ergebnisse darstellen und bewerten. Vermittelt werden diese Fähigkeiten im Rahmen von Laborpraktika während des Studiums. Das Erreichen der Ziele wird durch Kolloquien, die erfolgreiche Versuchsdurchführung und das Verfassen von Protokollen überprüft.
- Die Absolvent/innen setzten die erlernten theoretischen und experimentellen Methoden ein, um unter Anleitung neue Erkenntnisse zu erlangen. Die erlernten theoretischen und experimentellen Methoden werden im Rahmen der Bachelorarbeit angewendet.
- Die Absolvent/innen können sich mit Hilfe von Fachliteratur in neue Fragestellungen und Aufgabengebiete einarbeiten, konkrete experimentelle oder theoretische Aufgabenstellungen verstehen, Lösungswege nachvollziehen und die Ergebnisse interpretieren und bewerten. Sie besitzen die Fähigkeit, eine thematisch und zeitlich eng umgrenzte chemische Fragestellung unter Anleitung mit den erlernten Methoden und unter wissenschaftlich-analytischer Vorgehensweise weitgehend eigenständig zu bearbeiten, die gewonnenen Daten zu analysieren, zusammenzufassen und einem Fachpublikum zu präsentieren. Diese Fähigkeiten werden in Seminaren während des Studiums und vor allem im Rahmen der Vorbereitung und Anfertigung der Bachelorarbeit sowie eines Seminarvortrags vermittelt und überprüft.

Befähigung zur Aufnahme einer Erwerbstätigkeit

- Die Absolvent/innen besitzen Abstraktionsvermögen, Problemlösungskompetenz und die Fähigkeit, komplexe Zusammenhänge in analytischer Herangehensweise zu strukturieren. Die Grundlagen hierfür werden in Vorlesungen und Übungen der Chemie vermittelt und durch Klausuren überprüft.
- Die Absolvent/innen sind in der Lage, ihr theoretisches Wissen in der Praxis anzuwenden und können mit den erlernten wissenschaftlichen Methoden auch unbekannte Probleme aus unterschiedlichen fachlichen Perspektiven analysieren und bearbeiten. Sie sind es dabei gewohnt, in einem Team aus Kommiliton/innen, Kolleg/innen und/oder Wissenschaftler/innen konstruktiv und zielorientiert zusammenzuarbeiten. Der Praxisbezug ist durch einen hohen Anteil an Laborpraktika - sowohl Kurspraktika, als auch individuelle Forschungspraktika - und nicht zuletzt der Bachelor-Arbeit gegeben, deren erfolgreiche Absolvierung durch Protokolle bzw. die Bachelor-Thesis überprüft wird.
- Die Absolvent/innen können unterschiedliche Aufgaben parallel und unter Zeit- und Erfolgsdruck auch unter schwierigen Rahmenbedingungen erfolgreich bearbeiten. Diese Fähigkeit wird durch die Prüfungsdichte am Ende der Vorlesungszeit erlernt und befähigt die Absolvent/innen auch im stressigen Berufsalltag Aufgaben erfolgreich zu bearbeiten.
- Die Absolvent/innen sind in der Lage, konstruktiv und zielorientiert in einem heterogenen Team zusammenzuarbeiten, unterschiedliche und abweichende Ansichten produktiv zur Zielerreichung zu nutzen und auftretende Konflikte zu lösen. Diese Teamfähigkeit und Konfliktkompetenz erlernen die Studierenden in der Zusammenarbeit während Laborpraktika sowie in Arbeitskreisen während der Anfertigung ihrer Bachelorarbeit.
- Diese solide Wissensbasis und Methodenkompetenz sowie die eingeübte Teamfähigkeit können die Absolvent/innen gewinnbringend in ihrer Berufspraxis einsetzen.

Persönlichkeitsentwicklung

- Die Absolvent/innen kennen die Regeln guter wissenschaftlicher Praxis und beachten sie. Die Lehrenden fördern zudem die Selbstverantwortung für den Wissenserwerb sowie ein an wissenschaftlichen Werten orientiertes Denken und Handeln. Dies beinhaltet das Streben nach Erkenntnis und Wahrheit, Eindeutigkeit, Transparenz, Objektivität, Wertefreiheit, überpersönliche Gültigkeit, Überprüfbarkeit, Verlässlichkeit, Offenheit, Selbstreflexion und Redlichkeit sowie Neuigkeit. Insbesondere die Laborarbeit und das Erstellen von Protokollen sowie deren anschließende Korrektur stellt die Vermittlung guter wissenschaftlicher Praxis sicher.
- Die Absolvent/innen lernen, mit in der Forschung unvermeidbaren Rückschlägen umzugehen und ihre Zielsetzungen neu anzupassen.

Befähigung zum gesellschaftlichen Engagement

- Die Absolvent/innen haben ihr Wissen bezüglich naturwissenschaftlicher Fragen erweitert und erkennen deren wirtschaftliche, rechtliche und gesellschaftliche Implikationen und können begründet Position beziehen. Durch die Behandlung aktueller Forschungsthemen in den Lehrveranstaltungen und den Besuch von Vorlesungen zu Toxikologie und Rechtskunde werden Bezüge zu wirtschaftlichen, rechtlichen und gesellschaftlichen Fragestellungen hergestellt. Im Rahmen der Bachelorarbeit befassen sich die Studierenden ebenfalls mit aktuellen gesellschaftlich und wirtschaftlich relevanten chemischen Fragen.

Abbreviations used

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

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

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

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

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

Conventions

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

Notes

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

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

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

In accordance with

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

ASPO2015

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

09-Aug-2017 (2017-48)

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

Compulsory Courses

(150 ECTS credits)

Subfield General and Inorganic Chemistry

(47 ECTS credits)

Module title	Abbreviation
Principles of Inorganic Chemistry	08-AC1-152-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)
8	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

The module provides an overview of the fundamental knowledge of chemistry. Emphasis is placed on the material and particle level, metals, acid-base reactions, the periodic table, chemical equilibrium and complexometry. In addition, the module introduces fundamental concepts of chemistry and teaches the basics of inorganic chemistry.

Intended learning outcomes

The student understands the principles of the periodic table and can obtain information from it. He/she is proficient in basic models of the structure of matter and can describe them properly. He/she can depict chemical reactions using typical chemical formula language and interpret them by identifying the type of reaction. The students know how the most important quantitative and qualitative analytical methods work and their areas of application.

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

V (4) + V (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

240 h

Teaching cycle

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

§ 42 I Nr. 1 and § 22 II Nr. 1 h)
§ 62 I Nr. 1

Module appears in

Bachelor' degree (1 major) Biochemistry (2015)
Bachelor' degree (1 major) Chemistry (2015)
First state examination for the teaching degree Grundschule Chemistry (2015)
First state examination for the teaching degree Grundschule Didactics in Chemistry (Primary School) (2015)
First state examination for the teaching degree Realschule Chemistry (2015)
First state examination for the teaching degree Gymnasium Chemistry (2015)
First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Middle School) (2015)

First state examination for the teaching degree Mittelschule Chemistry (2015)
First state examination for the teaching degree Mittelschule Didactics in Chemistry (Middle School) (2015)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Module studies (Bachelor) Chemistry (2019)
Module studies (Bachelor) Orientierungsstudien (2020)
First state examination for the teaching degree Mittelschule Chemistry (2020 (Prüfungsordnungsversion 2015))
First state examination for the teaching degree Mittelschule Didactics in Chemistry (Middle School) (2020 (Prüfungsordnungsversion 2015))
First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Middle School) (2020 (Prüfungsordnungsversion 2015))
Bachelor' degree (1 major) Food Chemistry (2021)
Bachelor' degree (1 major) Biochemistry (2022)

Module title			Abbreviation
Inorganic Chemistry 1 (lab)			08-ACP1-152-m01
Module coordinator		**Module offered by**	
holder of the Chair of Anorganic Chemistry		Institute of Inorganic Chemistry	
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 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. The course focuses on laboratory safety, simple lab techniques, the synthesis of simple substances and analyses of unknown substances.

Intended learning outcomes

Students 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)

P (12) + S (2)

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

[a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)] and Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical assignments (2 to 4 random examinations)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

300 h

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) Chemistry (2015)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor' degree (1 major) Food Chemistry (2021)

Module title	Abbreviation
Inorganic Chemistry of the Elements	08-AS1-152-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)
6	numerical grade	--

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.

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.

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

V (2) + V (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

180 h

Teaching cycle

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

§ 62 I Nr. 1

Module appears in

Bachelor' degree (1 major) Biochemistry (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Mathematics (2015)
Bachelor' degree (1 major) Computational Mathematics (2015)
First state examination for the teaching degree Gymnasium Chemistry (2015)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor' degree (1 major) Food Chemistry (2021)
Bachelor' degree (1 major) Biochemistry (2022)
Bachelor' degree (1 major) Mathematics (2023)

Module title			Abbreviation
Analytical Chemistry (lab)			08-ANP-152-m01
Module coordinator		**Module offered by**	
holder of the Chair of Anorganic Chemistry		Institute of Inorganic Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
6	(not) successfully completed	--	
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. These experiments focus on different methods for the analysis of unknown substances.

Intended learning outcomes

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)

P (12) + S (1)

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

Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)
Assessment offered: Once a year, summer semester
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

180 h

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 (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor' degree (1 major) Food Chemistry (2021)
Bachelor' degree (1 major) Biochemistry (2022)

Module title			Abbreviation
Inorganic Chemistry 2 (lab)			08-ACP2-172-m01
Module coordinator		**Module offered by**	
holder of the Chair of Anorganic Chemistry		Institute of Inorganic Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	(not) successfully completed	(08-OCP1 or 08-OCP1-BC) and 08-AS1	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The module provides the opportunity to plan and carry out complex syntheses after an individual research. Focuses are the handling of organometallic compounds, their synthesis and the work in inert atmospheres. Spectroscopical methods are used for the precise determination of the products.

Intended learning outcomes

The student is able to experimentally solve complex issues after an individual research. He/She can describe the technical backrounds an explain them written and verbal using technical language. He/She can independently plan and carry out the synthesis of a chemical compound. Therefor he/she can apply advanced laboratory techniques.

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

P (12)

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/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

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) Chemistry (2017)
Bachelor' degree (1 major) Biochemistry (2022)

Module title	Abbreviation
Solid State Chemistry, Spectroscopic Methods, Organoelement Chemistry	08-AC-FSE-152-m01

Module coordinator	Module offered by
lecturers of lecture "Festkörperchemie" (Solid State Chemistry) and "Elementorganische Chemie" (Elemental Organic Chemistry)	Institute of Inorganic Chemistry

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

Duration	Module level	Other prerequisites
2 semester	undergraduate	--

Contents

This module equips students with an advanced knowledge of metals, alloys, saline compounds and organometallics. It focuses on their structures and properties, special material classes, reactivity and technical processes.

Intended learning outcomes

Students are able to describe the structure and properties of metals, alloys, saline compounds and 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. They can list spectroscopic methods that can be used for the structural analysis of solids and can describe them in an appropriate manner.

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

V (2) + V (2) + V (3) + Ü (1)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

360 h

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) Chemistry (2015)
Bachelor' degree (1 major) Chemistry (2017)

Subfield Organic Chemistry

(40 ECTS credits)

Module title			Abbreviation
Organic Chemistry 1			08-OC1-152-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	--	

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 (3) + Ü (1)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

Teaching cycle: every year, summer semester

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

§ 62 I Nr. 2

Module appears in

Bachelor' degree (1 major) Biology (2011)
Bachelor' degree (1 major) Chemistry (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Psychology (2010)
Bachelor' degree (1 major) Economathematics (2012)
Bachelor' degree (1 major) Romanic Languages (French/Spanish) (2013)
Bachelor's degree (1 major, 1 minor) Pedagogy (2011)
Bachelor's degree (1 major, 1 minor) Pedagogy (2013)
Bachelor's degree (1 major, 1 minor) French Studies (2013)

Bachelor's degree (1 major, 1 minor) History (2010)
Bachelor's degree (1 major, 1 minor) Philosophy (2013)
Bachelor's degree (1 major, 1 minor) Pre- and Protohistoric Archaeology (2012)
Bachelor's degree (1 major, 1 minor) Spanish Studies (2010)
Bachelor's degree (1 major, 1 minor) Political and Social Studies (2013)
Bachelor's degree (1 major, 1 minor) English and American Studies (2010)
Bachelor's degree (1 major, 1 minor) Russian Language and Culture (2008)
Bachelor's degree (1 major, 1 minor) Gallo-Roman philology (2010)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2013)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2010)
Bachelor's degree (1 major, 1 minor) Italian Studies (2010)
Bachelor's degree (2 majors) Classical Archaeology (2013)
Bachelor's degree (2 majors) Pedagogy (2013)
Bachelor's degree (2 majors) Philosophy (2013)
Bachelor's degree (2 majors) Special Education (2009)
Bachelor's degree (2 majors) Digital Humanities (2012)
Bachelor's degree (2 majors) Political and Social Studies (2011)
Bachelor's degree (2 majors) Russian Language and Culture (2012)
Bachelor's degree (2 majors) European Ethnology (2013)
Magister Theologiae Catholic Theology (2013)
Bachelor's degree (2 majors) Spanish Studies (2013)
Bachelor's degree (2 majors) English and American Studies (2009)
Bachelor's degree (2 majors) Gallo-Roman philology (2009)
Bachelor's degree (2 majors) German Language and Literature (2013)
Bachelor's degree (2 majors) Italian Studies (2009)
Bachelor' degree (1 major) Biochemistry (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Geography (2015)
Bachelor' degree (1 major) Computer Science (2015)
Bachelor' degree (1 major) Mathematics (2015)
Bachelor' degree (1 major) Musicology (2015)
Bachelor' degree (1 major) Physics (2015)
Bachelor' degree (1 major) Psychology (2015)
Bachelor' degree (1 major) Business Management and Economics (2015)
Bachelor' degree (1 major) Nanostructure Technology (2015)
Bachelor' degree (1 major) Biomedicine (2015)
Bachelor' degree (1 major) Music Education (2015)
Bachelor' degree (1 major) Computational Mathematics (2015)
Bachelor' degree (1 major) Political and Social Studies (2015)
Bachelor' degree (1 major) Functional Materials (2015)
Bachelor' degree (1 major) Academic Speech Therapy (2015)
Bachelor' degree (1 major) Indology/South Asian Studies (2015)
Bachelor's degree (1 major, 1 minor) Egyptology (2015)
Bachelor's degree (1 major, 1 minor) Pedagogy (2015)
Bachelor's degree (1 major, 1 minor) History (2015)
Bachelor's degree (1 major, 1 minor) Musicology (2015)
Bachelor's degree (1 major, 1 minor) Philosophy (2015)
Bachelor's degree (1 major, 1 minor) Pre- and Protohistoric Archaeology (2015)
Bachelor's degree (1 major, 1 minor) Ancient World (2015)
Bachelor's degree (1 major, 1 minor) Music Education (2015)
Bachelor's degree (1 major, 1 minor) Philosophy and Religion (2015)
Bachelor's degree (1 major, 1 minor) Theological Studies (2015)
Bachelor's degree (1 major, 1 minor) Political and Social Studies (2015)

Bachelor's degree (1 major, 1 minor) Russian Language and Culture (2015)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2015)
Bachelor's degree (2 majors) Egyptology (2015)
Bachelor's degree (2 majors) Classical Archaeology (2015)
Bachelor's degree (2 majors) Pedagogy (2015)
Bachelor's degree (2 majors) Protestant Theology (2015)
Bachelor's degree (2 majors) Musicology (2015)
Bachelor's degree (2 majors) Philosophy (2015)
Bachelor's degree (2 majors) Special Education (2015)
Bachelor's degree (2 majors) Pre- and Protohistoric Archaeology (2015)
Bachelor's degree (2 majors) Latin Philology (2015)
Bachelor's degree (2 majors) Music Education (2015)
Bachelor's degree (2 majors) Philosophy and Religion (2015)
Bachelor's degree (2 majors) Theological Studies (2015)
Bachelor's degree (2 majors) Digital Humanities (2015)
Bachelor's degree (2 majors) Political and Social Studies (2015)
Bachelor's degree (2 majors) Russian Language and Culture (2015)
Bachelor's degree (2 majors) Greek Philology (2015)
Bachelor's degree (2 majors) European Ethnology (2015)
Bachelor's degree (2 majors) Indology/South Asian Studies (2015)
Bachelor's degree (2 majors) Ancient Near Eastern Studies (2015)
First state examination for the teaching degree Gymnasium Chemistry (2015)
Bachelor's degree (2 majors) Geography (2015)
Bachelor's degree (2 majors) French Studies (2015)
Bachelor's degree (2 majors) History (2015)
Bachelor's degree (2 majors) Sport Science (Focus on health and Pedagogics in Movement) (2015)
Bachelor's degree (2 majors) German Language and Literature (2015)
Bachelor' degree (1 major) Mathematical Physics (2016)
Bachelor' degree (1 major) Human-Computer Systems (2016)
Bachelor's degree (2 majors) Theological Studies (2011)
Bachelor's degree (1 major, 1 minor) French Studies (2016)
Bachelor's degree (2 majors) French Studies (2016)
Bachelor's degree (1 major, 1 minor) Italian Studies (2016)
Bachelor's degree (2 majors) Italian Studies (2016)
Bachelor's degree (1 major, 1 minor) Spanish Studies (2016)
Bachelor's degree (2 majors) Spanish Studies (2016)
Bachelor' degree (1 major) Romanic Languages (French/Italian) (2016)
Bachelor' degree (1 major) Romanic Languages (French/Spanish) (2016)
Bachelor' degree (1 major) Romanic Languages (Italian/Spanish) (2016)
Bachelor' degree (1 major) Business Information Systems (2016)
Bachelor' degree (1 major) Games Engineering (2016)
Bachelor's degree (1 major, 1 minor) English and American Studies (2016)
Bachelor's degree (2 majors) English and American Studies (2016)
Bachelor' degree (1 major) Media Communication (2016)
Bachelor' degree (1 major) Food Chemistry (2016)
Bachelor's degree (1 major, 1 minor) Digital Humanities (2016)
Bachelor' degree (1 major) Biology (2017)
Bachelor's degree (1 major, 1 minor) Geography (2017)
Bachelor's degree (1 major, 1 minor) History of Medieval and Modern Art (2017)
Bachelor's degree (2 majors) History of Medieval and Modern Art (2017)
Bachelor's degree (2 majors) Comparative Indo-European Linguistics (2017)
Bachelor' degree (1 major) Aerospace Computer Science (2017)
Bachelor' degree (1 major) Modern China (2017)

Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor's degree (1 major, 1 minor) Museology and material culture (2017)
Bachelor' degree (1 major) Economathematics (2017)
Bachelor' degree (1 major) Games Engineering (2017)
Bachelor' degree (1 major) Computer Science (2017)
Bachelor' degree (1 major) Media Communication (2018)
Bachelor' degree (1 major) Biomedicine (2018)
Bachelor' degree (1 major) Human-Computer Systems (2018)
Bachelor's degree (2 majors) Classical Archaeology (2018)
Bachelor's degree (1 major, 1 minor) Classical Archaeology (2018)
Bachelor's degree (1 major, 1 minor) Digital Humanities (2018)
Bachelor's degree (2 majors) Digital Humanities (2018)
Bachelor' degree (1 major) Computer Science (2019)
Bachelor's degree (1 major, 1 minor) English and American Studies (2019)
Bachelor's degree (1 major, 1 minor) Indology/South Asian Studies (2019)
Bachelor' degree (1 major) Indology/South Asian Studies (2019)
Bachelor' degree (1 major) Business Information Systems (2019)
Bachelor's degree (2 majors) Indology/South Asian Studies (2019)
Bachelor' degree (1 major) Business Management and Economics (2019)
Bachelor' degree (1 major) Modern China (2019)
Bachelor' degree (1 major) Food Chemistry (2019)
Bachelor' degree (1 major) Biomedicine (2020)
Bachelor' degree (1 major) Pedagogy (2020)
Bachelor' degree (1 major) Political and Social Studies (2020)
Bachelor' degree (1 major) Business Information Systems (2020)
Bachelor's degree (1 major, 1 minor) Political and Social Studies (2020)
Bachelor's degree (2 majors) European Ethnology (2020)
Bachelor's degree (2 majors) Political and Social Studies (2020)
Bachelor's degree (2 majors) Special Education (2020)
Bachelor' degree (1 major) Physics (2020)
Bachelor' degree (1 major) Nanostructure Technology (2020)
Bachelor' degree (1 major) Mathematical Physics (2020)
Bachelor' degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major, 1 minor) Museology and material culture (2020)
Bachelor's degree (1 major, 1 minor) Pedagogy (2020)
Bachelor's degree (2 majors) Pedagogy (2020)
Bachelor' degree (1 major) Psychology (2020)
Bachelor' degree (1 major) Biology (2021)
Magister Theologiae Catholic Theology (2021)
Bachelor's degree (2 majors) History (2021)
Bachelor's degree (1 major, 1 minor) History (2021)
Bachelor' degree (1 major) Media Communication (2021)
Bachelor's degree (2 majors) Theological Studies (2021)
Bachelor's degree (1 major, 1 minor) Theological Studies (2021)
Bachelor's degree (1 major, 1 minor) English and American Studies (2021)
Bachelor's degree (2 majors) English and American Studies (2021)
Bachelor' degree (1 major) Functional Materials (2021)
Bachelor' degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (2 majors) Comparative Indo-European Linguistics (2021)
Bachelor' degree (1 major) Food Chemistry (2021)
Bachelor' degree (1 major) Quantum Technology (2021)
Bachelor's degree (2 majors) Special Education (2021)

Bachelor' degree (1 major) Business Information Systems (2021)
Bachelor' degree (1 major) Economathematics (2021)
Bachelor' degree (1 major) Business Management and Economics (2021)
Bachelor' degree (1 major) Human-Computer Systems (2022)
Bachelor's degree (1 major, 1 minor) Museology and material culture (2022)
Bachelor' degree (1 major) Biochemistry (2022)
Bachelor' degree (1 major) Biology (2022)
Bachelor' degree (1 major) Economathematics (2022)
Bachelor' degree (1 major) Mathematical Data Science (2022)
Bachelor' degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (2 majors) Ancient Near Eastern Archaeology (2022)
Bachelor's degree (1 major, 1 minor) Ancient World (2022)
Bachelor's degree (2 majors) Ancient Near Eastern Studies (2022)
Bachelor' degree (1 major) Franco-German studies: language, culture, digital competence (2022)
Bachelor' degree (1 major) Midwifery (2022)
Bachelor' degree (1 major) European Law (2023)
Bachelor's degree (1 major, 1 minor) English and American Studies (2023)
Bachelor's degree (2 majors) English and American Studies (2023)
Bachelor' degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor' degree (1 major) Mathematics (2023)
Bachelor' degree (1 major) Business Information Systems (2023)
Bachelor' degree (1 major) Economathematics (2023)
Bachelor's degree (1 major, 1 minor) History of Medieval and Modern Art (2023)
Bachelor's degree (2 majors) History of Medieval and Modern Art (2023)
Bachelor's degree (2 majors) Special Education (2023)
Bachelor' degree (1 major) Business Management and Economics (2023)
Bachelor' degree (1 major) Geography (2023)
Bachelor's degree (2 majors) Geography (2023)
Bachelor's degree (1 major, 1 minor) Geography (2023)
Bachelor's degree (2 majors) European Ethnology/Empiric Cultural Studies (2023)
Bachelor' degree (1 major) Mathematical Physics (2024)
Bachelor's degree (2 majors) German Language and Literature (2024)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2024)
Bachelor' degree (1 major) Music Education (2024)
Bachelor's degree (2 majors) Music Education (2024)
Bachelor's degree (1 major, 1 minor) Music Education (2024)

Module title	Abbreviation
Organic Chemistry 2 and analytical methods in organic chemistry	08-OC2-152-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	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

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 (3) + Ü (1) + V (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

270 h

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 (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Mathematics (2015)
Bachelor' degree (1 major) Computational Mathematics (2015)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor' degree (1 major) Functional Materials (2021)
Bachelor' degree (1 major) Biochemistry (2022)

Bachelor' degree (1 major) Mathematics (2023)

Module title			Abbreviation
Organic Chemistry - lab 1			08-OCP1-172-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)**	
8	(not) successfully completed	08-OC1 and (08-ACP1 or 08-ANP)	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

German contents available but not translated yet.

Das Modul bietet die Möglichkeit, das Wissen der Grundvorlesung(en) praktisch anzuwenden. Die Studierenden experimentieren nach einer Sicherheitseinweisung selbstständig im Labor. Neben der Durchführung der Versuche wird das Wissen der Studierenden in Kolloquien und Protokollen geprüft. Schwerpunkte sind der sichere Umgang mit Gefahrenstoffen, einfache experimentelle Grundoperationen der organischen Chemie, einfache bis mehrstufige Synthesen sowie Analyse der Produkte.

Intended learning outcomes

German intended learning outcomes available but not translated yet.

Die Studierenden sind in der Lage, sicher mit Gefahrenstoffen umzugehen. Er/Sie kann experimentelle Grundoperationen der organischen Chemie durchführen. Er/Sie kann die Produkte in Bezug auf Ausbeute und Reinheit analysieren sowie mögliche Fehlerquellen identifizieren. Die Studierenden können die in der Vorlesung erarbeiteten theoretischen Inhalte mit den praktischen Experimenten im Labor vernetzen.

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

P (14)

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/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

240 h

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) Chemistry (2017)

Module title			Abbreviation
Organic Chemistry - advanced laboratory course for students of chemistry			08-OCP2-152-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	(not) successfully completed	08-OC2 and (08-OCP1 or OCP1-BC)	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module gives students the opportunity to enhance their experimental skills by working with special hazardous substances, using complex working and synthesis techniques as well as extensive purification methods and performing elaborate product analyses.

Intended learning outcomes

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)

P (11)

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/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

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 (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor' degree (1 major) Biochemistry (2022)

Module title			Abbreviation
Organic Chemistry 3 & 4			08-OC3+4-152-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)**	
13	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
2 semester	undergraduate	--	

Contents

This module focuses on polar rearrangements, olefination reactions, pericyclic reactions, carbenes, nitriles and radicals. It discusses the fundamental principles of stereoselective synthesis, asymmetric catalysis, organometallic chemistry and retrosynthesis. The module also explores heterocyclic compounds, dyes, naturally occurring substances, biopolymers and protecting group techniques.

Intended learning outcomes

Students are able to formulate olefination reactions. They are able to develop stereoselective syntheses and asymmetric catalyses. Students are able to describe organometallic reactions. They are able to conduct retrosynthetic analyses of molecules. They 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 (2) + Ü (2) + V (2) + Ü (2) + S (1)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

390 h

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) Chemistry (2015)
Bachelor' degree (1 major) Chemistry (2017)

Subfield Physical and Theoretical Chemistry

(40 ECTS credits)

Module title	Abbreviation
Principles of quantum mechanics and spectroscopy	08-PC-QMS-152-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)
10	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

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 (4) + Ü (2) + V (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

300 h

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) Chemistry (2015)
Bachelor' degree (1 major) Chemistry (2017)

Module title	Abbreviation
Thermodynamics, Kinetics, Electrochemistry	08-PC-TKE-152-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	--

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 (4) + Ü (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

270 h

Teaching cycle

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

§ 62 I Nr. 1

Module appears in

Bachelor' degree (1 major) Biochemistry (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Mathematics (2015)
Bachelor' degree (1 major) Computational Mathematics (2015)
Bachelor' degree (1 major) Functional Materials (2015)
First state examination for the teaching degree Gymnasium Chemistry (2015)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor' degree (1 major) Functional Materials (2021)

Bachelor' degree (1 major) Biochemistry (2022)
Bachelor' degree (1 major) Mathematics (2023)

Module title			Abbreviation
Physical Chemistry (lab)			08-PCP-152-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	(not) successfully completed	08-PC-QMS or 08-PC-TKE	
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 (6)

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/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

270 h

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) Chemistry (2015)
Bachelor' degree (1 major) Chemistry (2017)

Module title	Abbreviation
Quantum Chemistry	08-TC-152-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)
3	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

This module provides students with deeper insights into advanced topics in quantum chemistry. It focuses on spin, the Pauli principle, Slater determinants, the Hartree-Fock method, correlation energy, configuration interaction and excited states, the Born-Oppenheimer approximation and bonding models of H2+.

Intended learning outcomes

Students are able to describe excited states of molecules with the help of key concepts and models.

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

V (2) + Ü (1)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

90 h

Teaching cycle

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

§ 22 II Nr. 1 h)
§ 22 II Nr. 2 f)
§ 22 II Nr. 3 f)

Module appears in

Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Mathematics (2015)
Bachelor' degree (1 major) Computational Mathematics (2015)
Bachelor' degree (1 major) Functional Materials (2015)
First state examination for the teaching degree Grundschule Chemistry (2015)
First state examination for the teaching degree Realschule Chemistry (2015)
First state examination for the teaching degree Gymnasium Chemistry (2015)
First state examination for the teaching degree Mittelschule Chemistry (2015)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Bachelor' degree (1 major) Biochemistry (2017)

Bachelor' degree (1 major) Chemistry (2017)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
First state examination for the teaching degree Mittelschule Chemistry (2020 (Prüfungsordnungsversion 2015))
Bachelor' degree (1 major) Functional Materials (2021)
Bachelor' degree (1 major) Biochemistry (2022)
Bachelor' degree (1 major) Mathematics (2023)

Module title	Abbreviation
Symmetry, chemical bonding and light	08-PC-SBL-152-m01

Module coordinator	Module offered by
lecturer of lecture "Symmetrie, chemische Bindung and Licht"	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
2 semester	undergraduate	--

Contents

This module provides an introduction to the symmetry of molecules. It focuses on group theory, symmetry operations, point groups, character tables and selection rules. The module deals with the chemical bond based on the qualitative MO theory and gives an introduction to the fundamentals of computational chemistry. It also gives students the opportunity to analyse the interactions between symmetry, chemical bonding and light in detail.

Intended learning outcomes

Students are able to analyse the symmetry of molecules. They are able to draw conclusions about the spectroscopic properties of a particular molecule from the symmetry of that molecule.

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

V (3) + Ü (2) + V (2) + Ü (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

270 h

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 (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Mathematics (2015)
Bachelor' degree (1 major) Computational Mathematics (2015)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor' degree (1 major) Biochemistry (2022)
Bachelor' degree (1 major) Mathematics (2023)

Subfield Basics of Natural Sciences

(23 ECTS credits)

Module title	Abbreviation
Biochemistry 1	08-BC1-152-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 lectures and exercises, this module acquaints students with the fundamental principles of biochemistry. A particular focus is on the biochemistry of proteins (amino acids, peptide bonds, primary, secondary, tertiary and quaternary structures), catalytic strategies and enzyme kinetics, carbohydrate metabolism (glycolysis, gluconeogenesis, citric acid cycle, cellular respiration, photosynthesis), fatty acid metabolism (beta oxidation, fatty acid synthesis), nucleotide metabolism, the urea cycle and amino acid metabolism. The module also discusses the structure of the DNA and the central dogma of molecular biology.

Intended learning outcomes

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

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

V (2) + Ü (1)

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

written examination (approx. 60 to 90 minutes)

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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

§ 42 I Nr. 2
§ 62 I Nr. 2

Module appears in

Bachelor' degree (1 major) Biochemistry (2015)
Bachelor' degree (1 major) Biology (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Food Chemistry (2015)
Bachelor' degree (1 major) Functional Materials (2015)
First state examination for the teaching degree Grundschule Chemistry (2015)
First state examination for the teaching degree Realschule Chemistry (2015)
First state examination for the teaching degree Gymnasium Chemistry (2015)
First state examination for the teaching degree Mittelschule Chemistry (2015)
Bachelor' degree (1 major) Food Chemistry (2016)
Bachelor' degree (1 major) Biology (2017)

Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor' degree (1 major) Food Chemistry (2019)
First state examination for the teaching degree Mittelschule Chemistry (2020 (Prüfungsordnungsversion 2015))
Bachelor' degree (1 major) Biology (2021)
Bachelor' degree (1 major) Functional Materials (2021)
Bachelor' degree (1 major) Food Chemistry (2021)
Bachelor' degree (1 major) Biochemistry (2022)
Bachelor' degree (1 major) Biology (2022)

Module title			Abbreviation
Mathematics for students in Chemistry and Biochemistry			10-M-MCH-172-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	--	

Contents

Functional relations, differentiation and integration of functions in one variable, curve sketching, differentiation and integration of functions in several variables, curve integrals, matrix calculus, power series.

Intended learning outcomes

The student is able to recognise and phrase 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 (3) + Ü (2)

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

written examination (approx. 90 to 120 minutes) and written exercises (approx. 25)

Allocation of places

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Additional information

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Workload

150 h

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 (2017)
Bachelor' degree (1 major) Chemistry (2017)
Module studies (Bachelor) Orientierungsstudien (2020)
Bachelor' degree (1 major) Biochemistry (2022)
exchange program Mathematics (2023)

Module title			Abbreviation
Introduction to Physics for Students of other Disciplines			11-EFNF-152-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

Fundamentals of mechanics, vibration theory, thermodynamics, optics, science of electricity, atomic and nuclear physics.

Intended learning outcomes

The students are able to identify fundamental physical contexts. They are able to assign them to corresponding fields in physics. They are able to apply simple formulae in order to analyse and evaluate these contexts.

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

V (4) + V (3)

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

written examination (60 to 120 minutes)

Allocation of places

--

Additional information

--

Workload

210 h

Teaching cycle

--

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

--

Module appears in

Bachelor' degree (1 major) Biology (2011)
Bachelor' degree (1 major) Chemistry (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Psychology (2010)
Bachelor' degree (1 major) Economathematics (2012)
Bachelor' degree (1 major) Romanic Languages (French/Spanish) (2013)
Bachelor's degree (1 major, 1 minor) Pedagogy (2011)
Bachelor's degree (1 major, 1 minor) Pedagogy (2013)
Bachelor's degree (1 major, 1 minor) French Studies (2013)
Bachelor's degree (1 major, 1 minor) History (2010)
Bachelor's degree (1 major, 1 minor) Philosophy (2013)
Bachelor's degree (1 major, 1 minor) Pre- and Protohistoric Archaeology (2012)
Bachelor's degree (1 major, 1 minor) Spanish Studies (2010)
Bachelor's degree (1 major, 1 minor) Political and Social Studies (2013)
Bachelor's degree (1 major, 1 minor) English and American Studies (2010)
Bachelor's degree (1 major, 1 minor) Russian Language and Culture (2008)

Bachelor's degree (1 major, 1 minor) Gallo-Roman philology (2010)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2013)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2010)
Bachelor's degree (1 major, 1 minor) Italian Studies (2010)
Bachelor's degree (2 majors) Classical Archaeology (2013)
Bachelor's degree (2 majors) Pedagogy (2013)
Bachelor's degree (2 majors) Philosophy (2013)
Bachelor's degree (2 majors) Special Education (2009)
Bachelor's degree (2 majors) Digital Humanities (2012)
Bachelor's degree (2 majors) Political and Social Studies (2011)
Bachelor's degree (2 majors) Russian Language and Culture (2012)
Bachelor's degree (2 majors) European Ethnology (2013)
Magister Theologiae Catholic Theology (2013)
First state examination for the teaching degree Gymnasium English (2009)
First state examination for the teaching degree Gymnasium Biology (2009)
First state examination for the teaching degree Gymnasium Chemistry (2009)
First state examination for the teaching degree Gymnasium Geography (2009)
First state examination for the teaching degree Gymnasium French Studies (2009)
First state examination for the teaching degree Gymnasium German (2009)
First state examination for the teaching degree Gymnasium History (2009)
First state examination for the teaching degree Gymnasium Greek Philology (2009)
First state examination for the teaching degree Gymnasium Computer Science (2009)
First state examination for the teaching degree Gymnasium Italian Studies (2009)
First state examination for the teaching degree Gymnasium Catholic Theology (2009)
First state examination for the teaching degree Gymnasium Latin Philology (2009)
First state examination for the teaching degree Gymnasium Mathematics (2012)
First state examination for the teaching degree Gymnasium Mathematics (2009)
First state examination for the teaching degree Gymnasium Music (2009)
First state examination for the teaching degree Gymnasium Physics (2009)
First state examination for the teaching degree Gymnasium Russian (2009)
First state examination for the teaching degree Gymnasium Social Science (2009)
First state examination for the teaching degree Gymnasium Spanish Studies (2009)
First state examination for the teaching degree Gymnasium Science of Sport (2009)
First state examination for the teaching degree Gymnasium Music Education, Advanced Studies (2009)
Bachelor's degree (2 majors) Spanish Studies (2013)
Bachelor's degree (2 majors) English and American Studies (2009)
Bachelor's degree (2 majors) Gallo-Roman philology (2009)
Bachelor's degree (2 majors) German Language and Literature (2013)
Bachelor's degree (2 majors) Italian Studies (2009)
Bachelor' degree (1 major) Biochemistry (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Geography (2015)
Bachelor' degree (1 major) Computer Science (2015)
Bachelor' degree (1 major) Food Chemistry (2015)
Bachelor' degree (1 major) Mathematics (2015)
Bachelor' degree (1 major) Musicology (2015)
Bachelor' degree (1 major) Physics (2015)
Bachelor' degree (1 major) Psychology (2015)
Bachelor' degree (1 major) Business Management and Economics (2015)
Bachelor' degree (1 major) Nanostructure Technology (2015)
Bachelor' degree (1 major) Biomedicine (2015)
Bachelor' degree (1 major) Music Education (2015)
Bachelor' degree (1 major) Computational Mathematics (2015)

Bachelor' degree (1 major) Political and Social Studies (2015)
Bachelor' degree (1 major) Functional Materials (2015)
Bachelor' degree (1 major) Academic Speech Therapy (2015)
Bachelor' degree (1 major) Indology/South Asian Studies (2015)
Bachelor's degree (1 major, 1 minor) Egyptology (2015)
Bachelor's degree (1 major, 1 minor) Pedagogy (2015)
Bachelor's degree (1 major, 1 minor) History (2015)
Bachelor's degree (1 major, 1 minor) Musicology (2015)
Bachelor's degree (1 major, 1 minor) Philosophy (2015)
Bachelor's degree (1 major, 1 minor) Pre- and Protohistoric Archaeology (2015)
Bachelor's degree (1 major, 1 minor) Ancient World (2015)
Bachelor's degree (1 major, 1 minor) Music Education (2015)
Bachelor's degree (1 major, 1 minor) Philosophy and Religion (2015)
Bachelor's degree (1 major, 1 minor) Theological Studies (2015)
Bachelor's degree (1 major, 1 minor) Political and Social Studies (2015)
Bachelor's degree (1 major, 1 minor) Russian Language and Culture (2015)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2015)
Bachelor's degree (2 majors) Egyptology (2015)
Bachelor's degree (2 majors) Classical Archaeology (2015)
Bachelor's degree (2 majors) Pedagogy (2015)
Bachelor's degree (2 majors) Protestant Theology (2015)
Bachelor's degree (2 majors) Musicology (2015)
Bachelor's degree (2 majors) Philosophy (2015)
Bachelor's degree (2 majors) Special Education (2015)
Bachelor's degree (2 majors) Pre- and Protohistoric Archaeology (2015)
Bachelor's degree (2 majors) Latin Philology (2015)
Bachelor's degree (2 majors) Music Education (2015)
Bachelor's degree (2 majors) Philosophy and Religion (2015)
Bachelor's degree (2 majors) Theological Studies (2015)
Bachelor's degree (2 majors) Digital Humanities (2015)
Bachelor's degree (2 majors) Political and Social Studies (2015)
Bachelor's degree (2 majors) Russian Language and Culture (2015)
Bachelor's degree (2 majors) Greek Philology (2015)
Bachelor's degree (2 majors) European Ethnology (2015)
Bachelor's degree (2 majors) Indology/South Asian Studies (2015)
Bachelor's degree (2 majors) Ancient Near Eastern Studies (2015)
First state examination for the teaching degree Gymnasium English (2015)
First state examination for the teaching degree Gymnasium Biology (2015)
First state examination for the teaching degree Gymnasium Chemistry (2015)
First state examination for the teaching degree Gymnasium Geography (2015)
First state examination for the teaching degree Gymnasium French Studies (2015)
First state examination for the teaching degree Gymnasium German (2015)
First state examination for the teaching degree Gymnasium History (2015)
First state examination for the teaching degree Gymnasium Greek Philology (2015)
First state examination for the teaching degree Gymnasium Computer Science (2015)
First state examination for the teaching degree Gymnasium Italian Studies (2015)
First state examination for the teaching degree Gymnasium Catholic Theology (2015)
First state examination for the teaching degree Gymnasium Latin Philology (2015)
First state examination for the teaching degree Gymnasium Mathematics (2015)
First state examination for the teaching degree Gymnasium Physics (2015)
First state examination for the teaching degree Gymnasium Russian (2015)
First state examination for the teaching degree Gymnasium Social Science (2015)
First state examination for the teaching degree Gymnasium Spanish Studies (2015)

First state examination for the teaching degree Gymnasium Science of Sport (2015)
Bachelor's degree (2 majors) Geography (2015)
Bachelor's degree (2 majors) French Studies (2015)
Bachelor's degree (2 majors) History (2015)
Bachelor's degree (2 majors) Sport Science (Focus on health and Pedagogics in Movement) (2015)
Bachelor's degree (2 majors) German Language and Literature (2015)
Bachelor' degree (1 major) Mathematical Physics (2016)
Bachelor' degree (1 major) Human-Computer Systems (2016)
Bachelor's degree (2 majors) Theological Studies (2011)
First state examination for the teaching degree Gymnasium Music (2015)
First state examination for the teaching degree Gymnasium Music Education, Advanced Studies (2015)
Bachelor's degree (1 major, 1 minor) French Studies (2016)
Bachelor's degree (2 majors) French Studies (2016)
Bachelor's degree (1 major, 1 minor) Italian Studies (2016)
Bachelor's degree (2 majors) Italian Studies (2016)
Bachelor's degree (1 major, 1 minor) Spanish Studies (2016)
Bachelor's degree (2 majors) Spanish Studies (2016)
Bachelor' degree (1 major) Romanic Languages (French/Italian) (2016)
Bachelor' degree (1 major) Romanic Languages (French/Spanish) (2016)
Bachelor' degree (1 major) Romanic Languages (Italian/Spanish) (2016)
Bachelor' degree (1 major) Business Information Systems (2016)
First state examination for the teaching degree Gymnasium French Studies (2016)
First state examination for the teaching degree Gymnasium Italian Studies (2016)
First state examination for the teaching degree Gymnasium Spanish Studies (2016)
Bachelor' degree (1 major) Games Engineering (2016)
Bachelor's degree (1 major, 1 minor) English and American Studies (2016)
Bachelor's degree (2 majors) English and American Studies (2016)
First state examination for the teaching degree Gymnasium English (2016)
Bachelor' degree (1 major) Media Communication (2016)
Bachelor' degree (1 major) Food Chemistry (2016)
Bachelor's degree (1 major, 1 minor) Digital Humanities (2016)
Bachelor' degree (1 major) Biology (2017)
Bachelor's degree (1 major, 1 minor) Geography (2017)
Bachelor's degree (1 major, 1 minor) History of Medieval and Modern Art (2017)
Bachelor's degree (2 majors) History of Medieval and Modern Art (2017)
Bachelor's degree (2 majors) Comparative Indo-European Linguistics (2017)
Bachelor' degree (1 major) Aerospace Computer Science (2017)
Bachelor' degree (1 major) Modern China (2017)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor's degree (1 major, 1 minor) Museology and material culture (2017)
Bachelor' degree (1 major) Economathematics (2017)
Bachelor' degree (1 major) Games Engineering (2017)
Bachelor' degree (1 major) Computer Science (2017)
First state examination for the teaching degree Gymnasium Greek Philology (2018)
Bachelor' degree (1 major) Media Communication (2018)
Bachelor' degree (1 major) Biomedicine (2018)
Bachelor' degree (1 major) Human-Computer Systems (2018)
Bachelor's degree (2 majors) Classical Archaeology (2018)
Bachelor's degree (1 major, 1 minor) Classical Archaeology (2018)
Bachelor's degree (1 major, 1 minor) Digital Humanities (2018)
Bachelor's degree (2 majors) Digital Humanities (2018)
First state examination for the teaching degree Gymnasium Physics (2018)

Bachelor' degree (1 major) Computer Science (2019)
First state examination for the teaching degree Gymnasium Mathematics (2019)
Bachelor's degree (1 major, 1 minor) English and American Studies (2019)
Bachelor's degree (1 major, 1 minor) Indology/South Asian Studies (2019)
Bachelor' degree (1 major) Indology/South Asian Studies (2019)
Bachelor' degree (1 major) Business Information Systems (2019)
Bachelor's degree (2 majors) Indology/South Asian Studies (2019)
Bachelor' degree (1 major) Business Management and Economics (2019)
Bachelor' degree (1 major) Modern China (2019)
Bachelor' degree (1 major) Food Chemistry (2019)
Bachelor' degree (1 major) Biomedicine (2020)
Bachelor' degree (1 major) Pedagogy (2020)
Bachelor' degree (1 major) Political and Social Studies (2020)
Bachelor' degree (1 major) Business Information Systems (2020)
Bachelor's degree (1 major, 1 minor) Political and Social Studies (2020)
Bachelor's degree (2 majors) European Ethnology (2020)
Bachelor's degree (2 majors) Political and Social Studies (2020)
Bachelor's degree (2 majors) Special Education (2020)
Bachelor' degree (1 major) Physics (2020)
Bachelor' degree (1 major) Nanostructure Technology (2020)
Bachelor' degree (1 major) Mathematical Physics (2020)
Bachelor' degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major, 1 minor) Museology and material culture (2020)
First state examination for the teaching degree Gymnasium Physics (2020)
Bachelor's degree (1 major, 1 minor) Pedagogy (2020)
Bachelor's degree (2 majors) Pedagogy (2020)
First state examination for the teaching degree Gymnasium Political and Social Studies (2020)
Bachelor' degree (1 major) Psychology (2020)
Bachelor' degree (1 major) Biology (2021)
Magister Theologiae Catholic Theology (2021)
Bachelor's degree (2 majors) History (2021)
Bachelor's degree (1 major, 1 minor) History (2021)
First state examination for the teaching degree Gymnasium History (2021)
Bachelor' degree (1 major) Media Communication (2021)
Bachelor's degree (2 majors) Theological Studies (2021)
Bachelor's degree (1 major, 1 minor) Theological Studies (2021)
Bachelor's degree (1 major, 1 minor) English and American Studies (2021)
Bachelor's degree (2 majors) English and American Studies (2021)
First state examination for the teaching degree Gymnasium English (2021)
Bachelor' degree (1 major) Functional Materials (2021)
First state examination for the teaching degree Gymnasium Philosophy and Ethics (2021)
Bachelor' degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (2 majors) Comparative Indo-European Linguistics (2021)
Bachelor' degree (1 major) Food Chemistry (2021)
Bachelor' degree (1 major) Quantum Technology (2021)
Bachelor's degree (2 majors) Special Education (2021)
Bachelor' degree (1 major) Business Information Systems (2021)
Bachelor' degree (1 major) Economathematics (2021)
Bachelor' degree (1 major) Business Management and Economics (2021)
Bachelor' degree (1 major) Human-Computer Systems (2022)
Bachelor's degree (1 major, 1 minor) Museology and material culture (2022)
Bachelor' degree (1 major) Biochemistry (2022)
Bachelor' degree (1 major) Biology (2022)

Bachelor' degree (1 major) Economathematics (2022)
Bachelor' degree (1 major) Mathematical Data Science (2022)
Bachelor' degree (1 major) Artificial Intelligence and Data Science (2022)
First state examination for the teaching degree Gymnasium Philosophy and Ethics (2022)
Bachelor's degree (2 majors) Ancient Near Eastern Archaeology (2022)
Bachelor's degree (1 major, 1 minor) Ancient World (2022)
Bachelor's degree (2 majors) Ancient Near Eastern Studies (2022)
Bachelor' degree (1 major) Franco-German studies: language, culture, digital competence (2022)
Bachelor' degree (1 major) Midwifery (2022)
First state examination for the teaching degree Gymnasium Russian (2023)
First state examination for the teaching degree Gymnasium Mathematics (2023)
First state examination for the teaching degree Gymnasium English (2023)
First state examination for the teaching degree Gymnasium Geography (2023)
Bachelor' degree (1 major) European Law (2023)
Bachelor's degree (1 major, 1 minor) English and American Studies (2023)
Bachelor's degree (2 majors) English and American Studies (2023)
Bachelor' degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor' degree (1 major) Mathematics (2023)
Bachelor' degree (1 major) Business Information Systems (2023)
Bachelor' degree (1 major) Economathematics (2023)
Bachelor's degree (1 major, 1 minor) History of Medieval and Modern Art (2023)
Bachelor's degree (2 majors) History of Medieval and Modern Art (2023)
Bachelor's degree (2 majors) Special Education (2023)
Bachelor' degree (1 major) Business Management and Economics (2023)
Bachelor' degree (1 major) Geography (2023)
Bachelor's degree (2 majors) Geography (2023)
Bachelor's degree (1 major, 1 minor) Geography (2023)
Bachelor's degree (2 majors) European Ethnology/Empiric Cultural Studies (2023)
First state examination for the teaching degree Gymnasium German (2024)
Bachelor' degree (1 major) Mathematical Physics (2024)
Bachelor's degree (2 majors) German Language and Literature (2024)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2024)
Bachelor' degree (1 major) Music Education (2024)
Bachelor's degree (2 majors) Music Education (2024)
Bachelor's degree (1 major, 1 minor) Music Education (2024)

Module title	Abbreviation
Laboratory Course Physics for Students of other Disciplines	11-PFNF-152-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

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

Intended learning outcomes

The students have recognised and understood physical contexts on the basis of the implementation of own experiments. They can conduct simple experiments in the laboratory. They are able to identify and assess sources of errors in experiments. They are able to compile a protocol for experimental procedures. They have a basic understanding of physical phenomena and know the basic ideas and ways of functioning of different measuring and imaging methods as well as their applications, especially in the field of biomedicine.

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

P (4)

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

a) practical assignment with oral test (approx. 15 minutes, during experiments) and b) written examination (90 minutes).
Each experiment comprises preparation, performance and evaluation. Test as well as performance of experiments can each be repeated once.

Allocation of places

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

Additional information

--

Workload

90 h

Teaching cycle

--

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

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Module appears in

Bachelor' degree (1 major) Biology (2011)
Bachelor' degree (1 major) Chemistry (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Psychology (2010)
Bachelor' degree (1 major) Economathematics (2012)
Bachelor' degree (1 major) Romanic Languages (French/Spanish) (2013)
Bachelor's degree (1 major, 1 minor) Pedagogy (2011)
Bachelor's degree (1 major, 1 minor) Pedagogy (2013)
Bachelor's degree (1 major, 1 minor) French Studies (2013)
Bachelor's degree (1 major, 1 minor) History (2010)

Bachelor's degree (1 major, 1 minor) Philosophy (2013)
Bachelor's degree (1 major, 1 minor) Pre- and Protohistoric Archaeology (2012)
Bachelor's degree (1 major, 1 minor) Spanish Studies (2010)
Bachelor's degree (1 major, 1 minor) Political and Social Studies (2013)
Bachelor's degree (1 major, 1 minor) English and American Studies (2010)
Bachelor's degree (1 major, 1 minor) Russian Language and Culture (2008)
Bachelor's degree (1 major, 1 minor) Gallo-Roman philology (2010)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2013)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2010)
Bachelor's degree (1 major, 1 minor) Italian Studies (2010)
Bachelor's degree (2 majors) Classical Archaeology (2013)
Bachelor's degree (2 majors) Pedagogy (2013)
Bachelor's degree (2 majors) Philosophy (2013)
Bachelor's degree (2 majors) Special Education (2009)
Bachelor's degree (2 majors) Digital Humanities (2012)
Bachelor's degree (2 majors) Political and Social Studies (2011)
Bachelor's degree (2 majors) Russian Language and Culture (2012)
Bachelor's degree (2 majors) European Ethnology (2013)
Magister Theologiae Catholic Theology (2013)
First state examination for the teaching degree Gymnasium English (2009)
First state examination for the teaching degree Gymnasium Biology (2009)
First state examination for the teaching degree Gymnasium Chemistry (2009)
First state examination for the teaching degree Gymnasium Geography (2009)
First state examination for the teaching degree Gymnasium French Studies (2009)
First state examination for the teaching degree Gymnasium German (2009)
First state examination for the teaching degree Gymnasium History (2009)
First state examination for the teaching degree Gymnasium Greek Philology (2009)
First state examination for the teaching degree Gymnasium Computer Science (2009)
First state examination for the teaching degree Gymnasium Italian Studies (2009)
First state examination for the teaching degree Gymnasium Catholic Theology (2009)
First state examination for the teaching degree Gymnasium Latin Philology (2009)
First state examination for the teaching degree Gymnasium Mathematics (2012)
First state examination for the teaching degree Gymnasium Mathematics (2009)
First state examination for the teaching degree Gymnasium Music (2009)
First state examination for the teaching degree Gymnasium Physics (2009)
First state examination for the teaching degree Gymnasium Russian (2009)
First state examination for the teaching degree Gymnasium Social Science (2009)
First state examination for the teaching degree Gymnasium Spanish Studies (2009)
First state examination for the teaching degree Gymnasium Science of Sport (2009)
First state examination for the teaching degree Gymnasium Music Education, Advanced Studies (2009)
Bachelor's degree (2 majors) Spanish Studies (2013)
Bachelor's degree (2 majors) English and American Studies (2009)
Bachelor's degree (2 majors) Gallo-Roman philology (2009)
Bachelor's degree (2 majors) German Language and Literature (2013)
Bachelor's degree (2 majors) Italian Studies (2009)
Bachelor' degree (1 major) Biochemistry (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Geography (2015)
Bachelor' degree (1 major) Computer Science (2015)
Bachelor' degree (1 major) Food Chemistry (2015)
Bachelor' degree (1 major) Mathematics (2015)
Bachelor' degree (1 major) Musicology (2015)
Bachelor' degree (1 major) Physics (2015)

Bachelor' degree (1 major) Psychology (2015)
Bachelor' degree (1 major) Business Management and Economics (2015)
Bachelor' degree (1 major) Nanostructure Technology (2015)
Bachelor' degree (1 major) Biomedicine (2015)
Bachelor' degree (1 major) Music Education (2015)
Bachelor' degree (1 major) Computational Mathematics (2015)
Bachelor' degree (1 major) Political and Social Studies (2015)
Bachelor' degree (1 major) Functional Materials (2015)
Bachelor' degree (1 major) Academic Speech Therapy (2015)
Bachelor' degree (1 major) Indology/South Asian Studies (2015)
Bachelor's degree (1 major, 1 minor) Egyptology (2015)
Bachelor's degree (1 major, 1 minor) Pedagogy (2015)
Bachelor's degree (1 major, 1 minor) History (2015)
Bachelor's degree (1 major, 1 minor) Musicology (2015)
Bachelor's degree (1 major, 1 minor) Philosophy (2015)
Bachelor's degree (1 major, 1 minor) Pre- and Protohistoric Archaeology (2015)
Bachelor's degree (1 major, 1 minor) Ancient World (2015)
Bachelor's degree (1 major, 1 minor) Music Education (2015)
Bachelor's degree (1 major, 1 minor) Philosophy and Religion (2015)
Bachelor's degree (1 major, 1 minor) Theological Studies (2015)
Bachelor's degree (1 major, 1 minor) Political and Social Studies (2015)
Bachelor's degree (1 major, 1 minor) Russian Language and Culture (2015)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2015)
Bachelor's degree (2 majors) Egyptology (2015)
Bachelor's degree (2 majors) Classical Archaeology (2015)
Bachelor's degree (2 majors) Pedagogy (2015)
Bachelor's degree (2 majors) Protestant Theology (2015)
Bachelor's degree (2 majors) Musicology (2015)
Bachelor's degree (2 majors) Philosophy (2015)
Bachelor's degree (2 majors) Special Education (2015)
Bachelor's degree (2 majors) Pre- and Protohistoric Archaeology (2015)
Bachelor's degree (2 majors) Latin Philology (2015)
Bachelor's degree (2 majors) Music Education (2015)
Bachelor's degree (2 majors) Philosophy and Religion (2015)
Bachelor's degree (2 majors) Theological Studies (2015)
Bachelor's degree (2 majors) Digital Humanities (2015)
Bachelor's degree (2 majors) Political and Social Studies (2015)
Bachelor's degree (2 majors) Russian Language and Culture (2015)
Bachelor's degree (2 majors) Greek Philology (2015)
Bachelor's degree (2 majors) European Ethnology (2015)
Bachelor's degree (2 majors) Indology/South Asian Studies (2015)
Bachelor's degree (2 majors) Ancient Near Eastern Studies (2015)
First state examination for the teaching degree Gymnasium English (2015)
First state examination for the teaching degree Gymnasium Biology (2015)
First state examination for the teaching degree Gymnasium Chemistry (2015)
First state examination for the teaching degree Gymnasium Geography (2015)
First state examination for the teaching degree Gymnasium French Studies (2015)
First state examination for the teaching degree Gymnasium German (2015)
First state examination for the teaching degree Gymnasium History (2015)
First state examination for the teaching degree Gymnasium Greek Philology (2015)
First state examination for the teaching degree Gymnasium Computer Science (2015)
First state examination for the teaching degree Gymnasium Italian Studies (2015)
First state examination for the teaching degree Gymnasium Catholic Theology (2015)

First state examination for the teaching degree Gymnasium Latin Philology (2015)
First state examination for the teaching degree Gymnasium Mathematics (2015)
First state examination for the teaching degree Gymnasium Physics (2015)
First state examination for the teaching degree Gymnasium Russian (2015)
First state examination for the teaching degree Gymnasium Social Science (2015)
First state examination for the teaching degree Gymnasium Spanish Studies (2015)
First state examination for the teaching degree Gymnasium Science of Sport (2015)
Bachelor's degree (2 majors) Geography (2015)
Bachelor's degree (2 majors) French Studies (2015)
Bachelor's degree (2 majors) History (2015)
Bachelor's degree (2 majors) Sport Science (Focus on health and Pedagogics in Movement) (2015)
Bachelor's degree (2 majors) German Language and Literature (2015)
Bachelor' degree (1 major) Mathematical Physics (2016)
Bachelor' degree (1 major) Human-Computer Systems (2016)
Bachelor's degree (2 majors) Theological Studies (2011)
First state examination for the teaching degree Gymnasium Music (2015)
First state examination for the teaching degree Gymnasium Music Education, Advanced Studies (2015)
Bachelor's degree (1 major, 1 minor) French Studies (2016)
Bachelor's degree (2 majors) French Studies (2016)
Bachelor's degree (1 major, 1 minor) Italian Studies (2016)
Bachelor's degree (2 majors) Italian Studies (2016)
Bachelor's degree (1 major, 1 minor) Spanish Studies (2016)
Bachelor's degree (2 majors) Spanish Studies (2016)
Bachelor' degree (1 major) Romanic Languages (French/Italian) (2016)
Bachelor' degree (1 major) Romanic Languages (French/Spanish) (2016)
Bachelor' degree (1 major) Romanic Languages (Italian/Spanish) (2016)
Bachelor' degree (1 major) Business Information Systems (2016)
First state examination for the teaching degree Gymnasium French Studies (2016)
First state examination for the teaching degree Gymnasium Italian Studies (2016)
First state examination for the teaching degree Gymnasium Spanish Studies (2016)
Bachelor' degree (1 major) Games Engineering (2016)
Bachelor's degree (1 major, 1 minor) English and American Studies (2016)
Bachelor's degree (2 majors) English and American Studies (2016)
First state examination for the teaching degree Gymnasium English (2016)
Bachelor' degree (1 major) Media Communication (2016)
Bachelor' degree (1 major) Food Chemistry (2016)
Bachelor's degree (1 major, 1 minor) Digital Humanities (2016)
Bachelor' degree (1 major) Biology (2017)
Bachelor's degree (1 major, 1 minor) Geography (2017)
Bachelor's degree (1 major, 1 minor) History of Medieval and Modern Art (2017)
Bachelor's degree (2 majors) History of Medieval and Modern Art (2017)
Bachelor's degree (2 majors) Comparative Indo-European Linguistics (2017)
Bachelor' degree (1 major) Aerospace Computer Science (2017)
Bachelor' degree (1 major) Modern China (2017)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor's degree (1 major, 1 minor) Museology and material culture (2017)
Bachelor' degree (1 major) Economathematics (2017)
Bachelor' degree (1 major) Games Engineering (2017)
Bachelor' degree (1 major) Computer Science (2017)
First state examination for the teaching degree Gymnasium Greek Philology (2018)
Bachelor' degree (1 major) Media Communication (2018)
Bachelor' degree (1 major) Biomedicine (2018)

Bachelor' degree (1 major) Human-Computer Systems (2018)
Bachelor's degree (2 majors) Classical Archaeology (2018)
Bachelor's degree (1 major, 1 minor) Classical Archaeology (2018)
Bachelor's degree (1 major, 1 minor) Digital Humanities (2018)
Bachelor's degree (2 majors) Digital Humanities (2018)
First state examination for the teaching degree Gymnasium Physics (2018)
Bachelor' degree (1 major) Computer Science (2019)
First state examination for the teaching degree Gymnasium Mathematics (2019)
Bachelor's degree (1 major, 1 minor) English and American Studies (2019)
Bachelor's degree (1 major, 1 minor) Indology/South Asian Studies (2019)
Bachelor' degree (1 major) Indology/South Asian Studies (2019)
Bachelor' degree (1 major) Business Information Systems (2019)
Bachelor's degree (2 majors) Indology/South Asian Studies (2019)
Bachelor' degree (1 major) Business Management and Economics (2019)
Bachelor' degree (1 major) Modern China (2019)
Bachelor' degree (1 major) Food Chemistry (2019)
Module studies (Bachelor) Orientierungsstudien (2020)
Bachelor' degree (1 major) Biomedicine (2020)
Bachelor' degree (1 major) Pedagogy (2020)
Bachelor' degree (1 major) Political and Social Studies (2020)
Bachelor' degree (1 major) Business Information Systems (2020)
Bachelor's degree (1 major, 1 minor) Political and Social Studies (2020)
Bachelor's degree (2 majors) European Ethnology (2020)
Bachelor's degree (2 majors) Political and Social Studies (2020)
Bachelor's degree (2 majors) Special Education (2020)
Bachelor' degree (1 major) Physics (2020)
Bachelor' degree (1 major) Nanostructure Technology (2020)
Bachelor' degree (1 major) Mathematical Physics (2020)
Bachelor' degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major, 1 minor) Museology and material culture (2020)
First state examination for the teaching degree Gymnasium Physics (2020)
Bachelor's degree (1 major, 1 minor) Pedagogy (2020)
Bachelor's degree (2 majors) Pedagogy (2020)
First state examination for the teaching degree Gymnasium Political and Social Studies (2020)
Bachelor' degree (1 major) Psychology (2020)
Bachelor' degree (1 major) Biology (2021)
Magister Theologiae Catholic Theology (2021)
Bachelor's degree (2 majors) History (2021)
Bachelor's degree (1 major, 1 minor) History (2021)
First state examination for the teaching degree Gymnasium History (2021)
Bachelor' degree (1 major) Media Communication (2021)
Bachelor's degree (2 majors) Theological Studies (2021)
Bachelor's degree (1 major, 1 minor) Theological Studies (2021)
Bachelor's degree (1 major, 1 minor) English and American Studies (2021)
Bachelor's degree (2 majors) English and American Studies (2021)
First state examination for the teaching degree Gymnasium English (2021)
Bachelor' degree (1 major) Functional Materials (2021)
First state examination for the teaching degree Gymnasium Philosophy and Ethics (2021)
Bachelor' degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (2 majors) Comparative Indo-European Linguistics (2021)
Bachelor' degree (1 major) Food Chemistry (2021)
Bachelor' degree (1 major) Quantum Technology (2021)
Bachelor's degree (2 majors) Special Education (2021)

Bachelor' degree (1 major) Business Information Systems (2021)
Bachelor' degree (1 major) Economathematics (2021)
Bachelor' degree (1 major) Business Management and Economics (2021)
Bachelor' degree (1 major) Human-Computer Systems (2022)
Bachelor's degree (1 major, 1 minor) Museology and material culture (2022)
Bachelor' degree (1 major) Biochemistry (2022)
Bachelor' degree (1 major) Biology (2022)
Bachelor' degree (1 major) Economathematics (2022)
Bachelor' degree (1 major) Mathematical Data Science (2022)
Bachelor' degree (1 major) Artificial Intelligence and Data Science (2022)
First state examination for the teaching degree Gymnasium Philosophy and Ethics (2022)
Bachelor's degree (2 majors) Ancient Near Eastern Archaeology (2022)
Bachelor's degree (1 major, 1 minor) Ancient World (2022)
Bachelor's degree (2 majors) Ancient Near Eastern Studies (2022)
Bachelor' degree (1 major) Franco-German studies: language, culture, digital competence (2022)
Bachelor' degree (1 major) Midwifery (2022)
First state examination for the teaching degree Gymnasium Russian (2023)
First state examination for the teaching degree Gymnasium Mathematics (2023)
First state examination for the teaching degree Gymnasium English (2023)
First state examination for the teaching degree Gymnasium Geography (2023)
Bachelor' degree (1 major) European Law (2023)
Bachelor's degree (1 major, 1 minor) English and American Studies (2023)
Bachelor's degree (2 majors) English and American Studies (2023)
Bachelor' degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor' degree (1 major) Mathematics (2023)
Bachelor' degree (1 major) Business Information Systems (2023)
Bachelor' degree (1 major) Economathematics (2023)
Bachelor's degree (1 major, 1 minor) History of Medieval and Modern Art (2023)
Bachelor's degree (2 majors) History of Medieval and Modern Art (2023)
Bachelor's degree (2 majors) Special Education (2023)
Bachelor' degree (1 major) Business Management and Economics (2023)
Bachelor' degree (1 major) Geography (2023)
Bachelor's degree (2 majors) Geography (2023)
Bachelor's degree (1 major, 1 minor) Geography (2023)
Bachelor's degree (2 majors) European Ethnology/Empiric Cultural Studies (2023)
First state examination for the teaching degree Gymnasium German (2024)
Bachelor' degree (1 major) Mathematical Physics (2024)
Bachelor's degree (2 majors) German Language and Literature (2024)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2024)
Bachelor' degree (1 major) Music Education (2024)
Bachelor's degree (2 majors) Music Education (2024)
Bachelor's degree (1 major, 1 minor) Music Education (2024)

Module title			Abbreviation
Toxicology and legal studies			03-TR-152-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 (1) + V (1)

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

written examination (approx. 90 minutes)

Allocation of places

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Additional information

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Workload

90 h

Teaching cycle

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

§ 22 II Nr. 1 h)
§ 22 II Nr. 2 f)
§ 22 II Nr. 3 f)

Module appears in

Bachelor' degree (1 major) Biochemistry (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Food Chemistry (2015)
First state examination for the teaching degree Grundschule Chemistry (2015)
First state examination for the teaching degree Grundschule Didactics in Chemistry (Primary School) (2015)
First state examination for the teaching degree Realschule Chemistry (2015)
First state examination for the teaching degree Gymnasium Chemistry (2015)
First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Middle School) (2015)
First state examination for the teaching degree Mittelschule Chemistry (2015)
First state examination for the teaching degree Mittelschule Didactics in Chemistry (Middle School) (2015)
Master's degree (1 major) Chemistry (2016)
Bachelor' degree (1 major) Food Chemistry (2016)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)

Master's degree (1 major) Chemistry (2018)
Bachelor' degree (1 major) Food Chemistry (2019)
First state examination for the teaching degree Mittelschule Chemistry (2020 (Prüfungsordnungsversion 2015))
First state examination for the teaching degree Mittelschule Didactics in Chemistry (Middle School) (2020 (Prüfungsordnungsversion 2015))
First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Middle School) (2020 (Prüfungsordnungsversion 2015))
Bachelor' degree (1 major) Food Chemistry (2021)
Bachelor' degree (1 major) Biochemistry (2022)

Key Skills Area

(20 ECTS credits)

General Key Skills

(5 ECTS credits)

Students may select any of the modules offered as part of the pool of general transferable skills (ASQ) of JMU.

Subject-specific Key Skills

(15 ECTS credits)

Subject-specific Key Skills, Compulsory Courses

(5 ECTS credits)

Module title			Abbreviation
Advanced laboratory course			08-VP-152-m01
Module coordinator		**Module offered by**	
head of the research group offering the module		Faculty of Chemistry and Pharmacy	
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 explore a research topic and apply the methods commonly used in the discipline in question.

Intended learning outcomes

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

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

P (10)

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

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

Allocation of places

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Additional information

Additional information on module duration: block placement / block taught practical course with a duration of 20 days.

Workload

150 h

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) Chemistry (2015)
Bachelor' degree (1 major) Chemistry (2017)

Subject-specific Key Skills, Compulsory Electives

(10 ECTS credits)

Module title	Abbreviation
Biochemistry 2	08-BC2-152-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 lectures and exercises, this module acquaints students with the fundamental principles of biochemistry. A particular focus is on replication, DNA repair, transcription, mRNA maturation, translation and translational regulation, protein targeting, nuclear transport and protein degradation. The module also discusses the fundamental principles of cellular signal transduction.

Intended learning outcomes

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

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

V (2) + Ü (1)

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

written examination (approx. 60 to 90 minutes)

Allocation of places

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Additional information

Pursuant to Section 2 Subsection 2 Sentence 2 Verordnung über die Ausbildung und Prüfung der Staatlich geprüften Lebensmittelchemikerinnen und Lebensmittelchemiker (Regulation on the training and examination of state-certified food chemists, APOLmCh) in conjunction with No. II 2. Letter e) and No. II 1. Letter c) of Annex 1 of APOLmCh and No. 3 of Annex 3 of APOLmCh.

Workload

150 h

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 (2015)
Bachelor' degree (1 major) Biology (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Food Chemistry (2015)
Bachelor' degree (1 major) Food Chemistry (2016)
Bachelor' degree (1 major) Biology (2017)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor' degree (1 major) Food Chemistry (2019)
Bachelor' degree (1 major) Biology (2021)
Bachelor' degree (1 major) Food Chemistry (2021)

Bachelor' degree (1 major) Biochemistry (2022) Bachelor' degree (1 major) Biology (2022)

Module title			Abbreviation
Practical course of Biochemistry			08-BCP-152-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	08-BC1	
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)

P (6)

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)
Assessment offered: Once a year, summer semester

Allocation of places

Students of the Bachelor's degree programme Biochemie (Biochemistry, 180 ECTS credits): no restrictions with regard to available places.
Students of the Bachelor's degree programme Chemie (Chemistry, 180 ECTS credits): no more than 6 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; a waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

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 (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor' degree (1 major) Biochemistry (2022)

Module title	Abbreviation
Applied Spectroscopy 3	08-PS3-152-m01

Module coordinator	Module offered by
lecturer of lecture "Praktische Spektroskopie 3"	Institute of Physical and Theoretical 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 gives students the opportunity to apply their theoretical knowledge of spectroscopic methods in practice and to interpret readings or graphs. We will record and analyse UV-VIS, fluorescence and vibration spectra and discuss modern mass spectrometry methods.

Intended learning outcomes

Students are able to work with different spectrometers and to interpret the resulting spectra. They are able to conduct error discussions.

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

V (3)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

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) Chemistry (2015)
Bachelor' degree (1 major) Functional Materials (2015)
Master's degree (1 major) Functional Materials (2016)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor' degree (1 major) Functional Materials (2021)

Module title			Abbreviation
Programming and numerical methods			08-PKC-152-m01
Module coordinator		**Module offered by**	
lecturer of lecture "Programmierkurs für Chemiker"		Institute of Physical and Theoretical Chemistry	
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 provides an introduction to the fundamentals of a programming language and discusses how they can be applied to problems in chemistry.

Intended learning outcomes

Students are able to describe the fundamentals of the programming language and to apply them to problems in chemistry.

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

S (2) + Ü (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Assessment offered: Once a year, summer semester
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

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) Chemistry (2015)
Bachelor' degree (1 major) Functional Materials (2015)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor' degree (1 major) Functional Materials (2021)

Module title			Abbreviation
Advanced chemical practical course			08-OP-152-m01
Module coordinator		**Module offered by**	
head of the research group offering the module		Faculty of Chemistry and Pharmacy	
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 explore a research topic and apply the methods commonly used in the discipline in question.

Intended learning outcomes

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

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

P (10)

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) talk (approx. 15 minutes) or b) log (approx. 10 to 20 pages)
Language of assessment: German and/or English

Allocation of places

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Additional information

Additional information on module duration: block placement / block taught practical course with a duration of 20 days.

Workload

150 h

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) Chemistry (2015)
Bachelor' degree (1 major) Chemistry (2017)
Module studies (Bachelor) Chemistry (2019)

Thesis

(10 ECTS credits)

Module title			Abbreviation
Bachelor Thesis			08-BA-152-m01
Module coordinator		**Module offered by**	
head of the research group offering the module		Faculty of Chemistry and Pharmacy	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
10	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	The supervisor may make the successful completion of certain modules that are relevant for the respective topic a prerequisite for the assignment of the topic.	

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 to module

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

Bachelor's thesis (approx. 40 pages)
Language of assessment: German and/or English

Allocation of places

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Additional information

Time to complete: 8 weeks.

Workload

300 h

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) Chemistry (2015)
Bachelor' degree (1 major) Chemistry (2017)

Compulsory Electives, Appendix DA

(170 ECTS credits)

Subfield General and Inorganic Chemistry

(35 ECTS credits)

Module title	Abbreviation
Principles of Inorganic Chemistry	08-AC1-152-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)
8	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

The module provides an overview of the fundamental knowledge of chemistry. Emphasis is placed on the material and particle level, metals, acid-base reactions, the periodic table, chemical equilibrium and complexometry. In addition, the module introduces fundamental concepts of chemistry and teaches the basics of inorganic chemistry.

Intended learning outcomes

The student understands the principles of the periodic table and can obtain information from it. He/she is proficient in basic models of the structure of matter and can describe them properly. He/she can depict chemical reactions using typical chemical formula language and interpret them by identifying the type of reaction. The students know how the most important quantitative and qualitative analytical methods work and their areas of application.

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

V (4) + V (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

240 h

Teaching cycle

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

§ 42 I Nr. 1 and § 22 II Nr. 1 h)
§ 62 I Nr. 1

Module appears in

Bachelor' degree (1 major) Biochemistry (2015)
Bachelor' degree (1 major) Chemistry (2015)
First state examination for the teaching degree Grundschule Chemistry (2015)
First state examination for the teaching degree Grundschule Didactics in Chemistry (Primary School) (2015)
First state examination for the teaching degree Realschule Chemistry (2015)
First state examination for the teaching degree Gymnasium Chemistry (2015)
First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Middle School) (2015)

First state examination for the teaching degree Mittelschule Chemistry (2015)
First state examination for the teaching degree Mittelschule Didactics in Chemistry (Middle School) (2015)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Module studies (Bachelor) Chemistry (2019)
Module studies (Bachelor) Orientierungsstudien (2020)
First state examination for the teaching degree Mittelschule Chemistry (2020 (Prüfungsordnungsversion 2015))
First state examination for the teaching degree Mittelschule Didactics in Chemistry (Middle School) (2020 (Prüfungsordnungsversion 2015))
First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Middle School) (2020 (Prüfungsordnungsversion 2015))
Bachelor' degree (1 major) Food Chemistry (2021)
Bachelor' degree (1 major) Biochemistry (2022)

Module title			Abbreviation
Inorganic Chemistry 1 (lab)			08-ACP1-152-m01
Module coordinator		**Module offered by**	
holder of the Chair of Anorganic Chemistry		Institute of Inorganic Chemistry	
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 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. The course focuses on laboratory safety, simple lab techniques, the synthesis of simple substances and analyses of unknown substances.

Intended learning outcomes

Students 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)

P (12) + S (2)

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

[a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)] and Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical assignments (2 to 4 random examinations)
Assessment offered: Once a year, winter semester
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

300 h

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) Chemistry (2015)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor' degree (1 major) Food Chemistry (2021)

Module title	Abbreviation
Inorganic Chemistry of the Elements	08-AS1-152-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)
6	numerical grade	--

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.

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.

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

V (2) + V (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

180 h

Teaching cycle

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

§ 62 I Nr. 1

Module appears in

Bachelor' degree (1 major) Biochemistry (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Mathematics (2015)
Bachelor' degree (1 major) Computational Mathematics (2015)
First state examination for the teaching degree Gymnasium Chemistry (2015)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor' degree (1 major) Food Chemistry (2021)
Bachelor' degree (1 major) Biochemistry (2022)
Bachelor' degree (1 major) Mathematics (2023)

Module title			Abbreviation
Analytical Chemistry (lab)			08-ANP-152-m01
Module coordinator		**Module offered by**	
holder of the Chair of Anorganic Chemistry		Institute of Inorganic Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
6	(not) successfully completed	--	
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. These experiments focus on different methods for the analysis of unknown substances.

Intended learning outcomes

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)

P (12) + S (1)

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

Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)
Assessment offered: Once a year, summer semester
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

180 h

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 (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor' degree (1 major) Food Chemistry (2021)
Bachelor' degree (1 major) Biochemistry (2022)

Module title			Abbreviation
Solid State Chemistry, Spectroscopic Methods (DD)			08-AC-FS-DA-152-m01
Module coordinator		**Module offered by**	
lecturer of lecture "Festkörperchemie" (Solid State Chemistry)		Institute of Inorganic 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 equips students with an advanced knowledge of metals, alloys and saline compounds. It focuses on their structures and properties, special material classes, reactivity and technical processes.

Intended learning outcomes

Students are able to describe the structure and properties of metals, alloys and saline compounds in an appropriate manner. They are able to systemise them and characterise their structure and reactivity. They can list spectroscopic methods that can be used for the structural analysis of solids and can describe them in an appropriate manner.

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

V (2) + V (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

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) Chemistry (2015)
Bachelor' degree (1 major) Chemistry (2017)

Subfield Organic Chemistry

(28 ECTS credits)

Module title			Abbreviation
Organic Chemistry 1			08-OC1-152-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	--	

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 (3) + Ü (1)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

Teaching cycle: every year, summer semester

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

§ 62 I Nr. 2

Module appears in

Bachelor' degree (1 major) Biology (2011)
Bachelor' degree (1 major) Chemistry (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Psychology (2010)
Bachelor' degree (1 major) Economathematics (2012)
Bachelor' degree (1 major) Romanic Languages (French/Spanish) (2013)
Bachelor's degree (1 major, 1 minor) Pedagogy (2011)
Bachelor's degree (1 major, 1 minor) Pedagogy (2013)
Bachelor's degree (1 major, 1 minor) French Studies (2013)

Bachelor's degree (1 major, 1 minor) History (2010)
Bachelor's degree (1 major, 1 minor) Philosophy (2013)
Bachelor's degree (1 major, 1 minor) Pre- and Protohistoric Archaeology (2012)
Bachelor's degree (1 major, 1 minor) Spanish Studies (2010)
Bachelor's degree (1 major, 1 minor) Political and Social Studies (2013)
Bachelor's degree (1 major, 1 minor) English and American Studies (2010)
Bachelor's degree (1 major, 1 minor) Russian Language and Culture (2008)
Bachelor's degree (1 major, 1 minor) Gallo-Roman philology (2010)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2013)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2010)
Bachelor's degree (1 major, 1 minor) Italian Studies (2010)
Bachelor's degree (2 majors) Classical Archaeology (2013)
Bachelor's degree (2 majors) Pedagogy (2013)
Bachelor's degree (2 majors) Philosophy (2013)
Bachelor's degree (2 majors) Special Education (2009)
Bachelor's degree (2 majors) Digital Humanities (2012)
Bachelor's degree (2 majors) Political and Social Studies (2011)
Bachelor's degree (2 majors) Russian Language and Culture (2012)
Bachelor's degree (2 majors) European Ethnology (2013)
Magister Theologiae Catholic Theology (2013)
Bachelor's degree (2 majors) Spanish Studies (2013)
Bachelor's degree (2 majors) English and American Studies (2009)
Bachelor's degree (2 majors) Gallo-Roman philology (2009)
Bachelor's degree (2 majors) German Language and Literature (2013)
Bachelor's degree (2 majors) Italian Studies (2009)
Bachelor' degree (1 major) Biochemistry (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Geography (2015)
Bachelor' degree (1 major) Computer Science (2015)
Bachelor' degree (1 major) Mathematics (2015)
Bachelor' degree (1 major) Musicology (2015)
Bachelor' degree (1 major) Physics (2015)
Bachelor' degree (1 major) Psychology (2015)
Bachelor' degree (1 major) Business Management and Economics (2015)
Bachelor' degree (1 major) Nanostructure Technology (2015)
Bachelor' degree (1 major) Biomedicine (2015)
Bachelor' degree (1 major) Music Education (2015)
Bachelor' degree (1 major) Computational Mathematics (2015)
Bachelor' degree (1 major) Political and Social Studies (2015)
Bachelor' degree (1 major) Functional Materials (2015)
Bachelor' degree (1 major) Academic Speech Therapy (2015)
Bachelor' degree (1 major) Indology/South Asian Studies (2015)
Bachelor's degree (1 major, 1 minor) Egyptology (2015)
Bachelor's degree (1 major, 1 minor) Pedagogy (2015)
Bachelor's degree (1 major, 1 minor) History (2015)
Bachelor's degree (1 major, 1 minor) Musicology (2015)
Bachelor's degree (1 major, 1 minor) Philosophy (2015)
Bachelor's degree (1 major, 1 minor) Pre- and Protohistoric Archaeology (2015)
Bachelor's degree (1 major, 1 minor) Ancient World (2015)
Bachelor's degree (1 major, 1 minor) Music Education (2015)
Bachelor's degree (1 major, 1 minor) Philosophy and Religion (2015)
Bachelor's degree (1 major, 1 minor) Theological Studies (2015)
Bachelor's degree (1 major, 1 minor) Political and Social Studies (2015)

Bachelor's degree (1 major, 1 minor) Russian Language and Culture (2015)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2015)
Bachelor's degree (2 majors) Egyptology (2015)
Bachelor's degree (2 majors) Classical Archaeology (2015)
Bachelor's degree (2 majors) Pedagogy (2015)
Bachelor's degree (2 majors) Protestant Theology (2015)
Bachelor's degree (2 majors) Musicology (2015)
Bachelor's degree (2 majors) Philosophy (2015)
Bachelor's degree (2 majors) Special Education (2015)
Bachelor's degree (2 majors) Pre- and Protohistoric Archaeology (2015)
Bachelor's degree (2 majors) Latin Philology (2015)
Bachelor's degree (2 majors) Music Education (2015)
Bachelor's degree (2 majors) Philosophy and Religion (2015)
Bachelor's degree (2 majors) Theological Studies (2015)
Bachelor's degree (2 majors) Digital Humanities (2015)
Bachelor's degree (2 majors) Political and Social Studies (2015)
Bachelor's degree (2 majors) Russian Language and Culture (2015)
Bachelor's degree (2 majors) Greek Philology (2015)
Bachelor's degree (2 majors) European Ethnology (2015)
Bachelor's degree (2 majors) Indology/South Asian Studies (2015)
Bachelor's degree (2 majors) Ancient Near Eastern Studies (2015)
First state examination for the teaching degree Gymnasium Chemistry (2015)
Bachelor's degree (2 majors) Geography (2015)
Bachelor's degree (2 majors) French Studies (2015)
Bachelor's degree (2 majors) History (2015)
Bachelor's degree (2 majors) Sport Science (Focus on health and Pedagogics in Movement) (2015)
Bachelor's degree (2 majors) German Language and Literature (2015)
Bachelor' degree (1 major) Mathematical Physics (2016)
Bachelor' degree (1 major) Human-Computer Systems (2016)
Bachelor's degree (2 majors) Theological Studies (2011)
Bachelor's degree (1 major, 1 minor) French Studies (2016)
Bachelor's degree (2 majors) French Studies (2016)
Bachelor's degree (1 major, 1 minor) Italian Studies (2016)
Bachelor's degree (2 majors) Italian Studies (2016)
Bachelor's degree (1 major, 1 minor) Spanish Studies (2016)
Bachelor's degree (2 majors) Spanish Studies (2016)
Bachelor' degree (1 major) Romanic Languages (French/Italian) (2016)
Bachelor' degree (1 major) Romanic Languages (French/Spanish) (2016)
Bachelor' degree (1 major) Romanic Languages (Italian/Spanish) (2016)
Bachelor' degree (1 major) Business Information Systems (2016)
Bachelor' degree (1 major) Games Engineering (2016)
Bachelor's degree (1 major, 1 minor) English and American Studies (2016)
Bachelor's degree (2 majors) English and American Studies (2016)
Bachelor' degree (1 major) Media Communication (2016)
Bachelor' degree (1 major) Food Chemistry (2016)
Bachelor's degree (1 major, 1 minor) Digital Humanities (2016)
Bachelor' degree (1 major) Biology (2017)
Bachelor's degree (1 major, 1 minor) Geography (2017)
Bachelor's degree (1 major, 1 minor) History of Medieval and Modern Art (2017)
Bachelor's degree (2 majors) History of Medieval and Modern Art (2017)
Bachelor's degree (2 majors) Comparative Indo-European Linguistics (2017)
Bachelor' degree (1 major) Aerospace Computer Science (2017)
Bachelor' degree (1 major) Modern China (2017)

Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor's degree (1 major, 1 minor) Museology and material culture (2017)
Bachelor' degree (1 major) Economathematics (2017)
Bachelor' degree (1 major) Games Engineering (2017)
Bachelor' degree (1 major) Computer Science (2017)
Bachelor' degree (1 major) Media Communication (2018)
Bachelor' degree (1 major) Biomedicine (2018)
Bachelor' degree (1 major) Human-Computer Systems (2018)
Bachelor's degree (2 majors) Classical Archaeology (2018)
Bachelor's degree (1 major, 1 minor) Classical Archaeology (2018)
Bachelor's degree (1 major, 1 minor) Digital Humanities (2018)
Bachelor's degree (2 majors) Digital Humanities (2018)
Bachelor' degree (1 major) Computer Science (2019)
Bachelor's degree (1 major, 1 minor) English and American Studies (2019)
Bachelor's degree (1 major, 1 minor) Indology/South Asian Studies (2019)
Bachelor' degree (1 major) Indology/South Asian Studies (2019)
Bachelor' degree (1 major) Business Information Systems (2019)
Bachelor's degree (2 majors) Indology/South Asian Studies (2019)
Bachelor' degree (1 major) Business Management and Economics (2019)
Bachelor' degree (1 major) Modern China (2019)
Bachelor' degree (1 major) Food Chemistry (2019)
Bachelor' degree (1 major) Biomedicine (2020)
Bachelor' degree (1 major) Pedagogy (2020)
Bachelor' degree (1 major) Political and Social Studies (2020)
Bachelor' degree (1 major) Business Information Systems (2020)
Bachelor's degree (1 major, 1 minor) Political and Social Studies (2020)
Bachelor's degree (2 majors) European Ethnology (2020)
Bachelor's degree (2 majors) Political and Social Studies (2020)
Bachelor's degree (2 majors) Special Education (2020)
Bachelor' degree (1 major) Physics (2020)
Bachelor' degree (1 major) Nanostructure Technology (2020)
Bachelor' degree (1 major) Mathematical Physics (2020)
Bachelor' degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major, 1 minor) Museology and material culture (2020)
Bachelor's degree (1 major, 1 minor) Pedagogy (2020)
Bachelor's degree (2 majors) Pedagogy (2020)
Bachelor' degree (1 major) Psychology (2020)
Bachelor' degree (1 major) Biology (2021)
Magister Theologiae Catholic Theology (2021)
Bachelor's degree (2 majors) History (2021)
Bachelor's degree (1 major, 1 minor) History (2021)
Bachelor' degree (1 major) Media Communication (2021)
Bachelor's degree (2 majors) Theological Studies (2021)
Bachelor's degree (1 major, 1 minor) Theological Studies (2021)
Bachelor's degree (1 major, 1 minor) English and American Studies (2021)
Bachelor's degree (2 majors) English and American Studies (2021)
Bachelor' degree (1 major) Functional Materials (2021)
Bachelor' degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (2 majors) Comparative Indo-European Linguistics (2021)
Bachelor' degree (1 major) Food Chemistry (2021)
Bachelor' degree (1 major) Quantum Technology (2021)
Bachelor's degree (2 majors) Special Education (2021)

Bachelor' degree (1 major) Business Information Systems (2021)
Bachelor' degree (1 major) Economathematics (2021)
Bachelor' degree (1 major) Business Management and Economics (2021)
Bachelor' degree (1 major) Human-Computer Systems (2022)
Bachelor's degree (1 major, 1 minor) Museology and material culture (2022)
Bachelor' degree (1 major) Biochemistry (2022)
Bachelor' degree (1 major) Biology (2022)
Bachelor' degree (1 major) Economathematics (2022)
Bachelor' degree (1 major) Mathematical Data Science (2022)
Bachelor' degree (1 major) Artificial Intelligence and Data Science (2022)
Bachelor's degree (2 majors) Ancient Near Eastern Archaeology (2022)
Bachelor's degree (1 major, 1 minor) Ancient World (2022)
Bachelor's degree (2 majors) Ancient Near Eastern Studies (2022)
Bachelor' degree (1 major) Franco-German studies: language, culture, digital competence (2022)
Bachelor' degree (1 major) Midwifery (2022)
Bachelor' degree (1 major) European Law (2023)
Bachelor's degree (1 major, 1 minor) English and American Studies (2023)
Bachelor's degree (2 majors) English and American Studies (2023)
Bachelor' degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor' degree (1 major) Mathematics (2023)
Bachelor' degree (1 major) Business Information Systems (2023)
Bachelor' degree (1 major) Economathematics (2023)
Bachelor's degree (1 major, 1 minor) History of Medieval and Modern Art (2023)
Bachelor's degree (2 majors) History of Medieval and Modern Art (2023)
Bachelor's degree (2 majors) Special Education (2023)
Bachelor' degree (1 major) Business Management and Economics (2023)
Bachelor' degree (1 major) Geography (2023)
Bachelor's degree (2 majors) Geography (2023)
Bachelor's degree (1 major, 1 minor) Geography (2023)
Bachelor's degree (2 majors) European Ethnology/Empiric Cultural Studies (2023)
Bachelor' degree (1 major) Mathematical Physics (2024)
Bachelor's degree (2 majors) German Language and Literature (2024)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2024)
Bachelor' degree (1 major) Music Education (2024)
Bachelor's degree (2 majors) Music Education (2024)
Bachelor's degree (1 major, 1 minor) Music Education (2024)

Module title	Abbreviation
Organic Chemistry 2 and analytical methods in organic chemistry	08-OC2-152-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	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

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 (3) + Ü (1) + V (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

270 h

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 (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Mathematics (2015)
Bachelor' degree (1 major) Computational Mathematics (2015)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor' degree (1 major) Functional Materials (2021)
Bachelor' degree (1 major) Biochemistry (2022)

Bachelor' degree (1 major) Mathematics (2023)

Module title			Abbreviation
Organic Chemistry - lab 1			08-OCP1-172-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)**	
8	(not) successfully completed	08-OC1 and (08-ACP1 or 08-ANP)	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

German contents available but not translated yet.

Das Modul bietet die Möglichkeit, das Wissen der Grundvorlesung(en) praktisch anzuwenden. Die Studierenden experimentieren nach einer Sicherheitseinweisung selbstständig im Labor. Neben der Durchführung der Versuche wird das Wissen der Studierenden in Kolloquien und Protokollen geprüft. Schwerpunkte sind der sichere Umgang mit Gefahrenstoffen, einfache experimentelle Grundoperationen der organischen Chemie, einfache bis mehrstufige Synthesen sowie Analyse der Produkte.

Intended learning outcomes

German intended learning outcomes available but not translated yet.

Die Studierenden sind in der Lage, sicher mit Gefahrenstoffen umzugehen. Er/Sie kann experimentelle Grundoperationen der organischen Chemie durchführen. Er/Sie kann die Produkte in Bezug auf Ausbeute und Reinheit analysieren sowie mögliche Fehlerquellen identifizieren. Die Studierenden können die in der Vorlesung erarbeiteten theoretischen Inhalte mit den praktischen Experimenten im Labor vernetzen.

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

P (14)

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/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

240 h

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) Chemistry (2017)

Module title			Abbreviation
Organic Chemistry 3 (DD)			08-OC-OC3-DA-152-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)**	
6	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

This module focuses on polar rearrangements, olefination reactions, pericyclic reactions, carbenes, nitriles and radicals. It discusses the fundamental principles of stereoselective synthesis, asymmetric catalysis, organometallic chemistry and retrosynthesis.

Intended learning outcomes

Students are able to formulate olefination reactions. They are able to develop stereoselective syntheses and asymmetric catalyses. Students are able to describe organometallic reactions. They are able to conduct retrosynthetic analyses of molecules.

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

V (2) + Ü (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

180 h

Teaching cycle

--

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

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Module appears in

Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Chemistry (2017)

Subfield Physical and Theoretical Chemistry

(37 ECTS credits)

Module title	Abbreviation
Principles of quantum mechanics and spectroscopy	08-PC-QMS-152-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)
10	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

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 (4) + Ü (2) + V (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

300 h

Teaching cycle

--

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

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Module appears in

Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Chemistry (2017)

Module title	Abbreviation
Thermodynamics, Kinetics, Electrochemistry	08-PC-TKE-152-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	--

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 (4) + Ü (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

270 h

Teaching cycle

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

§ 62 I Nr. 1

Module appears in

Bachelor' degree (1 major) Biochemistry (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Mathematics (2015)
Bachelor' degree (1 major) Computational Mathematics (2015)
Bachelor' degree (1 major) Functional Materials (2015)
First state examination for the teaching degree Gymnasium Chemistry (2015)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor' degree (1 major) Functional Materials (2021)

Bachelor' degree (1 major) Biochemistry (2022)
Bachelor' degree (1 major) Mathematics (2023)

Module title			Abbreviation
Physical Chemistry (lab)			08-PCP-152-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	(not) successfully completed	08-PC-QMS or 08-PC-TKE	
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 (6)

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/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations)
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

270 h

Teaching cycle

--

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

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Module appears in

Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Chemistry (2017)

Module title	Abbreviation
Quantum Chemistry	08-TC-152-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)
3	numerical grade	--

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

This module provides students with deeper insights into advanced topics in quantum chemistry. It focuses on spin, the Pauli principle, Slater determinants, the Hartree-Fock method, correlation energy, configuration interaction and excited states, the Born-Oppenheimer approximation and bonding models of H2+.

Intended learning outcomes

Students are able to describe excited states of molecules with the help of key concepts and models.

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

V (2) + Ü (1)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English
creditable for bonus

Allocation of places

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Additional information

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Workload

90 h

Teaching cycle

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

§ 22 II Nr. 1 h)
§ 22 II Nr. 2 f)
§ 22 II Nr. 3 f)

Module appears in

Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Mathematics (2015)
Bachelor' degree (1 major) Computational Mathematics (2015)
Bachelor' degree (1 major) Functional Materials (2015)
First state examination for the teaching degree Grundschule Chemistry (2015)
First state examination for the teaching degree Realschule Chemistry (2015)
First state examination for the teaching degree Gymnasium Chemistry (2015)
First state examination for the teaching degree Mittelschule Chemistry (2015)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
Bachelor' degree (1 major) Biochemistry (2017)

Bachelor' degree (1 major) Chemistry (2017)
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)
First state examination for the teaching degree Mittelschule Chemistry (2020 (Prüfungsordnungsversion 2015))
Bachelor' degree (1 major) Functional Materials (2021)
Bachelor' degree (1 major) Biochemistry (2022)
Bachelor' degree (1 major) Mathematics (2023)

Module title			Abbreviation
Symmetry, chemical bonding and light (DD)			08-PC-SBL-DA-152-m01
Module coordinator		**Module offered by**	
lecturer of lecture "Symmetrie, chemische Bindung and Licht"		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	--	

Contents

This module provides an introduction to the symmetry of molecules. It focuses on group theory, symmetry operations, point groups, character tables and selection rules. The module deals with the chemical bond based on the qualitative MO theory and gives an introduction to the fundamentals of computational chemistry.

Intended learning outcomes

Students are able to analyse the symmetry of molecules. They are able to draw conclusions about the spectroscopic properties of a particular molecule from the symmetry of that molecule.

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

V (3) + Ü (2)

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

a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)
Language of assessment: German and/or English

Allocation of places

--

Additional information

--

Workload

180 h

Teaching cycle

--

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

--

Module appears in

Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Chemistry (2017)

Subfield Basics of Natural Sciences

(20 ECTS credits)

Module title	Abbreviation
Biochemistry 1	08-BC1-152-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 lectures and exercises, this module acquaints students with the fundamental principles of biochemistry. A particular focus is on the biochemistry of proteins (amino acids, peptide bonds, primary, secondary, tertiary and quaternary structures), catalytic strategies and enzyme kinetics, carbohydrate metabolism (glycolysis, gluconeogenesis, citric acid cycle, cellular respiration, photosynthesis), fatty acid metabolism (beta oxidation, fatty acid synthesis), nucleotide metabolism, the urea cycle and amino acid metabolism. The module also discusses the structure of the DNA and the central dogma of molecular biology.

Intended learning outcomes

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

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

V (2) + Ü (1)

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

written examination (approx. 60 to 90 minutes)

Allocation of places

--

Additional information

--

Workload

150 h

Teaching cycle

--

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

§ 42 I Nr. 2
§ 62 I Nr. 2

Module appears in

Bachelor' degree (1 major) Biochemistry (2015)
Bachelor' degree (1 major) Biology (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Food Chemistry (2015)
Bachelor' degree (1 major) Functional Materials (2015)
First state examination for the teaching degree Grundschule Chemistry (2015)
First state examination for the teaching degree Realschule Chemistry (2015)
First state examination for the teaching degree Gymnasium Chemistry (2015)
First state examination for the teaching degree Mittelschule Chemistry (2015)
Bachelor' degree (1 major) Food Chemistry (2016)
Bachelor' degree (1 major) Biology (2017)

Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor' degree (1 major) Food Chemistry (2019)
First state examination for the teaching degree Mittelschule Chemistry (2020 (Prüfungsordnungsversion 2015))
Bachelor' degree (1 major) Biology (2021)
Bachelor' degree (1 major) Functional Materials (2021)
Bachelor' degree (1 major) Food Chemistry (2021)
Bachelor' degree (1 major) Biochemistry (2022)
Bachelor' degree (1 major) Biology (2022)

Module title			Abbreviation
Mathematics for students in Chemistry and Biochemistry			10-M-MCH-172-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	--	

Contents

Functional relations, differentiation and integration of functions in one variable, curve sketching, differentiation and integration of functions in several variables, curve integrals, matrix calculus, power series.

Intended learning outcomes

The student is able to recognise and phrase 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 (3) + Ü (2)

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

written examination (approx. 90 to 120 minutes) and written exercises (approx. 25)

Allocation of places

--

Additional information

--

Workload

150 h

Teaching cycle

--

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

--

Module appears in

Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Module studies (Bachelor) Orientierungsstudien (2020)
Bachelor' degree (1 major) Biochemistry (2022)
exchange program Mathematics (2023)

Module title			Abbreviation
Introduction to Physics for Students of other Disciplines			11-EFNF-152-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

Fundamentals of mechanics, vibration theory, thermodynamics, optics, science of electricity, atomic and nuclear physics.

Intended learning outcomes

The students are able to identify fundamental physical contexts. They are able to assign them to corresponding fields in physics. They are able to apply simple formulae in order to analyse and evaluate these contexts.

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

V (4) + V (3)

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

written examination (60 to 120 minutes)

Allocation of places

--

Additional information

--

Workload

210 h

Teaching cycle

--

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

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Module appears in

Bachelor' degree (1 major) Biology (2011)
Bachelor' degree (1 major) Chemistry (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Psychology (2010)
Bachelor' degree (1 major) Economathematics (2012)
Bachelor' degree (1 major) Romanic Languages (French/Spanish) (2013)
Bachelor's degree (1 major, 1 minor) Pedagogy (2011)
Bachelor's degree (1 major, 1 minor) Pedagogy (2013)
Bachelor's degree (1 major, 1 minor) French Studies (2013)
Bachelor's degree (1 major, 1 minor) History (2010)
Bachelor's degree (1 major, 1 minor) Philosophy (2013)
Bachelor's degree (1 major, 1 minor) Pre- and Protohistoric Archaeology (2012)
Bachelor's degree (1 major, 1 minor) Spanish Studies (2010)
Bachelor's degree (1 major, 1 minor) Political and Social Studies (2013)
Bachelor's degree (1 major, 1 minor) English and American Studies (2010)
Bachelor's degree (1 major, 1 minor) Russian Language and Culture (2008)

Bachelor's degree (1 major, 1 minor) Gallo-Roman philology (2010)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2013)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2010)
Bachelor's degree (1 major, 1 minor) Italian Studies (2010)
Bachelor's degree (2 majors) Classical Archaeology (2013)
Bachelor's degree (2 majors) Pedagogy (2013)
Bachelor's degree (2 majors) Philosophy (2013)
Bachelor's degree (2 majors) Special Education (2009)
Bachelor's degree (2 majors) Digital Humanities (2012)
Bachelor's degree (2 majors) Political and Social Studies (2011)
Bachelor's degree (2 majors) Russian Language and Culture (2012)
Bachelor's degree (2 majors) European Ethnology (2013)
Magister Theologiae Catholic Theology (2013)
First state examination for the teaching degree Gymnasium English (2009)
First state examination for the teaching degree Gymnasium Biology (2009)
First state examination for the teaching degree Gymnasium Chemistry (2009)
First state examination for the teaching degree Gymnasium Geography (2009)
First state examination for the teaching degree Gymnasium French Studies (2009)
First state examination for the teaching degree Gymnasium German (2009)
First state examination for the teaching degree Gymnasium History (2009)
First state examination for the teaching degree Gymnasium Greek Philology (2009)
First state examination for the teaching degree Gymnasium Computer Science (2009)
First state examination for the teaching degree Gymnasium Italian Studies (2009)
First state examination for the teaching degree Gymnasium Catholic Theology (2009)
First state examination for the teaching degree Gymnasium Latin Philology (2009)
First state examination for the teaching degree Gymnasium Mathematics (2012)
First state examination for the teaching degree Gymnasium Mathematics (2009)
First state examination for the teaching degree Gymnasium Music (2009)
First state examination for the teaching degree Gymnasium Physics (2009)
First state examination for the teaching degree Gymnasium Russian (2009)
First state examination for the teaching degree Gymnasium Social Science (2009)
First state examination for the teaching degree Gymnasium Spanish Studies (2009)
First state examination for the teaching degree Gymnasium Science of Sport (2009)
First state examination for the teaching degree Gymnasium Music Education, Advanced Studies (2009)
Bachelor's degree (2 majors) Spanish Studies (2013)
Bachelor's degree (2 majors) English and American Studies (2009)
Bachelor's degree (2 majors) Gallo-Roman philology (2009)
Bachelor's degree (2 majors) German Language and Literature (2013)
Bachelor's degree (2 majors) Italian Studies (2009)
Bachelor' degree (1 major) Biochemistry (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Geography (2015)
Bachelor' degree (1 major) Computer Science (2015)
Bachelor' degree (1 major) Food Chemistry (2015)
Bachelor' degree (1 major) Mathematics (2015)
Bachelor' degree (1 major) Musicology (2015)
Bachelor' degree (1 major) Physics (2015)
Bachelor' degree (1 major) Psychology (2015)
Bachelor' degree (1 major) Business Management and Economics (2015)
Bachelor' degree (1 major) Nanostructure Technology (2015)
Bachelor' degree (1 major) Biomedicine (2015)
Bachelor' degree (1 major) Music Education (2015)
Bachelor' degree (1 major) Computational Mathematics (2015)

Bachelor' degree (1 major) Political and Social Studies (2015)
Bachelor' degree (1 major) Functional Materials (2015)
Bachelor' degree (1 major) Academic Speech Therapy (2015)
Bachelor' degree (1 major) Indology/South Asian Studies (2015)
Bachelor's degree (1 major, 1 minor) Egyptology (2015)
Bachelor's degree (1 major, 1 minor) Pedagogy (2015)
Bachelor's degree (1 major, 1 minor) History (2015)
Bachelor's degree (1 major, 1 minor) Musicology (2015)
Bachelor's degree (1 major, 1 minor) Philosophy (2015)
Bachelor's degree (1 major, 1 minor) Pre- and Protohistoric Archaeology (2015)
Bachelor's degree (1 major, 1 minor) Ancient World (2015)
Bachelor's degree (1 major, 1 minor) Music Education (2015)
Bachelor's degree (1 major, 1 minor) Philosophy and Religion (2015)
Bachelor's degree (1 major, 1 minor) Theological Studies (2015)
Bachelor's degree (1 major, 1 minor) Political and Social Studies (2015)
Bachelor's degree (1 major, 1 minor) Russian Language and Culture (2015)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2015)
Bachelor's degree (2 majors) Egyptology (2015)
Bachelor's degree (2 majors) Classical Archaeology (2015)
Bachelor's degree (2 majors) Pedagogy (2015)
Bachelor's degree (2 majors) Protestant Theology (2015)
Bachelor's degree (2 majors) Musicology (2015)
Bachelor's degree (2 majors) Philosophy (2015)
Bachelor's degree (2 majors) Special Education (2015)
Bachelor's degree (2 majors) Pre- and Protohistoric Archaeology (2015)
Bachelor's degree (2 majors) Latin Philology (2015)
Bachelor's degree (2 majors) Music Education (2015)
Bachelor's degree (2 majors) Philosophy and Religion (2015)
Bachelor's degree (2 majors) Theological Studies (2015)
Bachelor's degree (2 majors) Digital Humanities (2015)
Bachelor's degree (2 majors) Political and Social Studies (2015)
Bachelor's degree (2 majors) Russian Language and Culture (2015)
Bachelor's degree (2 majors) Greek Philology (2015)
Bachelor's degree (2 majors) European Ethnology (2015)
Bachelor's degree (2 majors) Indology/South Asian Studies (2015)
Bachelor's degree (2 majors) Ancient Near Eastern Studies (2015)
First state examination for the teaching degree Gymnasium English (2015)
First state examination for the teaching degree Gymnasium Biology (2015)
First state examination for the teaching degree Gymnasium Chemistry (2015)
First state examination for the teaching degree Gymnasium Geography (2015)
First state examination for the teaching degree Gymnasium French Studies (2015)
First state examination for the teaching degree Gymnasium German (2015)
First state examination for the teaching degree Gymnasium History (2015)
First state examination for the teaching degree Gymnasium Greek Philology (2015)
First state examination for the teaching degree Gymnasium Computer Science (2015)
First state examination for the teaching degree Gymnasium Italian Studies (2015)
First state examination for the teaching degree Gymnasium Catholic Theology (2015)
First state examination for the teaching degree Gymnasium Latin Philology (2015)
First state examination for the teaching degree Gymnasium Mathematics (2015)
First state examination for the teaching degree Gymnasium Physics (2015)
First state examination for the teaching degree Gymnasium Russian (2015)
First state examination for the teaching degree Gymnasium Social Science (2015)
First state examination for the teaching degree Gymnasium Spanish Studies (2015)

First state examination for the teaching degree Gymnasium Science of Sport (2015)
Bachelor's degree (2 majors) Geography (2015)
Bachelor's degree (2 majors) French Studies (2015)
Bachelor's degree (2 majors) History (2015)
Bachelor's degree (2 majors) Sport Science (Focus on health and Pedagogics in Movement) (2015)
Bachelor's degree (2 majors) German Language and Literature (2015)
Bachelor' degree (1 major) Mathematical Physics (2016)
Bachelor' degree (1 major) Human-Computer Systems (2016)
Bachelor's degree (2 majors) Theological Studies (2011)
First state examination for the teaching degree Gymnasium Music (2015)
First state examination for the teaching degree Gymnasium Music Education, Advanced Studies (2015)
Bachelor's degree (1 major, 1 minor) French Studies (2016)
Bachelor's degree (2 majors) French Studies (2016)
Bachelor's degree (1 major, 1 minor) Italian Studies (2016)
Bachelor's degree (2 majors) Italian Studies (2016)
Bachelor's degree (1 major, 1 minor) Spanish Studies (2016)
Bachelor's degree (2 majors) Spanish Studies (2016)
Bachelor' degree (1 major) Romanic Languages (French/Italian) (2016)
Bachelor' degree (1 major) Romanic Languages (French/Spanish) (2016)
Bachelor' degree (1 major) Romanic Languages (Italian/Spanish) (2016)
Bachelor' degree (1 major) Business Information Systems (2016)
First state examination for the teaching degree Gymnasium French Studies (2016)
First state examination for the teaching degree Gymnasium Italian Studies (2016)
First state examination for the teaching degree Gymnasium Spanish Studies (2016)
Bachelor' degree (1 major) Games Engineering (2016)
Bachelor's degree (1 major, 1 minor) English and American Studies (2016)
Bachelor's degree (2 majors) English and American Studies (2016)
First state examination for the teaching degree Gymnasium English (2016)
Bachelor' degree (1 major) Media Communication (2016)
Bachelor' degree (1 major) Food Chemistry (2016)
Bachelor's degree (1 major, 1 minor) Digital Humanities (2016)
Bachelor' degree (1 major) Biology (2017)
Bachelor's degree (1 major, 1 minor) Geography (2017)
Bachelor's degree (1 major, 1 minor) History of Medieval and Modern Art (2017)
Bachelor's degree (2 majors) History of Medieval and Modern Art (2017)
Bachelor's degree (2 majors) Comparative Indo-European Linguistics (2017)
Bachelor' degree (1 major) Aerospace Computer Science (2017)
Bachelor' degree (1 major) Modern China (2017)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor's degree (1 major, 1 minor) Museology and material culture (2017)
Bachelor' degree (1 major) Economathematics (2017)
Bachelor' degree (1 major) Games Engineering (2017)
Bachelor' degree (1 major) Computer Science (2017)
First state examination for the teaching degree Gymnasium Greek Philology (2018)
Bachelor' degree (1 major) Media Communication (2018)
Bachelor' degree (1 major) Biomedicine (2018)
Bachelor' degree (1 major) Human-Computer Systems (2018)
Bachelor's degree (2 majors) Classical Archaeology (2018)
Bachelor's degree (1 major, 1 minor) Classical Archaeology (2018)
Bachelor's degree (1 major, 1 minor) Digital Humanities (2018)
Bachelor's degree (2 majors) Digital Humanities (2018)
First state examination for the teaching degree Gymnasium Physics (2018)

Bachelor' degree (1 major) Computer Science (2019)
First state examination for the teaching degree Gymnasium Mathematics (2019)
Bachelor's degree (1 major, 1 minor) English and American Studies (2019)
Bachelor's degree (1 major, 1 minor) Indology/South Asian Studies (2019)
Bachelor' degree (1 major) Indology/South Asian Studies (2019)
Bachelor' degree (1 major) Business Information Systems (2019)
Bachelor's degree (2 majors) Indology/South Asian Studies (2019)
Bachelor' degree (1 major) Business Management and Economics (2019)
Bachelor' degree (1 major) Modern China (2019)
Bachelor' degree (1 major) Food Chemistry (2019)
Bachelor' degree (1 major) Biomedicine (2020)
Bachelor' degree (1 major) Pedagogy (2020)
Bachelor' degree (1 major) Political and Social Studies (2020)
Bachelor' degree (1 major) Business Information Systems (2020)
Bachelor's degree (1 major, 1 minor) Political and Social Studies (2020)
Bachelor's degree (2 majors) European Ethnology (2020)
Bachelor's degree (2 majors) Political and Social Studies (2020)
Bachelor's degree (2 majors) Special Education (2020)
Bachelor' degree (1 major) Physics (2020)
Bachelor' degree (1 major) Nanostructure Technology (2020)
Bachelor' degree (1 major) Mathematical Physics (2020)
Bachelor' degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major, 1 minor) Museology and material culture (2020)
First state examination for the teaching degree Gymnasium Physics (2020)
Bachelor's degree (1 major, 1 minor) Pedagogy (2020)
Bachelor's degree (2 majors) Pedagogy (2020)
First state examination for the teaching degree Gymnasium Political and Social Studies (2020)
Bachelor' degree (1 major) Psychology (2020)
Bachelor' degree (1 major) Biology (2021)
Magister Theologiae Catholic Theology (2021)
Bachelor's degree (2 majors) History (2021)
Bachelor's degree (1 major, 1 minor) History (2021)
First state examination for the teaching degree Gymnasium History (2021)
Bachelor' degree (1 major) Media Communication (2021)
Bachelor's degree (2 majors) Theological Studies (2021)
Bachelor's degree (1 major, 1 minor) Theological Studies (2021)
Bachelor's degree (1 major, 1 minor) English and American Studies (2021)
Bachelor's degree (2 majors) English and American Studies (2021)
First state examination for the teaching degree Gymnasium English (2021)
Bachelor' degree (1 major) Functional Materials (2021)
First state examination for the teaching degree Gymnasium Philosophy and Ethics (2021)
Bachelor' degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (2 majors) Comparative Indo-European Linguistics (2021)
Bachelor' degree (1 major) Food Chemistry (2021)
Bachelor' degree (1 major) Quantum Technology (2021)
Bachelor's degree (2 majors) Special Education (2021)
Bachelor' degree (1 major) Business Information Systems (2021)
Bachelor' degree (1 major) Economathematics (2021)
Bachelor' degree (1 major) Business Management and Economics (2021)
Bachelor' degree (1 major) Human-Computer Systems (2022)
Bachelor's degree (1 major, 1 minor) Museology and material culture (2022)
Bachelor' degree (1 major) Biochemistry (2022)
Bachelor' degree (1 major) Biology (2022)

Bachelor' degree (1 major) Economathematics (2022)
Bachelor' degree (1 major) Mathematical Data Science (2022)
Bachelor' degree (1 major) Artificial Intelligence and Data Science (2022)
First state examination for the teaching degree Gymnasium Philosophy and Ethics (2022)
Bachelor's degree (2 majors) Ancient Near Eastern Archaeology (2022)
Bachelor's degree (1 major, 1 minor) Ancient World (2022)
Bachelor's degree (2 majors) Ancient Near Eastern Studies (2022)
Bachelor' degree (1 major) Franco-German studies: language, culture, digital competence (2022)
Bachelor' degree (1 major) Midwifery (2022)
First state examination for the teaching degree Gymnasium Russian (2023)
First state examination for the teaching degree Gymnasium Mathematics (2023)
First state examination for the teaching degree Gymnasium English (2023)
First state examination for the teaching degree Gymnasium Geography (2023)
Bachelor' degree (1 major) European Law (2023)
Bachelor's degree (1 major, 1 minor) English and American Studies (2023)
Bachelor's degree (2 majors) English and American Studies (2023)
Bachelor' degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor' degree (1 major) Mathematics (2023)
Bachelor' degree (1 major) Business Information Systems (2023)
Bachelor' degree (1 major) Economathematics (2023)
Bachelor's degree (1 major, 1 minor) History of Medieval and Modern Art (2023)
Bachelor's degree (2 majors) History of Medieval and Modern Art (2023)
Bachelor's degree (2 majors) Special Education (2023)
Bachelor' degree (1 major) Business Management and Economics (2023)
Bachelor' degree (1 major) Geography (2023)
Bachelor's degree (2 majors) Geography (2023)
Bachelor's degree (1 major, 1 minor) Geography (2023)
Bachelor's degree (2 majors) European Ethnology/Empiric Cultural Studies (2023)
First state examination for the teaching degree Gymnasium German (2024)
Bachelor' degree (1 major) Mathematical Physics (2024)
Bachelor's degree (2 majors) German Language and Literature (2024)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2024)
Bachelor' degree (1 major) Music Education (2024)
Bachelor's degree (2 majors) Music Education (2024)
Bachelor's degree (1 major, 1 minor) Music Education (2024)

Module title	Abbreviation
Laboratory Course Physics for Students of other Disciplines	11-PFNF-152-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

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

Intended learning outcomes

The students have recognised and understood physical contexts on the basis of the implementation of own experiments. They can conduct simple experiments in the laboratory. They are able to identify and assess sources of errors in experiments. They are able to compile a protocol for experimental procedures. They have a basic understanding of physical phenomena and know the basic ideas and ways of functioning of different measuring and imaging methods as well as their applications, especially in the field of biomedicine.

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

P (4)

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

a) practical assignment with oral test (approx. 15 minutes, during experiments) and b) written examination (90 minutes).
Each experiment comprises preparation, performance and evaluation. Test as well as performance of experiments can each be repeated once.

Allocation of places

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

Additional information

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Workload

90 h

Teaching cycle

--

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

--

Module appears in

Bachelor' degree (1 major) Biology (2011)
Bachelor' degree (1 major) Chemistry (2010)
Bachelor' degree (1 major) Physics (2012)
Bachelor' degree (1 major) Psychology (2010)
Bachelor' degree (1 major) Economathematics (2012)
Bachelor' degree (1 major) Romanic Languages (French/Spanish) (2013)
Bachelor's degree (1 major, 1 minor) Pedagogy (2011)
Bachelor's degree (1 major, 1 minor) Pedagogy (2013)
Bachelor's degree (1 major, 1 minor) French Studies (2013)
Bachelor's degree (1 major, 1 minor) History (2010)

Bachelor's degree (1 major, 1 minor) Philosophy (2013)
Bachelor's degree (1 major, 1 minor) Pre- and Protohistoric Archaeology (2012)
Bachelor's degree (1 major, 1 minor) Spanish Studies (2010)
Bachelor's degree (1 major, 1 minor) Political and Social Studies (2013)
Bachelor's degree (1 major, 1 minor) English and American Studies (2010)
Bachelor's degree (1 major, 1 minor) Russian Language and Culture (2008)
Bachelor's degree (1 major, 1 minor) Gallo-Roman philology (2010)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2013)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2010)
Bachelor's degree (1 major, 1 minor) Italian Studies (2010)
Bachelor's degree (2 majors) Classical Archaeology (2013)
Bachelor's degree (2 majors) Pedagogy (2013)
Bachelor's degree (2 majors) Philosophy (2013)
Bachelor's degree (2 majors) Special Education (2009)
Bachelor's degree (2 majors) Digital Humanities (2012)
Bachelor's degree (2 majors) Political and Social Studies (2011)
Bachelor's degree (2 majors) Russian Language and Culture (2012)
Bachelor's degree (2 majors) European Ethnology (2013)
Magister Theologiae Catholic Theology (2013)
First state examination for the teaching degree Gymnasium English (2009)
First state examination for the teaching degree Gymnasium Biology (2009)
First state examination for the teaching degree Gymnasium Chemistry (2009)
First state examination for the teaching degree Gymnasium Geography (2009)
First state examination for the teaching degree Gymnasium French Studies (2009)
First state examination for the teaching degree Gymnasium German (2009)
First state examination for the teaching degree Gymnasium History (2009)
First state examination for the teaching degree Gymnasium Greek Philology (2009)
First state examination for the teaching degree Gymnasium Computer Science (2009)
First state examination for the teaching degree Gymnasium Italian Studies (2009)
First state examination for the teaching degree Gymnasium Catholic Theology (2009)
First state examination for the teaching degree Gymnasium Latin Philology (2009)
First state examination for the teaching degree Gymnasium Mathematics (2012)
First state examination for the teaching degree Gymnasium Mathematics (2009)
First state examination for the teaching degree Gymnasium Music (2009)
First state examination for the teaching degree Gymnasium Physics (2009)
First state examination for the teaching degree Gymnasium Russian (2009)
First state examination for the teaching degree Gymnasium Social Science (2009)
First state examination for the teaching degree Gymnasium Spanish Studies (2009)
First state examination for the teaching degree Gymnasium Science of Sport (2009)
First state examination for the teaching degree Gymnasium Music Education, Advanced Studies (2009)
Bachelor's degree (2 majors) Spanish Studies (2013)
Bachelor's degree (2 majors) English and American Studies (2009)
Bachelor's degree (2 majors) Gallo-Roman philology (2009)
Bachelor's degree (2 majors) German Language and Literature (2013)
Bachelor's degree (2 majors) Italian Studies (2009)
Bachelor' degree (1 major) Biochemistry (2015)
Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Geography (2015)
Bachelor' degree (1 major) Computer Science (2015)
Bachelor' degree (1 major) Food Chemistry (2015)
Bachelor' degree (1 major) Mathematics (2015)
Bachelor' degree (1 major) Musicology (2015)
Bachelor' degree (1 major) Physics (2015)

Bachelor' degree (1 major) Psychology (2015)
Bachelor' degree (1 major) Business Management and Economics (2015)
Bachelor' degree (1 major) Nanostructure Technology (2015)
Bachelor' degree (1 major) Biomedicine (2015)
Bachelor' degree (1 major) Music Education (2015)
Bachelor' degree (1 major) Computational Mathematics (2015)
Bachelor' degree (1 major) Political and Social Studies (2015)
Bachelor' degree (1 major) Functional Materials (2015)
Bachelor' degree (1 major) Academic Speech Therapy (2015)
Bachelor' degree (1 major) Indology/South Asian Studies (2015)
Bachelor's degree (1 major, 1 minor) Egyptology (2015)
Bachelor's degree (1 major, 1 minor) Pedagogy (2015)
Bachelor's degree (1 major, 1 minor) History (2015)
Bachelor's degree (1 major, 1 minor) Musicology (2015)
Bachelor's degree (1 major, 1 minor) Philosophy (2015)
Bachelor's degree (1 major, 1 minor) Pre- and Protohistoric Archaeology (2015)
Bachelor's degree (1 major, 1 minor) Ancient World (2015)
Bachelor's degree (1 major, 1 minor) Music Education (2015)
Bachelor's degree (1 major, 1 minor) Philosophy and Religion (2015)
Bachelor's degree (1 major, 1 minor) Theological Studies (2015)
Bachelor's degree (1 major, 1 minor) Political and Social Studies (2015)
Bachelor's degree (1 major, 1 minor) Russian Language and Culture (2015)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2015)
Bachelor's degree (2 majors) Egyptology (2015)
Bachelor's degree (2 majors) Classical Archaeology (2015)
Bachelor's degree (2 majors) Pedagogy (2015)
Bachelor's degree (2 majors) Protestant Theology (2015)
Bachelor's degree (2 majors) Musicology (2015)
Bachelor's degree (2 majors) Philosophy (2015)
Bachelor's degree (2 majors) Special Education (2015)
Bachelor's degree (2 majors) Pre- and Protohistoric Archaeology (2015)
Bachelor's degree (2 majors) Latin Philology (2015)
Bachelor's degree (2 majors) Music Education (2015)
Bachelor's degree (2 majors) Philosophy and Religion (2015)
Bachelor's degree (2 majors) Theological Studies (2015)
Bachelor's degree (2 majors) Digital Humanities (2015)
Bachelor's degree (2 majors) Political and Social Studies (2015)
Bachelor's degree (2 majors) Russian Language and Culture (2015)
Bachelor's degree (2 majors) Greek Philology (2015)
Bachelor's degree (2 majors) European Ethnology (2015)
Bachelor's degree (2 majors) Indology/South Asian Studies (2015)
Bachelor's degree (2 majors) Ancient Near Eastern Studies (2015)
First state examination for the teaching degree Gymnasium English (2015)
First state examination for the teaching degree Gymnasium Biology (2015)
First state examination for the teaching degree Gymnasium Chemistry (2015)
First state examination for the teaching degree Gymnasium Geography (2015)
First state examination for the teaching degree Gymnasium French Studies (2015)
First state examination for the teaching degree Gymnasium German (2015)
First state examination for the teaching degree Gymnasium History (2015)
First state examination for the teaching degree Gymnasium Greek Philology (2015)
First state examination for the teaching degree Gymnasium Computer Science (2015)
First state examination for the teaching degree Gymnasium Italian Studies (2015)
First state examination for the teaching degree Gymnasium Catholic Theology (2015)

First state examination for the teaching degree Gymnasium Latin Philology (2015)
First state examination for the teaching degree Gymnasium Mathematics (2015)
First state examination for the teaching degree Gymnasium Physics (2015)
First state examination for the teaching degree Gymnasium Russian (2015)
First state examination for the teaching degree Gymnasium Social Science (2015)
First state examination for the teaching degree Gymnasium Spanish Studies (2015)
First state examination for the teaching degree Gymnasium Science of Sport (2015)
Bachelor's degree (2 majors) Geography (2015)
Bachelor's degree (2 majors) French Studies (2015)
Bachelor's degree (2 majors) History (2015)
Bachelor's degree (2 majors) Sport Science (Focus on health and Pedagogics in Movement) (2015)
Bachelor's degree (2 majors) German Language and Literature (2015)
Bachelor' degree (1 major) Mathematical Physics (2016)
Bachelor' degree (1 major) Human-Computer Systems (2016)
Bachelor's degree (2 majors) Theological Studies (2011)
First state examination for the teaching degree Gymnasium Music (2015)
First state examination for the teaching degree Gymnasium Music Education, Advanced Studies (2015)
Bachelor's degree (1 major, 1 minor) French Studies (2016)
Bachelor's degree (2 majors) French Studies (2016)
Bachelor's degree (1 major, 1 minor) Italian Studies (2016)
Bachelor's degree (2 majors) Italian Studies (2016)
Bachelor's degree (1 major, 1 minor) Spanish Studies (2016)
Bachelor's degree (2 majors) Spanish Studies (2016)
Bachelor' degree (1 major) Romanic Languages (French/Italian) (2016)
Bachelor' degree (1 major) Romanic Languages (French/Spanish) (2016)
Bachelor' degree (1 major) Romanic Languages (Italian/Spanish) (2016)
Bachelor' degree (1 major) Business Information Systems (2016)
First state examination for the teaching degree Gymnasium French Studies (2016)
First state examination for the teaching degree Gymnasium Italian Studies (2016)
First state examination for the teaching degree Gymnasium Spanish Studies (2016)
Bachelor' degree (1 major) Games Engineering (2016)
Bachelor's degree (1 major, 1 minor) English and American Studies (2016)
Bachelor's degree (2 majors) English and American Studies (2016)
First state examination for the teaching degree Gymnasium English (2016)
Bachelor' degree (1 major) Media Communication (2016)
Bachelor' degree (1 major) Food Chemistry (2016)
Bachelor's degree (1 major, 1 minor) Digital Humanities (2016)
Bachelor' degree (1 major) Biology (2017)
Bachelor's degree (1 major, 1 minor) Geography (2017)
Bachelor's degree (1 major, 1 minor) History of Medieval and Modern Art (2017)
Bachelor's degree (2 majors) History of Medieval and Modern Art (2017)
Bachelor's degree (2 majors) Comparative Indo-European Linguistics (2017)
Bachelor' degree (1 major) Aerospace Computer Science (2017)
Bachelor' degree (1 major) Modern China (2017)
Bachelor' degree (1 major) Biochemistry (2017)
Bachelor' degree (1 major) Chemistry (2017)
Bachelor's degree (1 major, 1 minor) Museology and material culture (2017)
Bachelor' degree (1 major) Economathematics (2017)
Bachelor' degree (1 major) Games Engineering (2017)
Bachelor' degree (1 major) Computer Science (2017)
First state examination for the teaching degree Gymnasium Greek Philology (2018)
Bachelor' degree (1 major) Media Communication (2018)
Bachelor' degree (1 major) Biomedicine (2018)

Bachelor' degree (1 major) Human-Computer Systems (2018)
Bachelor's degree (2 majors) Classical Archaeology (2018)
Bachelor's degree (1 major, 1 minor) Classical Archaeology (2018)
Bachelor's degree (1 major, 1 minor) Digital Humanities (2018)
Bachelor's degree (2 majors) Digital Humanities (2018)
First state examination for the teaching degree Gymnasium Physics (2018)
Bachelor' degree (1 major) Computer Science (2019)
First state examination for the teaching degree Gymnasium Mathematics (2019)
Bachelor's degree (1 major, 1 minor) English and American Studies (2019)
Bachelor's degree (1 major, 1 minor) Indology/South Asian Studies (2019)
Bachelor' degree (1 major) Indology/South Asian Studies (2019)
Bachelor' degree (1 major) Business Information Systems (2019)
Bachelor's degree (2 majors) Indology/South Asian Studies (2019)
Bachelor' degree (1 major) Business Management and Economics (2019)
Bachelor' degree (1 major) Modern China (2019)
Bachelor' degree (1 major) Food Chemistry (2019)
Module studies (Bachelor) Orientierungsstudien (2020)
Bachelor' degree (1 major) Biomedicine (2020)
Bachelor' degree (1 major) Pedagogy (2020)
Bachelor' degree (1 major) Political and Social Studies (2020)
Bachelor' degree (1 major) Business Information Systems (2020)
Bachelor's degree (1 major, 1 minor) Political and Social Studies (2020)
Bachelor's degree (2 majors) European Ethnology (2020)
Bachelor's degree (2 majors) Political and Social Studies (2020)
Bachelor's degree (2 majors) Special Education (2020)
Bachelor' degree (1 major) Physics (2020)
Bachelor' degree (1 major) Nanostructure Technology (2020)
Bachelor' degree (1 major) Mathematical Physics (2020)
Bachelor' degree (1 major) Aerospace Computer Science (2020)
Bachelor's degree (1 major, 1 minor) Museology and material culture (2020)
First state examination for the teaching degree Gymnasium Physics (2020)
Bachelor's degree (1 major, 1 minor) Pedagogy (2020)
Bachelor's degree (2 majors) Pedagogy (2020)
First state examination for the teaching degree Gymnasium Political and Social Studies (2020)
Bachelor' degree (1 major) Psychology (2020)
Bachelor' degree (1 major) Biology (2021)
Magister Theologiae Catholic Theology (2021)
Bachelor's degree (2 majors) History (2021)
Bachelor's degree (1 major, 1 minor) History (2021)
First state examination for the teaching degree Gymnasium History (2021)
Bachelor' degree (1 major) Media Communication (2021)
Bachelor's degree (2 majors) Theological Studies (2021)
Bachelor's degree (1 major, 1 minor) Theological Studies (2021)
Bachelor's degree (1 major, 1 minor) English and American Studies (2021)
Bachelor's degree (2 majors) English and American Studies (2021)
First state examination for the teaching degree Gymnasium English (2021)
Bachelor' degree (1 major) Functional Materials (2021)
First state examination for the teaching degree Gymnasium Philosophy and Ethics (2021)
Bachelor' degree (1 major) Computer Science und Sustainability (2021)
Bachelor's degree (2 majors) Comparative Indo-European Linguistics (2021)
Bachelor' degree (1 major) Food Chemistry (2021)
Bachelor' degree (1 major) Quantum Technology (2021)
Bachelor's degree (2 majors) Special Education (2021)

Bachelor' degree (1 major) Business Information Systems (2021)
Bachelor' degree (1 major) Economathematics (2021)
Bachelor' degree (1 major) Business Management and Economics (2021)
Bachelor' degree (1 major) Human-Computer Systems (2022)
Bachelor's degree (1 major, 1 minor) Museology and material culture (2022)
Bachelor' degree (1 major) Biochemistry (2022)
Bachelor' degree (1 major) Biology (2022)
Bachelor' degree (1 major) Economathematics (2022)
Bachelor' degree (1 major) Mathematical Data Science (2022)
Bachelor' degree (1 major) Artificial Intelligence and Data Science (2022)
First state examination for the teaching degree Gymnasium Philosophy and Ethics (2022)
Bachelor's degree (2 majors) Ancient Near Eastern Archaeology (2022)
Bachelor's degree (1 major, 1 minor) Ancient World (2022)
Bachelor's degree (2 majors) Ancient Near Eastern Studies (2022)
Bachelor' degree (1 major) Franco-German studies: language, culture, digital competence (2022)
Bachelor' degree (1 major) Midwifery (2022)
First state examination for the teaching degree Gymnasium Russian (2023)
First state examination for the teaching degree Gymnasium Mathematics (2023)
First state examination for the teaching degree Gymnasium English (2023)
First state examination for the teaching degree Gymnasium Geography (2023)
Bachelor' degree (1 major) European Law (2023)
Bachelor's degree (1 major, 1 minor) English and American Studies (2023)
Bachelor's degree (2 majors) English and American Studies (2023)
Bachelor' degree (1 major) Artificial Intelligence and Data Science (2023)
Bachelor' degree (1 major) Mathematics (2023)
Bachelor' degree (1 major) Business Information Systems (2023)
Bachelor' degree (1 major) Economathematics (2023)
Bachelor's degree (1 major, 1 minor) History of Medieval and Modern Art (2023)
Bachelor's degree (2 majors) History of Medieval and Modern Art (2023)
Bachelor's degree (2 majors) Special Education (2023)
Bachelor' degree (1 major) Business Management and Economics (2023)
Bachelor' degree (1 major) Geography (2023)
Bachelor's degree (2 majors) Geography (2023)
Bachelor's degree (1 major, 1 minor) Geography (2023)
Bachelor's degree (2 majors) European Ethnology/Empiric Cultural Studies (2023)
First state examination for the teaching degree Gymnasium German (2024)
Bachelor' degree (1 major) Mathematical Physics (2024)
Bachelor's degree (2 majors) German Language and Literature (2024)
Bachelor's degree (1 major, 1 minor) German Language and Literature (2024)
Bachelor' degree (1 major) Music Education (2024)
Bachelor's degree (2 majors) Music Education (2024)
Bachelor's degree (1 major, 1 minor) Music Education (2024)

Subfield Competences from foreign university

(50 ECTS credits)

Module title			Abbreviation
Qualifications - Partner University 1			08-VPUB1-152-m01
Module coordinator			**Module offered by**
programme coordinator of the exchange programme			Faculty of Chemistry and Pharmacy
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
25	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
2 semester	undergraduate	Please consult with course advisory service in advance.	

Contents

This module discusses topics from the curriculum of the partner university abroad.

Intended learning outcomes

Students have developed the knowledge and skills taught in the courses attended by them at the partner university.

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

No courses assigned to module
Course(s) as specified by partner university abroad

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

Assessments as specified by partner university abroad
Language of assessment: German and/or language spoken at partner university abroad

Allocation of places

--

Additional information

--

Workload

750 h

Teaching cycle

--

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

--

Module appears in

Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Chemistry (2017)

Module title			Abbreviation
Qualifications - Partner University 2			08-VPUB2-152-m01
Module coordinator		**Module offered by**	
programme coordinator of the exchange programme		Faculty of Chemistry and Pharmacy	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
25	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
2 semester	undergraduate	Please consult with course advisory service in advance.	

Contents

This module discusses topics from the curriculum of the partner university abroad.

Intended learning outcomes

Students have developed the knowledge and skills taught in the courses attended by them at the partner university.

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

No courses assigned to module

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

Assessments as specified by partner university abroad
Language of assessment: German and/or language spoken at partner university abroad

Allocation of places

--

Additional information

--

Workload

750 h

Teaching cycle

--

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

--

Module appears in

Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Chemistry (2017)

Thesis

(10 ECTS credits)

Module title			Abbreviation
Bachelor Thesis			08-BA-152-m01
Module coordinator		**Module offered by**	
head of the research group offering the module		Faculty of Chemistry and Pharmacy	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
10	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	The supervisor may make the successful completion of certain modules that are relevant for the respective topic a prerequisite for the assignment of the topic.	

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 to module

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

Bachelor's thesis (approx. 40 pages)
Language of assessment: German and/or English

Allocation of places

--

Additional information

Time to complete: 8 weeks.

Workload

300 h

Teaching cycle

--

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

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Module appears in

Bachelor' degree (1 major) Chemistry (2015)
Bachelor' degree (1 major) Chemistry (2017)