



Subdivided Module Catalogue

for the Subject

Chemistry

as vertieft studiertes Fach (studied with a focus on the
scientific discipline)

with the degree "Erste Staatsprüfung für das Lehramt an
Gymnasien"

Examination regulations version: 2009
Responsible: Faculty of Chemistry and Pharmacy

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:

LASPO2009

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

12-Jan-2012 (2011-105)

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.

The subject is divided into

Abbreviation	Module title	ECTS credits	Method of grading	page
Scientific Discipline (92 ECTS credits)				
Compulsory Courses (92 ECTS credits)				
o8-AC1-LA-102-mo1	Inorganic Chemistry 1 (teaching degree)	20	NUM	6
o8-AC2-LAGY-102-mo1	Inorganic Chemistry of the Elements (teaching degree for secondary schools)	3	NUM	8
o8-AS1-LAGY-102-mo1	Chemistry of the elements	6	NUM	11
o8-OC1-o92-mo1	Organic Chemistry 1	5	NUM	27
o8-OC2-LAGY-102-mo1	Organic Chemistry 2 (teaching degree for secondary schools)	6	NUM	29
o8-OC-Prakt-LAGY-o92-mo1	Organic Chemistry - laboratory course (teaching degree for secondary schools)	6	B/NB	32
o8-OC4-LAGY-102-mo1	Organic Chemistry 4 - advanced course	5	NUM	31
o8-OC-Spec-LAGY-o92-mo1	Practical spectroscopy 1 (teaching degree for secondary schools)	3	NUM	33
o8-PC-TKE-LAGY-o92-mo1	Thermodynamics, Kinetics, Electrochemistry	9	NUM	40
o8-PC-QMS-LAGY-o92-mo1	Principles of quantum mechanics and spectroscopy	5	NUM	39
o8-PC-Prakt-LAGY-o92-mo1	Physical Chemistry lab (teaching degree for secondary schools)	3	B/NB	38
o8-Forsch-LAGY-o92-mo1	Practical Research Course for Grammar School Teachers	8	NUM	26
o8-PC-VKM-LA-102-mo1	Basic Mathematics (teaching degree)	2	B/NB	41
o8-PH-Prakt-LAGY-o92-mo1	Physics lab (teaching degree for secondary schools)	3	B/NB	42
o8-BC-LAGY-o92-mo1	Biochemistry (teaching degree for secondary schools)	3	NUM	12
o8-Ch-Gy-ÜIV-o92-mo1	Exercises in Experimental Presentation, Intermediate School	5	B/NB	13
Teaching (10 ECTS credits)				
o8-FD-Gru-G-o92-mo1	Introduction in Planning and Methods	5	NUM	19
o8-FD-CEX-o92-mo1	Chemistry Education, Part II	3	NUM	18
o8-FD-SinKo-o92-mo1	Chemistry Education, Part III	2	B/NB	21
Freier Bereich (general as well as subject-specific electives)				
Teaching degree students must take modules worth a total of 15 ECTS credits in the area Freier Bereich (general as well as subject-specific electives) (Section 9 LASPO (general academic and examination regulations for teaching-degree programmes)). To achieve the required number of ECTS credits, students may take any modules from the areas below.				
Freier Bereich -- interdisciplinary: The interdisciplinary additional offer for a teaching degree can be found in the respective Annex "Ergänzende Bestimmungen für den "Freien Bereich" im Rahmen des Studiums für ein Lehramt".				
Chemistry (Freier Bereich (general as well as subject-specific electives) -- subject specific)				
o8-AC2-PS-LA-102-mo1	Practical spectroscopy 2 (teaching degree for secondary schools)	3	NUM	9
o8-AC3-LA-102-mo1	Elemental Organic Chemistry (teaching degree for secondary schools)	4	NUM	10
o8-TC-LA-o92-mo1	Theoretical Models in Chemistry (teaching degree for secondary schools)	3	NUM	43
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o8-PC-ESS-092-m01	Electronic structure and spectroscopy	3	NUM	37
o8-OC3-LA-102-m01	Organic Chemistry 3 (teaching degree for secondary schools)	6	NUM	30
o8-PC3-092-m01	Physical and Theoretical Chemistry 3: Symmetry and Quantum Chemistry	6	NUM	34
o8-PC4-092-m01	Physical Chemistry 4: Statistical Thermodynamics	3	NUM	36
o3-TR-072-m01	Toxicology and legal studies	3	NUM	5
o8-FBC2-PV-101-m01	Preparation of Exams Chemistry	5	B/NB	16
Teaching (Freier Bereich (general as well as subject-specific electives) -- subject specific)				
o8-FD-WPF-WA-092-m01	Guidance in Self-reliant Scientific Work	2	B/NB	25
o8-FD-WPF-LLL-092-m01	Extracurricular Sites	4	B/NB	23
o8-FBC1-092-m01	Instruction of pupils in making chemical experiments	5	B/NB	15
o8-FD-WP-102-m01	W- and P-Courses in Secondary Classes of Gymnasium	3	B/NB	22
Thesis (10 ECTS credits) Preparation of a written Hausarbeit (thesis) in accordance with the provisions of Section 29 LPO I (examination regulations for teaching-degree programmes) is a prerequisite for teaching degree students to be admitted to the Erste Staatsprüfung (First State Examination). In accordance with the provisions of Section 29 LPO I, students studying for a teaching degree Gymnasium may write this thesis in one of the subjects they selected as vertieft studiertes Fach (subject studied with a focus on the scientific discipline) or in the subject Erziehungswissenschaften (Educational Science). Pursuant to Section 29 Subsection 1 Sentence 2 LPO I, students may also choose to write an interdisciplinary thesis.				
o8-Ch-HA-GY-092-m01	Admission work (Chemistry for Grammar School Teachers)	10	NUM	14

Module title		Abbreviation
Toxicology and legal studies		03-TR-072-m01
Module coordinator		Module offered by
lecturer of lecture "Toxikologie und Rechtskunde"		Faculty of Medicine
ECTS	Method of grading	Only after succ. compl. of module(s)
3	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Basics of legal regulations for chemists (handling and transportation of hazardous materials), fundamentals of toxicology.		
Intended learning outcomes		
The students master the basics of legal regulations for chemists (handling and transport of hazardous substances) as well as the fundamentals of toxicology.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (approx. 90 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Biochemistry (2011) Bachelor' degree (1 major) Biochemistry (2013) Bachelor' degree (1 major) Biochemistry (2009) Bachelor' degree (1 major) Chemistry (2007) Bachelor' degree (1 major) Chemistry (2008) Bachelor' degree (1 major) Chemistry (2010) Bachelor' degree (1 major) Chemistry (2009) Bachelor' degree (1 major) Food Chemistry (2009) Bachelor' degree (1 major) FOKUS Chemistry (2011) Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2010) Master's degree (1 major) Chemistry (2014) First state examination for the teaching degree Grundschule Chemistry (2009) First state examination for the teaching degree Hauptschule Chemistry (2009) First state examination for the teaching degree Realschule Chemistry (2009) First state examination for the teaching degree Gymnasium Chemistry (2009) First state examination for the teaching degree Mittelschule Chemistry (2013)		
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Module title		Abbreviation
Inorganic Chemistry 1 (teaching degree)		o8-AC1-LA-102-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)
20	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	By way of exception, additional prerequisites are listed in the section on assessments.
Contents		
<p>This module provides students with an overview of the fundamental principles of chemistry. It focuses on particles, metals, acid-base reactions, the periodic table, chemical equilibrium and complexometry. In addition, the module introduces fundamental models of chemistry and principles of inorganic chemistry. It includes practical exercises based on the lecture on experimental chemistry and its extension. After a safety briefing, the students autonomously conduct experiments in the laboratory. The course focuses on laboratory safety, simple lab techniques, the synthesis of simple substances and analyses of unknown substances. In addition, students have the opportunity to advance their laboratory knowledge.</p>		
Intended learning outcomes		
<p>Students are able to explain the principles of the periodic table and to extract information from it. They are able to explain basic models of the structure of matter. They have developed the ability to use the language of chemical formulas to describe chemical reactions and to interpret them by identifying the type of reaction. Students are able to describe the main quantitative and qualitative analytical methods and their application areas. They are able to identify fundamental problems in chemistry and perform experiments to solve them. They have developed the ability to perform the necessary stoichiometric calculations and describe the chemical processes in an appropriate manner, both in written and oral form.</p>		
Courses (type, number of weekly contact hours, language — if other than German)		
<p>This module comprises 3 module components. Information on courses will be listed separately for each module component.</p> <ul style="list-style-type: none"> • o8-AC1-1-102: V + V + Ü (no information on SWS (weekly contact hours) and course language available) • o8-AC1-LA-2-102: P (no information on SWS (weekly contact hours) and course language available) • o8-AC1-LA-3-102: V (no information on SWS (weekly contact hours) and course language available) 		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
<p>Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.</p>		
<p>Assessment in module component o8-AC1-1-102: Principles of Inorganic Chemistry Principles of Inorganic Chemistry Principles of Inorganic Chemistry</p> <ul style="list-style-type: none"> • 10 ECTS, Method of grading: numerical grade • a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: 60 or 90 minutes each; 3 written examinations: 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) • Language of assessment: German or English • Other prerequisites: Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence). 		
<p>Assessment in module component o8-AC1-LA-2-102: Inorganic and Analytical Chemistry (lab) (teaching degree)</p> <ul style="list-style-type: none"> • 7 ECTS, Method of grading: (not) successfully completed 		

<ul style="list-style-type: none"> • pre/post-experiment examination talks (Vor-/Nachtestate, approx. 15 minutes each), log (approx. 5 to 10 pages) • Assessment offered: once a year, summer semester • Language of assessment: German or English <p>Assessment in module component 08-AC1-LA-3-102: Inorganic Chemistry 1 (accompanying lecture) (teaching degree)</p> <ul style="list-style-type: none"> • 3 ECTS, Method of grading: numerical grade • a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: 60 or 90 minutes each; 3 written examinations: 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) • Language of assessment: German or English
Allocation of places
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Additional information
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Workload
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Teaching cycle
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Referred to in LPO I (examination regulations for teaching-degree programmes)
§ 42 (1) 1. Chemie "Allgemeine und Anorganische Chemie" und "Physikalische und Analytische Chemie"
§ 62 (1) 1. Chemie "Allgemeine und Anorganische Chemie"; "Physikalische und Analytische Chemie"
Module appears in
<p>First state examination for the teaching degree Grundschule Chemistry (2009)</p> <p>First state examination for the teaching degree Grundschule Didactics in Chemistry (Primary School) (2009)</p> <p>First state examination for the teaching degree Hauptschule Chemistry (2009)</p> <p>First state examination for the teaching degree Hauptschule Didactics in Chemistry (Secondary School) (2009)</p> <p>First state examination for the teaching degree Realschule Chemistry (2009)</p> <p>First state examination for the teaching degree Gymnasium Chemistry (2009)</p> <p>First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Secondary School) (2009)</p> <p>First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Middle School) (2013)</p> <p>First state examination for the teaching degree Mittelschule Chemistry (2013)</p> <p>First state examination for the teaching degree Mittelschule Didactics in Chemistry (Middle School) (2013)</p>

Module title			Abbreviation
Inorganic Chemistry of the Elements (teaching degree for secondary schools)			o8-AC2-LAGY-102-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)	
3	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.			
Courses (type, number of weekly contact hours, language — if other than German)			
V (no information on SWS (weekly contact hours) and course language available)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)			
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German or English			
Allocation of places			
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Additional information			
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Workload			
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Teaching cycle			
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Referred to in LPO I (examination regulations for teaching-degree programmes)			
§ 62 (1) 1. Chemie "Allgemeine und Anorganische Chemie"; "Physikalische und Analytische Chemie"			
Module appears in			
First state examination for the teaching degree Grundschule Chemistry (2009) First state examination for the teaching degree Grundschule Didactics in Chemistry (Primary School) (2009) First state examination for the teaching degree Hauptschule Chemistry (2009) First state examination for the teaching degree Hauptschule Didactics in Chemistry (Secondary School) (2009) First state examination for the teaching degree Realschule Chemistry (2009) First state examination for the teaching degree Gymnasium Chemistry (2009) First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Secondary School) (2009) First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Middle School) (2013) First state examination for the teaching degree Mittelschule Chemistry (2013) First state examination for the teaching degree Mittelschule Didactics in Chemistry (Middle School) (2013)			

Module title		Abbreviation
Practical spectroscopy 2 (teaching degree for secondary schools)		o8-AC2-PS-LA-102-m01
Module coordinator		Module offered by
lecturer of lecture "Praktische Spektroskopie 2"		Institute of Inorganic 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 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 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 (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
First state examination for the teaching degree Grundschule Chemistry (2009) First state examination for the teaching degree Hauptschule Chemistry (2009) First state examination for the teaching degree Realschule Chemistry (2009) First state examination for the teaching degree Gymnasium Chemistry (2009) First state examination for the teaching degree Mittelschule Chemistry (2013)		

Module title		Abbreviation
Elemental Organic Chemistry (teaching degree for secondary schools)		o8-AC3-LA-102-m01
Module coordinator		Module offered by
lecturer of lecture "Elementorganische Chemie" (Elemental Organic Chemistry)		Institute of Inorganic Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
4	numerical grade	o8-AC1 (module component o8-AC1-4 only) and o8-OC3 (module component o8-OC3-2 only)
Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).
Contents		
This module equips students with an advanced knowledge of 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 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.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German, English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
First state examination for the teaching degree Grundschule Chemistry (2009) First state examination for the teaching degree Hauptschule Chemistry (2009) First state examination for the teaching degree Realschule Chemistry (2009) First state examination for the teaching degree Gymnasium Chemistry (2009) First state examination for the teaching degree Mittelschule Chemistry (2013)		

Module title		Abbreviation
Chemistry of the elements		o8-AS1-LAGY-102-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	o8-AC1 (module component o8-AC1-4 only) and o8-OC3 (module component o8-OC3-2 only)
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
This module equips students with an advanced knowledge of the periodic table and selected elements. It focuses on bonding conditions, trends in the periodic table and the description and structure of elements. In addition, it introduces students to elementary organic chemistry, coordination chemistry and complex chemistry.		
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 + V (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 62 (1) 1. Chemie "Allgemeine und Anorganische Chemie"; "Physikalische und Analytische Chemie"		
Module appears in		
First state examination for the teaching degree Gymnasium Chemistry (2009)		

Module title		Abbreviation
Biochemistry (teaching degree for secondary schools)		o8-BC-LAGY-092-m01
Module coordinator		Module offered by
holder of the Chair of Biochemistry		Chair of Biochemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
3	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).
Contents		
Comprising lectures and exercises, this module acquaints students with the fundamental principles of biochemistry.		
Intended learning outcomes		
Students have become familiar with the fundamental principles of biochemistry. They are able to describe the key biochemical processes in cellular systems.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 62 (1) 2. Chemie "Organische und Bioorganische Chemie"		
Module appears in		
Bachelor' degree (1 major) Physics (2010) Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) First state examination for the teaching degree Gymnasium Chemistry (2009)		

Module title		Abbreviation
Exercises in Experimental Presentation, Intermediate School		o8-Ch-Gy-ÜiV-o92-m01
Module coordinator		Module offered by
lecturers of the three lectures offered in this 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		
Students will design, prepare and deliver presentations on a range of topics in chemistry. Presentations will include live demonstrations.		
Intended learning outcomes		
Students are able to deliver detailed and scientifically correct presentations on given topics in inorganic, organic and physical chemistry that are tailored to the specific needs of their audience. They are able to select experiments on the topics in question that support particular teaching goals as well as to plan and safely perform them. Students will be expected to apply both their chemistry knowledge and skills and their teaching skills.		
Courses (type, number of weekly contact hours, language — if other than German)		
Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
one talk each in the fields of inorganic, organic and physical chemistry including demonstrations (approx. 45 minutes each) Assessment offered: once a year, winter semester Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 62 (1) 5. Chemie "Übungen im Vortragen mit Demonstrationen"		
Module appears in		
First state examination for the teaching degree Gymnasium Chemistry (2009)		

Module title		Abbreviation
Admission work (Chemistry for Grammar School Teachers)		o8-Ch-HA-GY-o92-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	Where applicable, specific modules/module components as specified by supervisor.
Duration	Module level	Other prerequisites
1 semester	undergraduate	Depending on their choice of topic, students who are writing their Hausarbeit (thesis) according to Section 29 LPO I (examination regulations for teaching-degree programmes) in the vertieft studiertes Fach (subject studied with a focus on the scientific discipline) Chemie (Chemistry) are highly recommended to complete module o8-Forsch-LAGY directly before completing module o8-Ch-HA-GY.
Contents		
Adhering to the principles of good scientific practice, students will independently research and write on a topic in chemistry or chemistry didactics they have agreed upon with an authorised examiner in accordance with the provisions of Section 29 LPO (examination regulations for teaching degree programmes).		
Intended learning outcomes		
To pass this module, students will be expected to: - be able to independently write an academic paper (define and analyse a problem, conduct a literature search, refer to relevant theories, interpret data, draw logical conclusions, and offer approaches to the solution of said problem). - be able to work to deadlines. - prepare an appropriate written account of the results of their work.		
Courses (type, number of weekly contact hours, language — if other than German)		
no courses assigned		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written thesis (Zulassungsarbeit, approx. 40 pages) Language of assessment: German, exceptions in accordance with Section 29 LPO I (examination regulations for teaching degree programmes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
First state examination for the teaching degree Gymnasium Chemistry (2009)		

Module title		Abbreviation
Instruction of pupils in making chemical experiments		o8-FBC1-092-m01
Module coordinator		Module offered by
holder of the Professorship of Didactics of Chemistry		Institute of Inorganic 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 gives students the opportunity to guide pupils as they explore chemistry topics and perform chemical experiments.		
Intended learning outcomes		
Students have learned how to guide pupils as they explore chemistry problems and perform chemical experiments.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
assessment of practical performance and final report (approx. 8 pages)		
Allocation of places		
Number of places: 30. Places will be allocated according to the number of subject semesters. Among applicants with the same number of subject semesters, places will be allocated by lot.		
Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
First state examination for the teaching degree Gymnasium Chemistry (2009)		

Module title		Abbreviation
Preparation of Exams Chemistry		o8-FBC2-PV-101-m01
Module coordinator		Module offered by
lecturers Inorganic and Organische Chemie (Organic Chemistry)		Faculty of Chemistry and Pharmacy
ECTS	Method of grading	Only after succ. compl. of module(s)
5	(not) successfully completed	o8-OC2-GHR and o8-OC-Prakt-GHR or o8-OC2-LAGY and o8-OC-Prakt-LAGY
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
This module gives students the opportunity to revise topics in organic and inorganic chemistry that are likely to be covered on the state examination and try exam papers from previous years.		
Intended learning outcomes		
Students are able to solve selected questions on organic and inorganic chemistry that were asked in the state examination in previous years.		
Courses (type, number of weekly contact hours, language — if other than German)		
This module comprises 2 module components. Information on courses will be listed separately for each module component.		
<ul style="list-style-type: none"> o8-FBC2-PV-1-101: S (no information on SWS (weekly contact hours) and course language available) o8-FBC2-PV-2-101: S (no information on SWS (weekly contact hours) and course language available) 		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.		
Assessment in module component o8-FBC2-PV-1-101: Preparation of Exams Inorganic Chemistry <ul style="list-style-type: none"> 2 ECTS, Method of grading: (not) successfully completed successful participation in the form of short presentations on selected assignments Assessment offered: once a year, summer semester Language of assessment: German or English 		
Assessment in module component o8-FBC2-PV-2-101: Preparation of Exams Organic Chemistry <ul style="list-style-type: none"> 3 ECTS, Method of grading: (not) successfully completed successful participation in the form of short presentations on selected assignments Assessment offered: once a year, summer semester Language of assessment: German or English 		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		

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

Module title		Abbreviation
Chemistry Education, Part II		o8-FD-CEx-092-m01
Module coordinator		Module offered by
holder of the Professorship of Didactics of Chemistry		Institute of Inorganic Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
3	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Selection and presentation of experiments for/in the chemistry classroom at Realschule/Gymnasium schools.		
Intended learning outcomes		
Students have learned some essential experiments for the chemistry classroom in Realschule and Gymnasium schools and have developed the ability to prepare and safely perform them.		
Courses (type, number of weekly contact hours, language — if other than German)		
S (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written examination (approx. 60 minutes)		
Allocation of places		
Number of places: 25. Places will be allocated according to the number of subject semesters. Among applicants with the same number of subject semesters, places will be allocated by lot.		
Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 42 Chemie Fachdidaktik § 62 (1) 6. Chemie Didaktik		
Module appears in		
First state examination for the teaching degree Realschule Chemistry (2009) First state examination for the teaching degree Gymnasium Chemistry (2009)		

Module title		Abbreviation
Introduction in Planning and Methods		o8-FD-Gru-G-092-mo1
Module coordinator		Module offered by
holder of the Professorship of Didactics of 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 introduces students to the fundamentals of chemistry didactics.		
Intended learning outcomes		
Students have become familiar with theories and models for teaching chemistry as well as with the objectives and framework conditions of chemistry lessons. They are able to translate the knowledge they have developed to application in the classroom.		
Courses (type, number of weekly contact hours, language — if other than German)		
This module comprises 2 module components. Information on courses will be listed separately for each module component. <ul style="list-style-type: none"> o8-FD-Gru-RSGy-2-092: S (no information on SWS (weekly contact hours) and course language available) o8-FD-Einf-1-092: V (no information on SWS (weekly contact hours) and course language available) 		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.		
Assessment in module component o8-FD-Gru-RSGy-2-092: Basics of Planning and Organization of Chemistry Education <ul style="list-style-type: none"> 2 ECTS, Method of grading: (not) successfully completed Testat (exam, approx. 20 minutes) Language of assessment: German or English Assessment in module component o8-FD-Einf-1-092: Introduction in Chemistry Education <ul style="list-style-type: none"> 3 ECTS, Method of grading: numerical grade written examination (approx. 90 minutes) Language of assessment: German or English 		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 36 (1) 7. Didaktik der Grundschule Chemie § 38 (1) 1. Didaktik der Hauptschule Chemie § 38 (1) 1. Didaktik der Mittelschule Chemie § 42 Chemie Fachdidaktik § 62 (1) 6. Chemie Didaktik		

Module appears in
First state examination for the teaching degree Gymnasium Chemistry (2009)

Module title		Abbreviation
Chemistry Education, Part III		o8-FD-SinKo-092-m01
Module coordinator		Module offered by
holder of the Professorship of Didactics of Chemistry		Institute of Inorganic Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
2	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
Teaching chemistry in a meaningful context.		
Intended learning outcomes		
Students are able to translate topics from the relevant chemistry curriculum into lessons for students in Sekundarstufe II at Gymnasium schools.		
Courses (type, number of weekly contact hours, language — if other than German)		
S (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
Testat (exam, approx. 20 minutes) Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 62 (1) 6. Chemie Didaktik		
Module appears in		
First state examination for the teaching degree Gymnasium Chemistry (2009)		

Module title		Abbreviation
W- and P-Courses in Secondary Classes of Gymnasium		o8-FD-WP-102-m01
Module coordinator		Module offered by
holders of the Professorships of Chemistry Teaching and Physics Teaching		Institute of Inorganic Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
3	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: regular participation in practical exercise (sitting in on classes at a Gymnasium).
Contents		
Project seminars (P-Seminars) and academic skills seminars (W-Seminars) for Oberstufe students at Gymnasium schools: What do they teach and how are they designed?; sitting in on classes at a Gymnasium school; careers advice and project management in the context of a P-Seminar; supervising seminar papers and introducing Oberstufe students to good academic practice in the context of a W-Seminar; designing a W-Seminar and a P-Seminar.		
Intended learning outcomes		
Students are able to independently design and teach W-Seminars and P-Seminars for Oberstufe students at Gymnasium schools.		
Courses (type, number of weekly contact hours, language — if other than German)		
S + P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written elaboration (approx. 10 to 15 pages) and presentation (approx. 30 minutes) Language of assessment: German or English		
Allocation of places		
Number of places: 12. Places will be allocated according to the number of subject semesters. Among applicants with the same number of subject semesters, places will be allocated by lot.		
Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
First state examination for the teaching degree Gymnasium Chemistry (2009)		

Module title		Abbreviation
Extracurricular Sites		o8-FD-WPF-LLL-092-m01
Module coordinator		Module offered by
holder of the Professorship of Didactics of Chemistry		Institute of Inorganic Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
4	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
This module discusses the opportunities and limitations of out-of-classroom learning in chemistry.		
Intended learning outcomes		
Students are able to plan chemistry lessons that include out-of-classroom learning activities and, in particular, activities in school labs that support their teaching goals. They are able to put those plans into practice and guide pupils as they perform experiments.		
Courses (type, number of weekly contact hours, language — if other than German)		
This module comprises 2 module components. Information on courses will be listed separately for each module component. <ul style="list-style-type: none"> o8-FD-WPF-LLL-1-092: S (no information on SWS (weekly contact hours) and course language available) o8-FD-WPF-LLL-2-092: P (no information on SWS (weekly contact hours) and course language available) 		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
Assessment in this module comprises the assessments in the individual module components as specified below. Unless stated otherwise, successful completion of the module will require successful completion of all individual assessments.		
Assessment in module component o8-FD-WPF-LLL-1-092: Opportunities of Extracurricular Sites <ul style="list-style-type: none"> 2 ECTS, Method of grading: (not) successfully completed presentation of a project (approx. 30 minutes) Language of assessment: German or English Assessment in module component o8-FD-WPF-LLL-2-092: School Lab <ul style="list-style-type: none"> 2 ECTS, Method of grading: (not) successfully completed successful supervision of experiments in learn-teach-lab Language of assessment: German or English 		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
--		
Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
First state examination for the teaching degree Grundschule Chemistry (2009) First state examination for the teaching degree Grundschule Didactics in Chemistry (Primary School) (2009) First state examination for the teaching degree Hauptschule Chemistry (2009) First state examination for the teaching degree Hauptschule Didactics in Chemistry (Secondary School) (2009)		
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First state examination for the teaching degree Realschule Chemistry (2009)
First state examination for the teaching degree Gymnasium Chemistry (2009)
First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Secondary School) (2009)
First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Middle School) (2013)
First state examination for the teaching degree Mittelschule Chemistry (2013)
First state examination for the teaching degree Mittelschule Didactics in Chemistry (Middle School) (2013)

Module title		Abbreviation
Guidance in Self-reliant Scientific Work		o8-FD-WPF-WA-092-m01
Module coordinator		Module offered by
holder of the Professorship of Didactics of Chemistry		Institute of Inorganic Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
2	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
This module will teach students how to independently research and write on selected topics in chemistry didactics.		
Intended learning outcomes		
Students are able to independently research and write on selected topics in chemistry didactics. They are able to provide an account of the current state of research as well as to develop ideas to advance the discipline.		
Courses (type, number of weekly contact hours, language — if other than German)		
S (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
presentation (approx. 30 minutes) Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
--		
Referred to in LPO I (examination regulations for teaching-degree programmes)		
--		
Module appears in		
First state examination for the teaching degree Grundschule Chemistry (2009) First state examination for the teaching degree Grundschule Didactics in Chemistry (Primary School) (2009) First state examination for the teaching degree Hauptschule Chemistry (2009) First state examination for the teaching degree Hauptschule Didactics in Chemistry (Secondary School) (2009) First state examination for the teaching degree Realschule Chemistry (2009) First state examination for the teaching degree Gymnasium Chemistry (2009) First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Secondary School) (2009) First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Middle School) (2013) First state examination for the teaching degree Mittelschule Chemistry (2013) First state examination for the teaching degree Mittelschule Didactics in Chemistry (Middle School) (2013)		

Module title		Abbreviation
Practical Research Course for Grammar School Teachers		o8-Forsch-LAGY-o92-m01
Module coordinator		Module offered by
lecturer of the respective research group		Faculty of Chemistry and Pharmacy
ECTS	Method of grading	Only after succ. compl. of module(s)
8	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
This module gives students the opportunity to research and write on a defined problem within a given time frame and using the scientific methods they have learned during the programme.		
Intended learning outcomes		
Students are able to conduct research on a defined problem/topic, adhering to the principles of good scientific practice, and to present the results of their work in written form.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
written thesis (approx. 20 pages) Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 62 (1) 4. Chemie "Forschungsorientiertes Laborpraktikum"		
Module appears in		
First state examination for the teaching degree Gymnasium Chemistry (2009)		

Module title		Abbreviation
Organic Chemistry 1		o8-OC1-092-m01
Module coordinator		Module offered by
holder of the Professorship of Organic Chemistry		Institute of Organic Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).
Contents		
This module provides students with an overview of the fundamental principles of organic chemistry. It examines the bonding situation of carbon and introduces students to the nomenclature of simple and moderately complex organic compounds. The module also discusses the fundamental principles of stereochemistry, substitution, addition and elimination reactions as well as synthesis planning.		
Intended learning outcomes		
Students know important categories of substances in organic chemistry. They are able to use different systems of nomenclature to determine simple substance names. Students are able to analyse the stereochemistry of molecules. They are able to describe and formulate some of the most important reactions in organic chemistry. For that purpose, they can analyse and categorise the characteristic reaction conditions and can use them for simple syntheses.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: 60 or 90 minutes each; 3 written examinations: 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)		
Allocation of places		
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Additional information		
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Workload		
--		
Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 62 (1) 2. Chemie "Organische und Bioorganische Chemie"		
Module appears in		
Bachelor' degree (1 major) Biochemistry (2011) Bachelor' degree (1 major) Biochemistry (2013) Bachelor' degree (1 major) Biochemistry (2009) Bachelor' degree (1 major) Chemistry (2010) Bachelor' degree (1 major) Chemistry (2009) Bachelor' degree (1 major) Mathematics (2012)		
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Bachelor' degree (1 major) Mathematics (2013)
 Bachelor' degree (1 major) Computational Mathematics (2009)
 Bachelor' degree (1 major) Computational Mathematics (2012)
 Bachelor' degree (1 major) Computational Mathematics (2013)
 Bachelor' degree (1 major) FOKUS Chemistry (2011)
 First state examination for the teaching degree Gymnasium Chemistry (2009)

Module title		Abbreviation
Organic Chemistry 2 (teaching degree for secondary schools)		o8-OC2-LAGY-102-m01
Module coordinator		Module offered by
holder of the Chair of Physically Organic Chemistry		Institute of Organic Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
6	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).
Contents		
This module 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.		
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.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German or English		
Allocation of places		
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Additional information		
--		
Workload		
--		
Teaching cycle		
--		
Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 62 (1) 2. Chemie "Organische und Bioorganische Chemie"		
Module appears in		
First state examination for the teaching degree Gymnasium Chemistry (2009)		

Module title		Abbreviation
Organic Chemistry 3 (teaching degree for secondary schools)		o8-OC3-LA-102-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	o8-OC1 or o8-OC1-GHR
Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).
Contents		
This module 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 + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
First state examination for the teaching degree Grundschule Chemistry (2009) First state examination for the teaching degree Hauptschule Chemistry (2009) First state examination for the teaching degree Realschule Chemistry (2009) First state examination for the teaching degree Gymnasium Chemistry (2009) First state examination for the teaching degree Mittelschule Chemistry (2013)		

Module title		Abbreviation
Organic Chemistry 4 - advanced course		o8-OC4-LAGY-102-m01
Module coordinator		Module offered by
holder of the Chair of Organic Chemistry II		Institute of Organic Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
5	numerical grade	o8-OC1 or o8-OC1-GHR
Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).
Contents		
This module discusses biologically important bonding classes, their reactions and syntheses, working with special hazardous substances, complicated working and synthesis techniques, purification methods and product analysis.		
Intended learning outcomes		
Students are able to name important heteroaromatics and to formulate their reactions and syntheses. They are able to characterise and categorise dyes. Students are able to describe the structure and selective synthesis of proteins. In addition, they are able to describe the structure of the DNA, carbohydrates, fats, terpenes and steroids.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German or English		
Allocation of places		
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Additional information		
--		
Workload		
--		
Teaching cycle		
--		
Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 62 (1) 2. Chemie "Organische und Bioorganische Chemie"		
Module appears in		
First state examination for the teaching degree Grundschule Chemistry (2009) First state examination for the teaching degree Hauptschule Chemistry (2009) First state examination for the teaching degree Realschule Chemistry (2009) First state examination for the teaching degree Gymnasium Chemistry (2009) First state examination for the teaching degree Mittelschule Chemistry (2013)		

Module title		Abbreviation
Organic Chemistry - laboratory course (teaching degree for secondary schools)		o8-OC-Prakt-LAGY-o92-mo1
Module coordinator		Module offered by
lecturers Organische Chemie (Organic Chemistry)		Institute of Organic 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. In addition to those experiments, students will be expected to take oral tests and write lab reports to demonstrate their knowledge. The course focuses on the safe handling of hazardous substances, simple experimental unit operations of organic chemistry, simple to multi-level syntheses and the analysis of the products.		
Intended learning outcomes		
Students know how to safely handle hazardous substances. They are able to conduct simple experimental operations of organic chemistry. They are able to analyse the yield and purity of the products and identify possible error sources. They are able to connect the theoretical aspects covered in the lecture with practical experiments in the laboratory.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
pre/post-experiment examination talks (Vor-/Nachtestate, approx. 15 minutes each), log (approx. 5 to 10 pages) Assessment offered: once a year, summer semester Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
--		
Teaching cycle		
--		
Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 62 (1) 2. Chemie "Organische und Bioorganische Chemie"		
Module appears in		
First state examination for the teaching degree Gymnasium Chemistry (2009)		

Module title		Abbreviation
Practical spectroscopy 1 (teaching degree for secondary schools)		o8-OC-Spec-LAGY-o92-m01
Module coordinator		Module offered by
lecturer of lecture "Organische Chemie 2"		Institute of Organic 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 introduces students to the spectroscopic methods of infrared spectroscopy, mass spectrometry and NMR spectroscopy.		
Intended learning outcomes		
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 (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 62 (1) 2. Chemie "Organische und Bioorganische Chemie"		
Module appears in		
First state examination for the teaching degree Grundschule Chemistry (2009) First state examination for the teaching degree Hauptschule Chemistry (2009) First state examination for the teaching degree Realschule Chemistry (2009) First state examination for the teaching degree Gymnasium Chemistry (2009) First state examination for the teaching degree Mittelschule Chemistry (2013)		

Module title		Abbreviation
Physical and Theoretical Chemistry 3: Symmetry and Quantum Chemistry		o8-PC3-092-m01
Module coordinator		Module offered by
lecturer of lecture "Quantenchemie"		Institute of Physical and Theoretical Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
6	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).
Contents		
This module discusses the fundamental principles of quantum chemistry and symmetry in chemistry.		
Intended learning outcomes		
Students have become familiar with the fundamental principles of quantum chemistry and symmetry in chemistry and are able to apply the knowledge they have developed.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü + V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) 1 to 3 written examinations (1 written examination: 90 minutes; 2 written examinations: 60 or 90 minutes each; 3 written examinations: 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Biochemistry (2013) Bachelor' degree (1 major) Chemistry (2010) Bachelor' degree (1 major) Chemistry (2009) Bachelor' degree (1 major) Mathematics (2012) Bachelor' degree (1 major) Mathematics (2013) Bachelor' degree (1 major) Computational Mathematics (2009) Bachelor' degree (1 major) Computational Mathematics (2012) Bachelor' degree (1 major) Computational Mathematics (2013) Bachelor' degree (1 major) FOKUS Chemistry (2011) First state examination for the teaching degree Grundschule Chemistry (2009) First state examination for the teaching degree Hauptschule Chemistry (2009) First state examination for the teaching degree Realschule Chemistry (2009)		
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First state examination for the teaching degree Gymnasium Chemistry (2009)
First state examination for the teaching degree Mittelschule Chemistry (2013)

Module title		Abbreviation
Physical Chemistry 4: Statistical Thermodynamics		o8-PC4-092-m01
Module coordinator		Module offered by
lecturer of lecture "Statistische Thermodynamik"		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	Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).
Contents		
This module discusses the fundamental principles of statistical thermodynamics.		
Intended learning outcomes		
Students have become familiar with the fundamental principles of statistical thermodynamics and are able to apply the knowledge they have developed.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
Bachelor' degree (1 major) Chemistry (2010) Bachelor' degree (1 major) Chemistry (2009) Bachelor' degree (1 major) FOKUS Chemistry (2011) First state examination for the teaching degree Grundschule Chemistry (2009) First state examination for the teaching degree Hauptschule Chemistry (2009) First state examination for the teaching degree Realschule Chemistry (2009) First state examination for the teaching degree Gymnasium Chemistry (2009) First state examination for the teaching degree Mittelschule Chemistry (2013)		

Module title		Abbreviation
Electronic structure and spectroscopy		o8-PC-ESS-092-m01
Module coordinator		Module offered by
lecturer of lecture "Elektronische Struktur und Spektroskopie" (Electronic Structure and Spectroscopy)		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	Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).
Contents		
Fundamentals of atomic and molecular structure as well as spectroscopy.		
Intended learning outcomes		
Students have learned the fundamentals of atomic and molecular structure as well as spectroscopy and are able to apply the knowledge they have developed.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
First state examination for the teaching degree Grundschule Chemistry (2009) First state examination for the teaching degree Hauptschule Chemistry (2009) First state examination for the teaching degree Realschule Chemistry (2009) First state examination for the teaching degree Gymnasium Chemistry (2009) First state examination for the teaching degree Mittelschule Chemistry (2013)		

Module title		Abbreviation
Physical Chemistry lab (teaching degree for secondary schools)		o8-PC-Prakt-LAGY-o92-m01
Module coordinator		Module offered by
lecturers Physikalische Chemie (Physical Chemistry)		Institute of Physical and Theoretical Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
3	(not) successfully completed	o8-PC-TKE-LAGY
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
This module gives students the opportunity to apply in practice the knowledge they have gained through the related lecture(s). After a safety briefing, the students autonomously conduct experiments in the laboratory. In addition to those experiments, students will be expected to take oral tests and write lab reports to demonstrate their knowledge.		
Intended learning outcomes		
Students are able to connect the theoretical principles of thermodynamics, kinetics, electrochemistry and spectroscopy with practical laboratory experiments. They are able to analyse the resulting measurements.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
pre/post-experiment examination talks (Vor-/Nachtestate, approx. 15 minutes each), log (approx. 5 to 10 pages) Assessment offered: once a year, winter semester Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 62 (1) 1. Chemie "Allgemeine und Anorganische Chemie"; "Physikalische und Analytische Chemie"		
Module appears in		
First state examination for the teaching degree Gymnasium Chemistry (2009)		

Module title		Abbreviation
Principles of quantum mechanics and spectroscopy		o8-PC-QMS-LAGY-o92-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)
5	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).
Contents		
This module 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.		
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.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 62 (1) 1. Chemie "Allgemeine und Anorganische Chemie"; "Physikalische und Analytische Chemie"		
Module appears in		
First state examination for the teaching degree Gymnasium Chemistry (2009)		

Module title		Abbreviation
Thermodynamics, Kinetics, Electrochemistry		o8-PC-TKE-LAGY-o92-m01
Module coordinator		Module offered by
lecturer of lecture "Thermodynamik, Kinetik, Elektrochemie"		Institute of Physical and Theoretical Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
9	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).
Contents		
This module introduces students to the principles of thermodynamics. It focuses on the laws of thermodynamics, chemical equilibria, ideal and real gasses/solutions/mixed phases and electrochemistry. In addition to thermodynamic processes, it discusses the fundamental principles of kinetics.		
Intended learning outcomes		
Students are able to explain the laws of thermodynamics. They are able to describe thermodynamic aspects of solutions, gases, mixed phases and electrochemical reactions. Students are able to interpret the kinetic aspects of chemical reactions.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: 60 or 90 minutes each; 3 written examinations: 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 62 (1) 1. Chemie "Allgemeine und Anorganische Chemie"; "Physikalische und Analytische Chemie"		
Module appears in		
First state examination for the teaching degree Gymnasium Chemistry (2009)		

Module title		Abbreviation
Basic Mathematics (teaching degree)		o8-PC-VKM-LA-102-m01
Module coordinator		Module offered by
lecturer of block course "Mathematik" (Mathematics)		Institute of Physical and Theoretical Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
2	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
This module provides an introduction to mathematical concepts and methods used in physical/theoretical chemistry. It trains students in those methods with the help of examples taken from thermodynamics and kinetics.		
Intended learning outcomes		
Students have been trained in mathematical methods. They are able to apply those methods to problems in chemistry.		
Courses (type, number of weekly contact hours, language — if other than German)		
V + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
exercises (4 work sheets) Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
First state examination for the teaching degree Grundschule Chemistry (2009) First state examination for the teaching degree Grundschule Didactics in Chemistry (Primary School) (2009) First state examination for the teaching degree Hauptschule Chemistry (2009) First state examination for the teaching degree Hauptschule Didactics in Chemistry (Secondary School) (2009) First state examination for the teaching degree Realschule Chemistry (2009) First state examination for the teaching degree Gymnasium Chemistry (2009) First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Secondary School) (2009) First state examination for the teaching degree Sonderpädagogik Didactics in Chemistry (Middle School) (2013) First state examination for the teaching degree Mittelschule Chemistry (2013) First state examination for the teaching degree Mittelschule Didactics in Chemistry (Middle School) (2013)		

Module title		Abbreviation
Physics lab (teaching degree for secondary schools)		o8-PH-Prakt-LAGY-o92-m01
Module coordinator		Module offered by
lecturers Physikalische Chemie (Physical Chemistry)		Institute of Physical and Theoretical Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
3	(not) successfully completed	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	--
Contents		
This module covers key experiments in physics.		
Intended learning outcomes		
Students are able to plan, perform and evaluate key experiments in physics.		
Courses (type, number of weekly contact hours, language — if other than German)		
P (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
pre/post-experiment examination talks (Vor-/Nachtestate, approx. 15 minutes each), log (approx. 5 to 10 pages) Language of assessment: German or English		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
§ 62 (1) 3. Chemie "Physik"		
Module appears in		
First state examination for the teaching degree Gymnasium Chemistry (2009)		

Module title		Abbreviation
Theoretical Models in Chemistry (teaching degree for secondary schools)		o8-TC-LA-092-m01
Module coordinator		Module offered by
lecturer of lecture "Quantenchemie"		Institute of Physical and Theoretical Chemistry
ECTS	Method of grading	Only after succ. compl. of module(s)
3	numerical grade	--
Duration	Module level	Other prerequisites
1 semester	undergraduate	Admission prerequisite to assessment: successful completion of exercises in the respective classes as specified at the beginning of the course (usually 70% of exercises to be successfully completed) as well as regular attendance of exercises (usually a maximum of 2 incidents of unexcused absence).
Contents		
This module provides students with 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 H ₂ ⁺ .		
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 + Ü (no information on SWS (weekly contact hours) and course language available)		
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)		
a) 1 to 3 written examinations (1 written examination: approx. 90 minutes; 2 written examinations: approx. 60 or 90 minutes each; 3 written examinations: approx. 60 minutes each) or b) oral examination of one candidate each (approx. 20 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes)		
Allocation of places		
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Additional information		
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Workload		
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Teaching cycle		
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Referred to in LPO I (examination regulations for teaching-degree programmes)		
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Module appears in		
First state examination for the teaching degree Grundschule Chemistry (2009) First state examination for the teaching degree Hauptschule Chemistry (2009) First state examination for the teaching degree Realschule Chemistry (2009) First state examination for the teaching degree Gymnasium Chemistry (2009) First state examination for the teaching degree Mittelschule Chemistry (2013)		