Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

Module Catalogue
for the Subject

Chemistry

as a Master's with 1 major

with the degree "Master of Science"

(120 ECTS credits)

Examination regulations version: 2014
Responsible: Faculty of Chemistry and Pharmacy

Contents

The subject is divided into

Content and Objectives of the Programme

The Master's program in Chemistry is offered by the Faculty of Chemistry and Pharmacy of the JMU as a fundamentally-oriented course with the degree of "Master of Science" (M.Sc.), in the context of a consecutive Bachelor's and Master's degree program.

The Master's course prepares students for scientific as well as doctoral work in chemistry and the eventual award of the degree Dr. rer. nat. The aim of the training is to provide students with in-depth knowledge of scientific work in the research and application of chemistry and the associated basic concepts. Through the education and training of analytical thinking, students should acquire the ability to independently apply the basic knowledge obtained earlier in their Bachelor studies and to transfer it to, and later familiarize themselves with, a wide variety of new tasks.

Through the thesis, students should show that they are able to deal with an experimental or theoretical task in a thematically-limited extent using known methods and from a scientific point of view. The Master's examination intends to determine whether the candidate or the candidate has an overview of the relationships in chemistry, and has the ability to apply the learned scientific methods. It allows the acquisition of an internationally comparable degree in the field of chemistry and provides a professional qualification to prepare for future work in research and development.

Abbreviations used

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

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

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

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

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

Conventions

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

Notes

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

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

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

In accordance with

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

ASPO2009

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

19-Feb-2014 (2014-1)

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

Compulsory Electives

(90 ECTS credits)

Compulsory Electives Focuses

(75 ECTS credits)

Students must choose three focuses with 25 ECTS credits each.

Inorganic Chemistry

(25 ECTS credits)

Compulsory Courses

(20 ECTS credits)

Module title				Abbreviation
Advanced Inorganic Chemistry				08-ACM1-141-m01
Module coordinator			**Module offered by**	
Managing Director of the Institute of Inorganic Chemistry			Institute of Inorganic Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
10	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
2 semester	graduate	--		

Contents

This module discusses advanced topics in main group chemistry and transition metal chemistry. It focuses on special compounds of the main group elements (MGEs), bonding situations of MGEs and MGE compounds, the chemistry of transition metals and coordination chemistry.

Intended learning outcomes

Students are able to characterise and explain special compounds of the main group elements. They can describe the chemical properties of transition metals and analyse the structure as well as chemical and physical aspects of coordination compounds.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title	Abbreviation
Inorganic Chemistry practical course for advanced	08-ACPM-132-m01

Module coordinator	Module offered by
focus point coordinator "Inorganic 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	graduate	--

Contents

This module gives students the opportunity to enhance their skills in advanced synthesis and analytical methods in inorganic chemistry. The focus will be on working under inert atmospheres, purification methods, spectral analysis and crystallography. Students will be expected to conduct their work in the lab independently, write a lab report documenting their findings and deliver a presentation.

Intended learning outcomes

Students are able to use advanced synthesis and analytical methods in inorganic chemistry in the lab and to interpret their findings. They are able to write a lab report documenting their findings and deliver a presentation.

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

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

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

practical work with lab report (approx. 20 pages) and talk (approx. 15 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 40 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Compulsory Electives

(5 ECTS credits)

Module title			**Abbreviation**
Bioanorganic Chemistry			08-ACM2-141-m01

Module coordinator	**Module offered by**
lecturer of seminar "Anorganische Aspekte der Biochemie and Medizinischen Chemie" (Inorganic Aspects of Biochemistry and Medicinal 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	graduate	--

Contents

This module introduces students to the fundamental principles of bioinorganic chemistry (BIC). It discusses the methods of BIC, structures and effects of metalliferous enzymes and applications of BIC in the fields of diagnosis and therapy.

Intended learning outcomes

Students are able to describe the principles of, and methods in, BIC. They can explain the structure and effects of metalliferous enzymes and describe applications of BIC in biochemistry and medicine.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title			Abbreviation
Solid state chemistry and inorganic materials			08-ACM3-141-m01
Module coordinator			**Module offered by**
lecturer of seminar "Festkörperchemie and Anorganische Materialien" (Solid State Chemistry and Inorganic Materials)			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	graduate	--	

Contents

This module provides an introduction to solid-state chemistry. It focuses on the structure, chemical and physical properties, synthesis methods and selected materials of solids.

Intended learning outcomes

Students are able to describe the structure and properties of solids. They can explain methods for solid-state synthesis. They can describe important aspects of selected materials regarding the corresponding solids.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Advanced organometallic chemistry and its application in homogeneous catalysis				08-HKM2-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Spezielle Metallorganische Chemie and deren Anwendung in der Homogenkatalyse"			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	graduate	--		

Contents

This module examines elementary organic compounds of transition metals with homogeneous catalytic applications.

Intended learning outcomes

Students can describe and analyse the structure, reactivity and analysis of elementary organic compounds. They are able to characterise special substance classes. They can formulate homogeneous catalysis reactions.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Organic Chemistry

(25 ECTS credits)

Compulsory Courses

(15 ECTS credits)

Module title				Abbreviation
Modern Synthetic Methods				08-OCM-SYNT-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar			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		graduate	--	

Contents

This module discusses modern stereoselective synthesis methods. It focuses on selected total syntheses, organometallic chemistry and catalysis.

Intended learning outcomes

Students are able to stereoselectively plan complex chemical syntheses and to stereochemically analyse them. They can explain total syntheses. They can describe aspects of organometallic chemistry and catalysis in synthesis chemistry.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				**Abbreviation**
Advanced NMR- and Mass Spectrometry				08-OCM-NMRMS-141-m01
Module coordinator			**Module offered by**	
lab course supervisor			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	graduate	--		

Contents

This module equips students with an advanced knowledge of NMR and mass spectrometry. It offers deeper insights into the theoretical principles of the two measuring techniques and includes exercises that give students the opportunity to learn how to evaluate complicated spectra and use a spectrometer.

Intended learning outcomes

Students are able to discuss NMR and mass spectroscopy demonstrating a high degree of expertise in the field. They are able to experiment with both spectrometers and analyse complicated spectra.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title			**Abbreviation**
Advanced Research Project			08-OCM-AKP1-122-m01
Module coordinator			**Module offered by**
head of the research group offering the module			Institute of Organic Chemistry
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	graduate	--	

Contents

This module gives students the opportunity to get involved in the work of one of the research groups based at the Institute of Organic Chemistry and learn some advanced synthesis and analytical methods.

Intended learning outcomes

Students are able to describe and use some of the synthesis and analytical methods typically used by the research group as well as to describe theoretical aspects.

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

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

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

talk (approx. 15 minutes) and log (approx. 15 to 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)

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Compulsory Electives

(10 ECTS credits)

Module title			**Abbreviation**
Modern Aspects of Natural Product Chemistry and Biological Chemistry			08-OCM-NAT-141-m01
Module coordinator		**Module offered by**	
lecturer of the seminar		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	graduate	--	
Contents			
This module discusses advanced topics in natural product chemistry and biological chemistry.			
Intended learning outcomes			
Students are able to discuss advanced topics in natural product chemistry and biological chemistry.			
Courses (type, number of weekly contact hours, language — if other than German)			
S (no information on SWS (weekly contact hours) and course language available)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English			
Allocation of places			
Chemistry Master's: no restrictions. Biochemistry Master's: 20 places. Places will be allocated by lot.			
Additional information			
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Workload			
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Teaching cycle			
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Referred to in LPO I (examination regulations for teaching-degree programmes)			
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Module appears in			
Master's degree (1 major) Chemistry (2014)			

Module title				Abbreviation
Organic Functional Materials				08-OCM-FM-141-m01

Module coordinator	Module offered by
lecturer of the seminar "Organische Funktionsmaterialien"	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	graduate	--

Contents

The module deals with specific topics in organic functional materials. The focus is on fundamental (photo)physical effects in organic molecular and polymeric semiconductors as well as their application in (opto)electronic components such as field effect transistors, organic light-emitting diodes, or organic solar cells as well as in non-linear optics.

Intended learning outcomes

The students are able to explain fundamental (photo)physical processes in organic semiconductors. He/She can explain the synthesis of these semiconductor materials as well as their application in (opto)electronic components such as field effect transistors, organic light-emitting diodes or in organic photovoltaics as well as in nonlinear optics.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Organo- and Biocatalysis				08-HKM1-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Organo- and Biokatalyse"			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	graduate		--	

Contents

This module provides students with deeper insights into topics in organic compounds and enzymes in catalytic processes. Organocatalysis: enantioselective implementation, principles, green chemistry, substance classes and application areas. Biocatalysis: effects of enzymes in view of different aspects, especially regarding organic synthesis.

Intended learning outcomes

Students are able to categorise organocatalysts and explain their effects and areas of application. They can describe the structure and applications of enzymes in organic synthesis. They are able to mechanistically describe and analyse the effects of enzymes.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Supramolecular Chemistry (Basics)				08-SCM1-102-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Organischen Chemie"			Faculty of Chemistry and Pharmacy	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		

Contents

This module introduces students to the fundamental principles of supramolecular chemistry. It focuses on interactions between molecules, molecular recognition by receptors, complexes, supramolecular polymers, coordination polymers and networks, liquid crystals, self-assembly in aqueous media, synthetic ion channels and modern applications of supramolecular chemistry.

Intended learning outcomes

Students are able to explain interactions between molecules demonstrating a high degree of expertise in the field as well as to describe the formation, structure and polymers of coordination compounds. They are able to describe the self-assembly of polymers in aqueous media as well as to identify the characteristics of synthetic ion channels. They can name modern applications of supramolecular chemistry.

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

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

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

written examination (approx. 90 minutes) or oral examination of one candidate each (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)

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Functional Materials (2012)

Module title				Abbreviation
Bioorganic Chemistry				08-SCM3-141-m01

Module coordinator	Module offered by
lecturer of lecture "Bioorganische Chemie" (Bioorganic 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	graduate	--

Contents

This module discusses topics at the interface of organic chemistry, biology and medicine. It focuses on molecular interactions and recognition, molecular diversity, active agent development, new aspects of DNA, RNA, proteins and carbohydrates.

Intended learning outcomes

Students are able to describe molecular interactions and detection mechanisms of bioorganic chemistry. They can explain the molecular diversity of biological systems. They can characterise the fabrication of agents. They can describe modern aspects of DNA, RNA, proteins and carbohydrates.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Computational Chemistry				08-TCM2-141-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Computational Chemistry"			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	graduate	--		
Contents				
This module introduces students to the fundamental principles of computational chemistry.				
Intended learning outcomes				
Students are able to explain the theoretical principles of computational chemistry and to apply methods in computational chemistry.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Physical Chemistry

(25 ECTS credits)

Compulsory Courses

(10 ECTS credits)

Module title				Abbreviation
Laser Spectroscopy				08-PCM1a-132-m01
Module coordinator			**Module offered by**	
lecturer of seminar "Laserspektroskopie" (Laser 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	graduate	--		
Contents				
This module introduces students to the fundamental principles of laser spectroscopy. It discusses absorption and emission spectroscopy.				
Intended learning outcomes				
Students are able to explain the components and operating principles of lasers as well as the optical principles of laser technology. They are able to describe the principles of absorption and emission spectroscopy.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
written examination (90 minutes) or oral examination (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)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Advanced Physical Chemistry (Lab)				08-PCM1b-132-m01

Module coordinator	Module offered by
lecturer of seminar "Laserspektroskopie" (Laser Spectroscopy)	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	graduate	--

Contents

This module gives students the opportunity to use modern experimental methods in physical chemistry in the laboratory. After a safety briefing, the students autonomously conduct experiments in the laboratory. Students will be expected to take tests and write lab reports to demonstrate their knowledge.

Intended learning outcomes

Students have developed a high level of proficiency in modern experimental methods in physical chemistry.
They are able to analyse the resulting measurements and write a lab report.

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

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

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

Vortestate (pre-experiment exams) and Nachtestate (post-experiment exams) (approx. 15 minutes) and log (approx. 15 pages)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 20 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Compulsory Electives

(15 ECTS credits)

Module title				Abbreviation
Chemical Dynamics				08-PCM2-102-m01
Module coordinator			**Module offered by**	
lecturer of seminar "Chemische Dynamik" (Chemical Dynamics)			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	graduate	--		
Contents				
This module gives students the opportunity to explore advanced topics in chemical kinetics and reaction dynamics in more detail. It discusses methods and models for investigating and describing chemical reactions.				
Intended learning outcomes				
Students are able to discuss advanced topics in chemical kinetics and reaction dynamics. They can describe methods and models for the investigation of chemical reactions.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
written examination (90 minutes) or oral examination of one candidate each (20 minutes) or talk (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				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2010) Master's degree (1 major) Chemistry (2014) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Computational Mathematics (2012)				

Module title					Abbreviation
Nanoscale Materials					08-PCM3-102-m01
Module coordinator				**Module offered by**	
lecturer of the seminar "Nanoskalige Materialien"				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		graduate	--		

Contents

This module discusses advanced topics in nanoscale materials. It focuses on the structure, properties, fabrication, modern characterisation methods and application areas of nanoscale materials.

Intended learning outcomes

Students are able to characterise nanoscale materials. They are able to name analytical methods and application areas of nanoscale materials.

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

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

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

written examination (90 minutes) or oral examination of one candidate each (20 minutes) or talk (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

Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Computational Mathematics (2012)
Master's degree (1 major) Functional Materials (2012)

Module title	Abbreviation
Ultrafast spectroscopy and quantumcontrol	08-PCM4-141-m01

Module coordinator	Module offered by
lecturer of the seminar "Ultrakurzzeitspektroskopie and Quantenkontrolle"	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	graduate	Prior successful completion of modules 08-PCM1a and 08-PCM1b is highly recommended.

Contents

This module discusses advanced topics in ultrafast spectroscopy and quantum control. It focuses on ultrashort laser pulses, time-resolved laser spectroscopy and coherent control.

Intended learning outcomes

Students are able to describe the generation of ultrashort laser pulses and to characterise them. They can explain the theory of time-resolved laser spectroscopy and name experimental methods. They can describe the principles and applications of quantum control.

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

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

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

written examination (approx. 90 minutes) or oral examination of one candidate each (approx. 20 minutes) or talk (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

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Physical chemistry of supramolecular assemblies				08-PCM5-141-m01

Module coordinator	Module offered by
lecturer of the seminar "Physikalische Chemie Supramolekularer Strukturen"	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	graduate	--

Contents

This module examines the basic interactions between molecules. It discusses the formation and physical-chemical properties of aggregates as well as key applications of supramolecular chemistry.

Intended learning outcomes

Students are able to explain the basic interactions between molecules demonstrating a high degree of expertise in the field. They can describe the formation and physical-chemical properties of aggregates. They can name modern applications of supramolecular chemistry.

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

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

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

written examination (approx. 90 minutes) or oral examination of one candidate each (approx. 20 minutes) or talk (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

Master's degree (1 major) Chemistry (2014)

Module title			Abbreviation
Physical Chemistry (Advanced Lab)			08-PCM6-132-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)
5	(not) successfully completed	08-PCM1

Duration	Module level	Other prerequisites
1 semester	graduate	--

Contents

This module gives students the opportunity to get involved in the work of one of the research groups based at the Institute of Physical Chemistry and learn some advanced synthesis and analytical methods.

Intended learning outcomes

Students have become proficient in the research methods typically used by the relevant physical chemistry research group. They are able to analyse their findings and thus help answer topical questions in physical chemistry.

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

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

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

presentation (approx. 20 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 20 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Theoretical Chemistry (Basics)				08-TCM1-141-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Theoretische Chemie"			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	graduate	--		
Contents				
This module introduces students to the fundamental principles of theoretical chemistry.				
Intended learning outcomes				
Students are able to describe the mathematical and physical principles underlying the quantum chemical and quantum dynamical approaches of theoretical chemistry.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title			**Abbreviation**
Computational Chemistry			08-TCM2-141-m01
Module coordinator		**Module offered by**	
lecturer of lecture "Computational Chemistry"		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	graduate	--	
Contents			
This module introduces students to the fundamental principles of computational chemistry.			
Intended learning outcomes			
Students are able to explain the theoretical principles of computational chemistry and to apply methods in computational chemistry.			
Courses (type, number of weekly contact hours, language — if other than German)			
S + Ü (no information on SWS (weekly contact hours) and course language available)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English			
Allocation of places			
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Additional information			
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Workload			
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Teaching cycle			
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Referred to in LPO I (examination regulations for teaching-degree programmes)			
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Module appears in			
Master's degree (1 major) Chemistry (2014)			

Biochemistry

(25 ECTS credits)

Students are highly recommended to consult with course advisory service prior to choosing this focus.

Compulsory Courses

(15 ECTS credits)

Module title				**Abbreviation**
Molecular Biology				08-BC-MOLM-141-m01
Module coordinator			**Module offered by**	
holder of the Chair of Biochemistry			Chair of Biochemistry	
ECTS	**Method of grading**		**Only after succ. compl. of module(s)**	
5	numerical grade		--	
Duration		**Module level**	**Other prerequisites**	
1 semester		undergraduate	--	
Contents				
Comprising a lecture and an exercise, this module discusses advanced topics in molecular physiology and functional biochemistry.				
Intended learning outcomes				
Students have developed a sound knowledge of molecular biology.				
Courses (type, number of weekly contact hours, language — if other than German)				
V + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 60 to 90 minutes) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes). Students will be informed about the method and length of the assessment prior to the course. Language of assessment: German or English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Molecular Biology Lab				08-BC-MOLP-141-m01
Module coordinator			**Module offered by**	
holder of the Chair of Biochemistry			Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
10	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	undergraduate	--		
Contents				
This module equips students with practical skills in the areas of recombinant engineering and characterisation of macromolecular complexes, modern biomolecular techniques, in vivo analysis of biochemical processes, and modern imaging techniques.				
Intended learning outcomes				
Students have developed a knowledge of molecular biology and are able to apply it to practical experiments.				
Courses (type, number of weekly contact hours, language — if other than German)				
Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 60 to 90 minutes) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or e) presentation (approx. 30 minutes). Students will be informed about the method and length of the assessment prior to the course. Assessment offered: once a year, winter semester Language of assessment: German, English				
Allocation of places				
Biochemistry Bachelor's: 24 places. Chemistry Master's: 6 places.				
Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Compulsory Electives

(10 ECTS credits)

Module title				Abbreviation
Practical course Molecular Machines for advanced students				08-BC-VPMM-141-m01

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

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

Duration	Module level	Other prerequisites
1 semester	graduate	--

Contents

This module gives students the opportunity to explore a research topic. Selected methods and topics in molecular biology and biochemistry; cloning, mutagenesis, protein expression and purification, RNA-protein and protein-protein interactions, isolation and functional analysis of macromolecular complexes.

Intended learning outcomes

Students are able to explore a specific research topic and deliver an oral presentation on the results of their work.

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

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

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

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

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 40 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Practical course Protein Degradation in Eukaryotes for advanced students				08-BC-VPPD-141-m01
Module coordinator			**Module offered by**	
holder of the Chair of Biochemistry			Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
10	numerical grade	08-BC-MOLP		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		

Contents

This module gives students the opportunity to explore a research topic in the field of protein degradation in eukaryotes.

Intended learning outcomes

Students are able to explore a specific research topic and deliver an oral presentation on the results of their work.

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

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

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

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

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 40 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				**Abbreviation**
Practical course RNA Biochemistry for advanced students				08-BC-VPRB-141-m01
Module coordinator			**Module offered by**	
holder of the Chair of Biochemistry			Chair of Biochemistry	
ECTS	**Method of grading**		**Only after succ. compl. of module(s)**	
10	numerical grade		08-BC-MOLP	
Duration	**Module level**		**Other prerequisites**	
1 semester	graduate		--	

Contents

This module gives students the opportunity to explore a research topic in the field of RNA biochemistry. Ribosomes as "molecular machines", regulatory mechanisms of eukaryotic protein biosynthesis. Gradient centrifugation, in vitro translation in different cell-free systems.

Intended learning outcomes

Students are able to explore a specific research topic and deliver an oral presentation on the results of their work. They are able to familiarise themselves with different mechanisms of general and specific translation control with the help of different methods as well as to present their findings in an appropriate and understandable manner.

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

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

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

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

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 40 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title			**Abbreviation**
Practical course Structural Biology for advanced students			08-BC-VPSB-141-m01
Module coordinator		**Module offered by**	
holder of the Chair of Biochemistry		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
10	numerical grade	08-BC-MOLP	
Duration	**Module level**	**Other prerequisites**	
1 semester	graduate	--	

Contents

This module discusses cloning and the expression of protein constructs for crystallisation. It teaches students the fundamental principles and techniques of crystallisation and crystal optimisation as well as crystallographic data collection.

Intended learning outcomes

Students have developed an understanding of the method of selecting protein constructs for crystallisation. They master fundamental skills and techniques for protein crystallisation as well as data collection and processing.

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

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

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

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

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 40 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Bioanorganic Chemistry				08-ACM2-141-m01
Module coordinator			**Module offered by**	
lecturer of seminar "Anorganische Aspekte der Biochemie and Medizinischen Chemie" (Inorganic Aspects of Biochemistry and Medicinal 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	graduate	--		

Contents

This module introduces students to the fundamental principles of bioinorganic chemistry (BIC). It discusses the methods of BIC, structures and effects of metalliferous enzymes and applications of BIC in the fields of diagnosis and therapy.

Intended learning outcomes

Students are able to describe the principles of, and methods in, BIC. They can explain the structure and effects of metalliferous enzymes and describe applications of BIC in biochemistry and medicine.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Organo- and Biocatalysis				08-HKM1-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Organo- and Biokatalyse"			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	graduate		--	

Contents

This module provides students with deeper insights into topics in organic compounds and enzymes in catalytic processes. Organocatalysis: enantioselective implementation, principles, green chemistry, substance classes and application areas. Biocatalysis: effects of enzymes in view of different aspects, especially regarding organic synthesis.

Intended learning outcomes

Students are able to categorise organocatalysts and explain their effects and areas of application. They can describe the structure and applications of enzymes in organic synthesis. They are able to mechanistically describe and analyse the effects of enzymes.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Modern Aspects of Natural Product Chemistry and Biological Chemistry				08-OCM-NAT-141-m01

Module coordinator	Module offered by
lecturer of the seminar	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	graduate	--

Contents

This module discusses advanced topics in natural product chemistry and biological chemistry.

Intended learning outcomes

Students are able to discuss advanced topics in natural product chemistry and biological chemistry.

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

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

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

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

Allocation of places

Chemistry Master's: no restrictions. Biochemistry Master's: 20 places. Places will be allocated by lot.

Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title			**Abbreviation**
Principles of drug design			08-MCM3-132-m01
Module coordinator		**Module offered by**	
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)		Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	graduate	--	
Contents			
Fundamentals: drug targets (types and classification), target validation, effect mechanisms, protein-ligand interactions, lead finding; lead optimisation. Experimental methods: bioassays, HTS, combinatorial chemistry, naturally occurring substances. Theoretical methods: molecular modelling, structure-based drug design, pharmacophore models, docking, virtual screening, simulation methods, de novo design. Ligand-based drug design. QSAR. Predictions of pharmacokinetic and toxicological components (ADME). Case examples, prodrug strategies, bioisosterism, SAR.			
Intended learning outcomes			
Students master the theoretical and experimental methods and aspects of drug design.			
Courses (type, number of weekly contact hours, language — if other than German)			
S + Ü (no information on SWS (weekly contact hours) and course language available)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
presentation with discussion (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			
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2014)			

Module title				Abbreviation
Clinical and Analytical Chemistry				08-PH-KAC-092-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Klinisch-analytische Chemie" (Clinical and Analytical Chemistry)			Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**		**Only after succ. compl. of module(s)**	
5	numerical grade		--	
Duration		**Module level**	**Other prerequisites**	
1 semester		undergraduate	--	
Contents				
This module discusses advanced topics in clinical analytical chemistry.				
Intended learning outcomes				
Students have developed an advanced knowledge of molecular biology.				
Courses (type, number of weekly contact hours, language — if other than German)				
V (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
written examination (120 minutes)				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Biochemistry (2012) Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2010) Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Clinical and Analytical Chemistry (practical course)				08-PH-KACP-092-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Klinisch-analytische Chemie" (Clinical and Analytical Chemistry)			Institute of Pharmacy and Food 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 covers practical topics in clinical chemistry and clinical diagnostics as well as the related analytical methods.

Intended learning outcomes

Students have developed a knowledge of clinical analytical chemistry and are able to apply it to practical 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 is creditable for bonus)

examination talks (Testate, approx. 15 minutes each), log (approx. 5 to 10 pages)

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Biochemistry (2012)
Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)

Functional Materials

(25 ECTS credits)

Compulsory Courses

(20 ECTS credits)

Module title				Abbreviation
Lab Course Materials Science				08-FMM-MP-102-m01
Module coordinator			**Module offered by**	
lecturers specialisation subject Funktionsmaterialien (Functional Materials)			Chair of Chemical Technology of Material Synthesis	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	(not) successfully completed	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		

Contents

Ten selected experiments in materials science.

Intended learning outcomes

Students have developed an advanced proficiency in the performance of experiments in materials science.

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

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

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

Vortestate (pre-experiment exams) and Nachtestate (post-experiment exams) (15 minutes), assessment of practical performance, log (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)

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Project Work				08-FMM-PA-102-m01

Module coordinator	Module offered by
head of the research group offering the module	Chair of Chemical Technology of Material Synthesis

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

Duration	Module level	Other prerequisites
1 semester	graduate	--

Contents

This module gives students the opportunity to explore a research topic under the guidance of a supervisor and to describe their findings.

Intended learning outcomes

Students have developed an advanced proficiency in the performance of experiments in materials science.

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

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

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

talk (approx. 15 minutes) and log (approx. 15 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)

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Organic Functional Materials				08-OCM-FM-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Organische Funktionsmaterialien"			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		graduate	--	

Contents

The module deals with specific topics in organic functional materials. The focus is on fundamental (photo)physical effects in organic molecular and polymeric semiconductors as well as their application in (opto)electronic components such as field effect transistors, organic light-emitting diodes, or organic solar cells as well as in nonlinear optics.

Intended learning outcomes

The students are able to explain fundamental (photo)physical processes in organic semiconductors. He/She can explain the synthesis of these semiconductor materials as well as their application in (opto)electronic components such as field effect transistors, organic light-emitting diodes or in organic photovoltaics as well as in nonlinear optics.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Material Sciences 1 (Principles)				08-FS1-141-m01
Module coordinator			**Module offered by**	
Dean of Studies Funktionswerkstoffe (Functional Materials)			Chair of Chemical Technology of Material Synthesis	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	undergraduate	--		

Contents

This module discusses the fundamental relations between chemical bonding, the structure, the microstructure and the properties of materials.

Intended learning outcomes

Students have become familiar with the fundamental relations between chemical bonding, the structure, the microstructure and the properties of materials. They have developed the ability to apply them to research problems.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Compulsory Electives

(5 ECTS credits)

Module title				**Abbreviation**
Material Sciences 2 (Materials)				08-FS2-141-m01
Module coordinator			**Module offered by**	
Dean of Studies Funktionswerkstoffe (Functional Materials)			Chair of Chemical Technology of Material Synthesis	
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 deals with the fabrication and properties of the main material groups.

Intended learning outcomes

Students have developed a knowledge of the fabrication and properties of the main material groups and are able to apply that knowledge to research problems.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Chemically and bio-inspired Nanotechnology for Material Synthesis				08-NTM-141-m01
Module coordinator			**Module offered by**	
holder of the Chair of Chemical Technology of Material Synthesis			Chair of Chemical Technology of Material Synthesis	
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 an introduction to the synthesis methods of sol-gel chemistry and discusses the methods of analysis used to characterise the generated materials. It also discusses the fundamental principles of biomineralisation and uses examples to introduce students to bio-inspired material synthesis.

Intended learning outcomes

Students have developed an advanced knowledge of sol-gel chemistry and biomineralisation.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Molecular Materials (Lecture)				08-FMM-CT-141-m01
Module coordinator			**Module offered by**	
Dean of Studies Funktionswerkstoffe (Functional Materials)			Chair of Chemical Technology of Material Synthesis	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		
Contents				
This module discusses the theoretical principles of molecular and soft materials.				
Intended learning outcomes				
Students have developed a knowledge of the principles of molecular and soft materials and are able to apply that knowledge to research problems.				
Courses (type, number of weekly contact hours, language — if other than German)				
V + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
presentation (approx. 30 minutes) and examination				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title			Abbreviation
Polymer Chemistry			03-FU-PM1-141-m01
Module coordinator		**Module offered by**	
holder of the Chair of Functional Materials in Medicine and Dentistry		Faculty of Medicine	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	graduate	--	

Contents

Basic methods of polymerisation: free radical polymerisations, polyadditions, ionic polymerisations, controlled radical polymerisations; characterisation of polymers and polymer analytics: gel permeation chromatography, endgroup analysis, mass spectrometry, rheology.

Intended learning outcomes

The students are familiar with the fundamentals of polymer chemistry and the related methods for their characterisation.

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

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

- 03-FU-PM1-1-141: V (no information on SWS (weekly contact hours) and course language available)
- 03-FU-PM1-2-122: P (no information on SWS (weekly contact hours) and course language available)

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

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

Assessment in module component 03-FU-PM1-1-141: Polymer Chemistry (Lecture)

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

Assessment in module component 03-FU-PM1-2-122: Polymer Chemistry (Practical course)

- 2 ECTS, Method of grading: (not) successfully completed
- Vortestate (pre-experiment exams, approx. 15 minutes each) and logs (approx. 5 pages each)
- Assessment offered: once a year, summer semester
- Language of assessment: German, English if agreed upon with the examiner

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Polymers II				03-PM2-122-m01

Module coordinator	**Module offered by**
holder of the Chair of Functional Materials in Medicine and Dentistry	Faculty of Medicine

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

Duration	**Module level**	**Other prerequisites**
1 semester	graduate	--

Contents

In-depth knowledge and practical application of: - free radical polymerisation, polyaddition - ionic polymerisations - controlled radical polymerisation - polymer characterisation (e. g. gel permeation chromatography, end-group analysis, mass spectrometry) - current aspects of polymer research (e. g. block-copolymers, polymer topographies, polymer functionalisation).

Intended learning outcomes

Students acquire an advanced knowledge of polymer synthesis, modification and characterisation.

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

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

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

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (20 minutes) or c) talk (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

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Technology of Functional Materials (2010)
Master's degree (1 major) Functional Materials (2012)

Module title			Abbreviation
Nanoscale Materials			08-PCM3-102-m01

Module coordinator	**Module offered by**
lecturer of the seminar "Nanoskalige Materialien"	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	graduate	--

Contents

This module discusses advanced topics in nanoscale materials. It focuses on the structure, properties, fabrication, modern characterisation methods and application areas of nanoscale materials.

Intended learning outcomes

Students are able to characterise nanoscale materials. They are able to name analytical methods and application areas of nanoscale materials.

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

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

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

written examination (90 minutes) or oral examination of one candidate each (20 minutes) or talk (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

Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Computational Mathematics (2012)
Master's degree (1 major) Functional Materials (2012)

Module title				**Abbreviation**
Supramolecular Chemistry (Basics)				08-SCM1-102-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Organischen Chemie"			Faculty of Chemistry and Pharmacy	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		

Contents

This module introduces students to the fundamental principles of supramolecular chemistry. It focuses on interactions between molecules, molecular recognition by receptors, complexes, supramolecular polymers, coordination polymers and networks, liquid crystals, self-assembly in aqueous media, synthetic ion channels and modern applications of supramolecular chemistry.

Intended learning outcomes

Students are able to explain interactions between molecules demonstrating a high degree of expertise in the field as well as to describe the formation, structure and polymers of coordination compounds. They are able to describe the self-assembly of polymers in aqueous media as well as to identify the characteristics of synthetic ion channels. They can name modern applications of supramolecular chemistry.

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

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

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

written examination (approx. 90 minutes) or oral examination of one candidate each (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)

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Functional Materials (2012)

Module title				Abbreviation
Solid state chemistry and inorganic materials				08-ACM3-141-m01

Module coordinator	Module offered by
lecturer of seminar "Festkörperchemie and Anorganische Materialien" (Solid State Chemistry and Inorganic Materials)	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	graduate	--

Contents

This module provides an introduction to solid-state chemistry. It focuses on the structure, chemical and physical properties, synthesis methods and selected materials of solids.

Intended learning outcomes

Students are able to describe the structure and properties of solids. They can explain methods for solid-state synthesis. They can describe important aspects of selected materials regarding the corresponding solids.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Homogeneous Catalysis

(25 ECTS credits)

Compulsory Courses

(20 ECTS credits)

Module title				Abbreviation
Organo- and Biocatalysis				08-HKM1-141-m01

Module coordinator	Module offered by
lecturer of the seminar "Organo- and Biokatalyse"	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	graduate	--

Contents

This module provides students with deeper insights into topics in organic compounds and enzymes in catalytic processes. Organocatalysis: enantioselective implementation, principles, green chemistry, substance classes and application areas. Biocatalysis: effects of enzymes in view of different aspects, especially regarding organic synthesis.

Intended learning outcomes

Students are able to categorise organocatalysts and explain their effects and areas of application. They can describe the structure and applications of enzymes in organic synthesis. They are able to mechanistically describe and analyse the effects of enzymes.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Advanced organometallic chemistry and its application in homogeneous catalysis				08-HKM2-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Spezielle Metallorganische Chemie and deren Anwendung in der Homogenkatalyse"			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	graduate	--		

Contents

This module examines elementary organic compounds of transition metals with homogeneous catalytic applications.

Intended learning outcomes

Students can describe and analyse the structure, reactivity and analysis of elementary organic compounds. They are able to characterise special substance classes. They can formulate homogeneous catalysis reactions.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Practical course Homogeneous catalysis in Inorganic Chemistry				08-HKM3AC-132-m01

Module coordinator	Module offered by
lecturer of the seminar "Spezielle Metallorganische Chemie and deren Anwendung in der Homogenkatalyse"	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	graduate	--

Contents

This module gives students the opportunity to enhance their skills in advanced synthesis and analytical methods in homogeneous catalysis. The focus will be on catalyst synthesis and characterisation, spectral analysis and crystallography. Students will be expected to conduct their work in the lab independently, write a lab report documenting their findings and deliver a presentation.

Intended learning outcomes

Students are able to use advanced synthesis and analytical methods in homogeneous catalysis in the lab and to interpret their findings. They are able to write a lab report documenting their findings and deliver a presentation.

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

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

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

practical work with lab report (approx. 10 pages) and talk (approx. 15 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 20 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title			**Abbreviation**
Practical course Homogeneous catalysis in Organic Chemistry			08-HKM3OC-132-m01
Module coordinator		**Module offered by**	
lecturer of the seminar "Spezielle Metallorganische Chemie and deren Anwendung in der Homogenkatalyse"		Institute of Organic Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	(not) successfully completed	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	graduate	--	

Contents

This module gives students the opportunity to enhance their skills in advanced synthesis and analytical methods in homogeneous catalysis. The focus will be on catalyst synthesis and characterisation, spectral analysis and crystallography. Students will be expected to conduct their work in the lab independently, write a lab report documenting their findings and deliver a presentation.

Intended learning outcomes

Students are able to use advanced synthesis and analytical methods in homogeneous catalysis in the lab and to interpret their findings. They are able to write a lab report documenting their findings and deliver a presentation.

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

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

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

practical work with lab report (approx. 10 pages) and talk (approx. 15 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 20 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Compulsory Electives

(5 ECTS credits)

Module title			Abbreviation
Advanced transition metal chemistry			08-HKM4-141-m01

Module coordinator	**Module offered by**
lecturer of the seminar "Spezielle Übergangsmetallchemie"	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	graduate	--

Contents

This module provides students with deeper insights into topics in the chemistry of transition metals and coordination chemistry. It also provides an introduction to bioinorganic chemistry and discusses recent developments in transition metal chemistry.

Intended learning outcomes

Students are able to explain transition metals and coordination compounds demonstrating a high degree of expertise in the field. They can explain the fundamental principles of bioinorganic chemistry.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Chemical Dynamics				08-PCM2-102-m01

Module coordinator	Module offered by
lecturer of seminar "Chemische Dynamik" (Chemical Dynamics)	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	graduate	--

Contents

This module gives students the opportunity to explore advanced topics in chemical kinetics and reaction dynamics in more detail. It discusses methods and models for investigating and describing chemical reactions.

Intended learning outcomes

Students are able to discuss advanced topics in chemical kinetics and reaction dynamics. They can describe methods and models for the investigation of chemical reactions.

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

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

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

written examination (90 minutes) or oral examination of one candidate each (20 minutes) or talk (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

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Computational Mathematics (2012)

Module title				Abbreviation
Modern Synthetic Methods				08-OCM-SYNT-141-m01

Module coordinator	Module offered by
lecturer of the seminar	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	graduate	--

Contents

This module discusses modern stereoselective synthesis methods. It focuses on selected total syntheses, organometallic chemistry and catalysis.

Intended learning outcomes

Students are able to stereoselectively plan complex chemical syntheses and to stereochemically analyse them. They can explain total syntheses. They can describe aspects of organometallic chemistry and catalysis in synthesis chemistry.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Computational Chemistry				08-TCM2-141-m01

Module coordinator	Module offered by
lecturer of lecture "Computational Chemistry"	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	graduate	--

Contents

This module introduces students to the fundamental principles of computational chemistry.

Intended learning outcomes

Students are able to explain the theoretical principles of computational chemistry and to apply methods in computational chemistry.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Polymer Chemistry				03-FU-PM1-141-m01
Module coordinator			**Module offered by**	
holder of the Chair of Functional Materials in Medicine and Dentistry			Faculty of Medicine	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		

Contents

Basic methods of polymerisation: free radical polymerisations, polyadditions, ionic polymerisations, controlled radical polymerisations; characterisation of polymers and polymer analytics: gel permeation chromatography, endgroup analysis, mass spectrometry, rheology.

Intended learning outcomes

The students are familiar with the fundamentals of polymer chemistry and the related methods for their characterisation.

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

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

- 03-FU-PM1-1-141: V (no information on SWS (weekly contact hours) and course language available)
- 03-FU-PM1-2-122: P (no information on SWS (weekly contact hours) and course language available)

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

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

Assessment in module component 03-FU-PM1-1-141: Polymer Chemistry (Lecture)

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

Assessment in module component 03-FU-PM1-2-122: Polymer Chemistry (Practical course)

- 2 ECTS, Method of grading: (not) successfully completed
- Vortestate (pre-experiment exams, approx. 15 minutes each) and logs (approx. 5 pages each)
- Assessment offered: once a year, summer semester
- Language of assessment: German, English if agreed upon with the examiner

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in
Master's degree (1 major) Chemistry (2014)

Medicinal Chemistry

(25 ECTS credits)

Compulsory Courses

(25 ECTS credits)

Module title				Abbreviation
Practical course medicinal chemistry				08-MCM1-102-m01
Module coordinator			**Module offered by**	
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)			Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
10	(not) successfully completed	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		
Contents				
Selected methods and topics in medicinal chemistry (synthesis, testing, analysis, theory, pharmacokinetics).				
Intended learning outcomes				
Students have developed a knowledge of medicinal chemistry and are able to apply it to practical 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 is creditable for bonus)				
Vortestate (pre-experiment exams) and Nachtestate (post-experiment exams) (approx. 20 minutes), assessment of practical performance, written report (approx. 30 to 50 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)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2010) Master's degree (1 major) Chemistry (2014) Master's degree (1 major) FOKUS Pharmacy (2012)				

Module title	Abbreviation
Pharmaceutical/Medicinal Chemistry 1	08-MCM2a-141-m01

Module coordinator	Module offered by
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)	Institute of Pharmacy and Food Chemistry

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

Duration	Module level	Other prerequisites
1 semester	graduate	--

Contents

Chemistry of drugs by field of indication; principles of drug development, strategies for active agent discovery; structure-activity relationships; molecular effect mechanisms; pharmacological principles of the drugs discussed in the module; drug analysis; drug synthesis; biotransformation, pharmacokinetics of individual drugs; history of drug development: discussion of specific examples.

Intended learning outcomes

Students have developed a knowledge of pharmaceutical/medicinal chemistry.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Pharmaceutical/Medicinal Chemistry 2				08-MCM2b-141-m01
Module coordinator			**Module offered by**	
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)			Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		

Contents

Chemistry of drugs by field of indication; principles of drug development, strategies for active agent discovery; structure-activity relationships; molecular effect mechanisms; pharmacological principles of the drugs discussed in the module; drug analysis; drug synthesis; biotransformation, pharmacokinetics of individual drugs; history of drug development: discussion of specific examples.

Intended learning outcomes

Students have developed a knowledge of pharmaceutical/medicinal chemistry.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Principles of drug design				08-MCM3-132-m01
Module coordinator			**Module offered by**	
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)			Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		
Contents				
Fundamentals: drug targets (types and classification), target validation, effect mechanisms, protein-ligand interactions, lead finding; lead optimisation. Experimental methods: bioassays, HTS, combinatorial chemistry, naturally occurring substances. Theoretical methods: molecular modelling, structure-based drug design, pharmacophore models, docking, virtual screening, simulation methods, de novo design. Ligand-based drug design. QSAR. Predictions of pharmacokinetic and toxicological components (ADME). Case examples, prodrug strategies, bioisosterism, SAR.				
Intended learning outcomes				
Students master the theoretical and experimental methods and aspects of drug design.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
presentation with discussion (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				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2014)				

Supramolecular Chemistry

(25 ECTS credits)

Compulsory Courses

(10 ECTS credits)

Module title	Abbreviation
Supramolecular Chemistry (Basics)	08-SCM1-102-m01

Module coordinator	Module offered by
lecturer of lecture "Organischen Chemie"	Faculty of Chemistry and Pharmacy

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

Duration	Module level	Other prerequisites
1 semester	graduate	--

Contents

This module introduces students to the fundamental principles of supramolecular chemistry. It focuses on interactions between molecules, molecular recognition by receptors, complexes, supramolecular polymers, coordination polymers and networks, liquid crystals, self-assembly in aqueous media, synthetic ion channels and modern applications of supramolecular chemistry.

Intended learning outcomes

Students are able to explain interactions between molecules demonstrating a high degree of expertise in the field as well as to describe the formation, structure and polymers of coordination compounds. They are able to describe the self-assembly of polymers in aqueous media as well as to identify the characteristics of synthetic ion channels. They can name modern applications of supramolecular chemistry.

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

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

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

written examination (approx. 90 minutes) or oral examination of one candidate each (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)

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Functional Materials (2012)

Module title			Abbreviation
Supramolecular Chemistry (Practical Course)			08-SCM2-102-m01
Module coordinator		**Module offered by**	
lecturer of lecture "Supramolekularen Chemie (Organische Chemie/Physikalische Chemie)"		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	graduate	--

Contents

This module gives students the opportunity to perform some of the key experiments in supramolecular chemistry. They will perform syntheses of host-guest complexes, dye aggregates and nanoparticles and use advanced analytical methods to characterise them.

Intended learning outcomes

Students are able to perform syntheses of host-guest complexes and use spectroscopic methods to analyse and characterise them. They are able to produce nanoparticles and to characterise them microscopically.

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

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

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

practical work, logs (approx. 5 pages each)
Language of assessment: German or English

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Bioorganic Chemistry				08-SCM3-141-m01

Module coordinator	Module offered by
lecturer of lecture "Bioorganische Chemie" (Bioorganic 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	graduate	--

Contents

This module discusses topics at the interface of organic chemistry, biology and medicine. It focuses on molecular interactions and recognition, molecular diversity, active agent development, new aspects of DNA, RNA, proteins and carbohydrates.

Intended learning outcomes

Students are able to describe molecular interactions and detection mechanisms of bioorganic chemistry. They can explain the molecular diversity of biological systems. They can characterise the fabrication of agents. They can describe modern aspects of DNA, RNA, proteins and carbohydrates.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Compulsory Electives

(15 ECTS credits)

No less than one of the two modules 08-SCM3 or 08-PCM5 must be completed in the focus.

<table>
<tr><td colspan="4">Module title</td><td>Abbreviation</td></tr>
<tr><td colspan="4">Bioorganic Chemistry</td><td>08-SCM3-141-m01</td></tr>
<tr><td colspan="3">Module coordinator</td><td colspan="2">Module offered by</td></tr>
<tr><td colspan="3">lecturer of lecture "Bioorganische Chemie" (Bioorganic Chemistry)</td><td colspan="2">Institute of Organic Chemistry</td></tr>
<tr><td>ECTS</td><td colspan="2">Method of grading</td><td colspan="2">Only after succ. compl. of module(s)</td></tr>
<tr><td>5</td><td colspan="2">numerical grade</td><td colspan="2">--</td></tr>
<tr><td colspan="2">Duration</td><td>Module level</td><td colspan="2">Other prerequisites</td></tr>
<tr><td colspan="2">1 semester</td><td>graduate</td><td colspan="2">--</td></tr>
<tr><td colspan="5">Contents</td></tr>
<tr><td colspan="5">This module discusses topics at the interface of organic chemistry, biology and medicine. It focuses on molecular interactions and recognition, molecular diversity, active agent development, new aspects of DNA, RNA, proteins and carbohydrates.</td></tr>
<tr><td colspan="5">Intended learning outcomes</td></tr>
<tr><td colspan="5">Students are able to describe molecular interactions and detection mechanisms of bioorganic chemistry. They can explain the molecular diversity of biological systems. They can characterise the fabrication of agents. They can describe modern aspects of DNA, RNA, proteins and carbohydrates.</td></tr>
<tr><td colspan="5">Courses (type, number of weekly contact hours, language — if other than German)</td></tr>
<tr><td colspan="5">S (no information on SWS (weekly contact hours) and course language available)</td></tr>
<tr><td colspan="5">Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)</td></tr>
<tr><td colspan="5">a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course.
Language of assessment: German, English</td></tr>
<tr><td colspan="5">Allocation of places</td></tr>
<tr><td colspan="5">--</td></tr>
<tr><td colspan="5">Additional information</td></tr>
<tr><td colspan="5">--</td></tr>
<tr><td colspan="5">Workload</td></tr>
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<tr><td colspan="5">Teaching cycle</td></tr>
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<tr><td colspan="5">Referred to in LPO I (examination regulations for teaching-degree programmes)</td></tr>
<tr><td colspan="5">--</td></tr>
<tr><td colspan="5">Module appears in</td></tr>
<tr><td colspan="5">Master's degree (1 major) Chemistry (2014)</td></tr>
</table>

Module title	Abbreviation
Physical chemistry of supramolecular assemblies	08-PCM5-141-m01

Module coordinator	Module offered by
lecturer of the seminar "Physikalische Chemie Supramolekularer Strukturen"	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	graduate	--

Contents

This module examines the basic interactions between molecules. It discusses the formation and physical-chemical properties of aggregates as well as key applications of supramolecular chemistry.

Intended learning outcomes

Students are able to explain the basic interactions between molecules demonstrating a high degree of expertise in the field. They can describe the formation and physical-chemical properties of aggregates. They can name modern applications of supramolecular chemistry.

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

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

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

written examination (approx. 90 minutes) or oral examination of one candidate each (approx. 20 minutes) or talk (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

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Bioanorganic Chemistry				08-ACM2-141-m01
Module coordinator			**Module offered by**	
lecturer of seminar "Anorganische Aspekte der Biochemie and Medizinischen Chemie" (Inorganic Aspects of Biochemistry and Medicinal 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		graduate	--	

Contents

This module introduces students to the fundamental principles of bioinorganic chemistry (BIC). It discusses the methods of BIC, structures and effects of metalliferous enzymes and applications of BIC in the fields of diagnosis and therapy.

Intended learning outcomes

Students are able to describe the principles of, and methods in, BIC. They can explain the structure and effects of metalliferous enzymes and describe applications of BIC in biochemistry and medicine.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title			**Abbreviation**
Principles of drug design			08-MCM3-132-m01
Module coordinator		**Module offered by**	
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)		Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	graduate	--	

Contents

Fundamentals: drug targets (types and classification), target validation, effect mechanisms, protein-ligand interactions, lead finding; lead optimisation. Experimental methods: bioassays, HTS, combinatorial chemistry, naturally occurring substances. Theoretical methods: molecular modelling, structure-based drug design, pharmacophore models, docking, virtual screening, simulation methods, de novo design. Ligand-based drug design. QSAR. Predictions of pharmacokinetic and toxicological components (ADME). Case examples, prodrug strategies, bioisosterism, SAR.

Intended learning outcomes

Students master the theoretical and experimental methods and aspects of drug design.

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

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

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

presentation with discussion (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

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Computational Chemistry				08-TCM2-141-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Computational Chemistry"			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	graduate	--		
Contents				
This module introduces students to the fundamental principles of computational chemistry.				
Intended learning outcomes				
Students are able to explain the theoretical principles of computational chemistry and to apply methods in computational chemistry.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Organic Functional Materials				08-OCM-FM-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Organische Funktionsmaterialien"			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	graduate	--		

Contents

The module deals with specific topics in organic functional materials. The focus is on fundamental (photo)physical effects in organic molecular and polymeric semiconductors as well as their application in (opto)electronic components such as field effect transistors, organic light-emitting diodes, or organic solar cells as well as in non-linear optics.

Intended learning outcomes

The students are able to explain fundamental (photo)physical processes in organic semiconductors. He/She can explain the synthesis of these semiconductor materials as well as their application in (opto)electronic components such as field effect transistors, organic light-emitting diodes or in organic photovoltaics as well as in nonlinear optics.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Nanoscale Materials				08-PCM3-102-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Nanoskalige Materialien"			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	graduate	--		

Contents

This module discusses advanced topics in nanoscale materials. It focuses on the structure, properties, fabrication, modern characterisation methods and application areas of nanoscale materials.

Intended learning outcomes

Students are able to characterise nanoscale materials. They are able to name analytical methods and application areas of nanoscale materials.

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

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

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

written examination (90 minutes) or oral examination of one candidate each (20 minutes) or talk (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

Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Computational Mathematics (2012)
Master's degree (1 major) Functional Materials (2012)

Theoretical Chemistry

(25 ECTS credits)

Compulsory Courses

(10 ECTS credits)

Module title				**Abbreviation**
Theoretical Chemistry (Basics)				08-TCM1-141-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Theoretische Chemie"			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	graduate	--		
Contents				
This module introduces students to the fundamental principles of theoretical chemistry.				
Intended learning outcomes				
Students are able to describe the mathematical and physical principles underlying the quantum chemical and quantum dynamical approaches of theoretical chemistry.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Programming in Theoretical Chemistry				08-TCM3-102-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Programmieren in Theoretischer Chemie"			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	graduate	--		

Contents

This module provides an introduction to the fundamentals of programming in theoretical chemistry and discusses its application areas.

Intended learning outcomes

Students are able to explain and use one of the programming languages typically used in theoretical chemistry as well as to name its application areas.

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

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

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

completion and discussion of approx. 5 programming exercises as well as talk (approx. 45 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

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Computational Mathematics (2012)

Compulsory Electives

(15 ECTS credits)

Two of the three modules 08-TCAP1, 08-TCAP2 and 08-TCAP3 must be taken.

Module title				Abbreviation
Computational Chemistry				08-TCM2-141-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Computational Chemistry"			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		graduate	--	
Contents				
This module introduces students to the fundamental principles of computational chemistry.				
Intended learning outcomes				
Students are able to explain the theoretical principles of computational chemistry and to apply methods in computational chemistry.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Theoretical Chemistry - Project course wave-packet dynamics				08-TCAP1-132-m01
Module coordinator			**Module offered by**	
head of the research group offering the module			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	graduate	--		
Contents				
This module gives students the opportunity to get involved in the work of one of the research groups based at the Institute of Theoretical Chemistry and learn some of the methods typically used in the discipline. The focus will be on wave packet dynamics.				
Intended learning outcomes				
Students have learned some of the methods typically used in theoretical chemistry and, in particular, in wave packet dynamics. They are able to explain issues that are relevant to the field of wave packet dynamics.				
Courses (type, number of weekly contact hours, language — if other than German)				
P (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
presentation (approx. 30 minutes) Language of assessment: German or English				
Allocation of places				
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Additional information				
Additional information on module duration: 4 weeks.				
Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Theoretical Chemistry - Project coursewave function based methods				08-TCAP2-132-m01
Module coordinator			**Module offered by**	
head of the research group offering the module			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	graduate	--		

Contents

This module gives students the opportunity to get involved in the work of one of the research groups based at the Institute of Theoretical Chemistry and learn some of the methods typically used in the discipline. The focus will be on wave function methods.

Intended learning outcomes

Students have learned some of the methods typically used in theoretical chemistry and, in particular, in wave function methods. They are able to explain issues that are relevant to the field of wave function methods.

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

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

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

presentation (approx. 30 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 4 weeks.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Theoretical Chemistry - Project course Computational Photochemistry				08-TCAP3-132-m01

Module coordinator	Module offered by
head of the research group offering the module	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	graduate	--

Contents

This module gives students the opportunity to get involved in the work of one of the research groups based at the Institute of Theoretical Chemistry and learn some of the methods typically used in the discipline. The focus will be on theoretical photochemistry.

Intended learning outcomes

Students have learned some of the methods typically used in theoretical chemistry and, in particular, in theoretical photochemistry. They are able to explain issues that are relevant to the field of theoretical photochemistry.

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

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

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

presentation (approx. 30 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 4 weeks.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title			Abbreviation
Principles of drug design			08-MCM3-132-m01

Module coordinator	Module offered by
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)	Institute of Pharmacy and Food Chemistry

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

Duration	Module level	Other prerequisites
1 semester	graduate	--

Contents

Fundamentals: drug targets (types and classification), target validation, effect mechanisms, protein-ligand interactions, lead finding; lead optimisation. Experimental methods: bioassays, HTS, combinatorial chemistry, naturally occurring substances. Theoretical methods: molecular modelling, structure-based drug design, pharmacophore models, docking, virtual screening, simulation methods, de novo design. Ligand-based drug design. QSAR. Predictions of pharmacokinetic and toxicological components (ADME). Case examples, prodrug strategies, bioisosterism, SAR.

Intended learning outcomes

Students master the theoretical and experimental methods and aspects of drug design.

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

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

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

presentation with discussion (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

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Additional qualifications

(15 ECTS credits)

Additional qualifications Compulsory Electives Focuses

(5 ECTS credits)

Module from the Focuses (Schwerpunkte) area of mandatory electives that has not been used as part of a focus subject.

Module title				Abbreviation
Advanced Inorganic Chemistry				08-ACM1-141-m01
Module coordinator			**Module offered by**	
Managing Director of the Institute of Inorganic Chemistry			Institute of Inorganic Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
10	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
2 semester	graduate	--		

Contents

This module discusses advanced topics in main group chemistry and transition metal chemistry. It focuses on special compounds of the main group elements (MGEs), bonding situations of MGEs and MGE compounds, the chemistry of transition metals and coordination chemistry.

Intended learning outcomes

Students are able to characterise and explain special compounds of the main group elements. They can describe the chemical properties of transition metals and analyse the structure as well as chemical and physical aspects of coordination compounds.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Bioanorganic Chemistry				08-ACM2-141-m01

Module coordinator	Module offered by
lecturer of seminar "Anorganische Aspekte der Biochemie and Medizinischen Chemie" (Inorganic Aspects of Biochemistry and Medicinal 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	graduate	--

Contents

This module introduces students to the fundamental principles of bioinorganic chemistry (BIC). It discusses the methods of BIC, structures and effects of metalliferous enzymes and applications of BIC in the fields of diagnosis and therapy.

Intended learning outcomes

Students are able to describe the principles of, and methods in, BIC. They can explain the structure and effects of metalliferous enzymes and describe applications of BIC in biochemistry and medicine.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title			Abbreviation
Solid state chemistry and inorganic materials			08-ACM3-141-m01

Module coordinator	Module offered by
lecturer of seminar "Festkörperchemie and Anorganische Materialien" (Solid State Chemistry and Inorganic Materials)	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	graduate	--

Contents

This module provides an introduction to solid-state chemistry. It focuses on the structure, chemical and physical properties, synthesis methods and selected materials of solids.

Intended learning outcomes

Students are able to describe the structure and properties of solids. They can explain methods for solid-state synthesis. They can describe important aspects of selected materials regarding the corresponding solids.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title			Abbreviation
Modern Synthetic Methods			08-OCM-SYNT-141-m01

Module coordinator	Module offered by
lecturer of the seminar	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	graduate	--

Contents

This module discusses modern stereoselective synthesis methods. It focuses on selected total syntheses, organometallic chemistry and catalysis.

Intended learning outcomes

Students are able to stereoselectively plan complex chemical syntheses and to stereochemically analyse them. They can explain total syntheses. They can describe aspects of organometallic chemistry and catalysis in synthesis chemistry.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title	Abbreviation
Advanced NMR- and Mass Spectrometry	08-OCM-NMRMS-141-m01

Module coordinator	Module offered by
lab course supervisor	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	graduate	--

Contents

This module equips students with an advanced knowledge of NMR and mass spectrometry. It offers deeper insights into the theoretical principles of the two measuring techniques and includes exercises that give students the opportunity to learn how to evaluate complicated spectra and use a spectrometer.

Intended learning outcomes

Students are able to discuss NMR and mass spectroscopy demonstrating a high degree of expertise in the field. They are able to experiment with both spectrometers and analyse complicated spectra.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Modern Aspects of Natural Product Chemistry and Biological Chemistry				08-OCM-NAT-141-m01

Module coordinator	**Module offered by**
lecturer of the seminar	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	graduate	--

Contents

This module discusses advanced topics in natural product chemistry and biological chemistry.

Intended learning outcomes

Students are able to discuss advanced topics in natural product chemistry and biological chemistry.

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

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

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

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

Allocation of places

Chemistry Master's: no restrictions. Biochemistry Master's: 20 places. Places will be allocated by lot.

Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title			**Abbreviation**
Organic Functional Materials			08-OCM-FM-141-m01
Module coordinator		**Module offered by**	
lecturer of the seminar "Organische Funktionsmaterialien"		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	graduate	--	

Contents

The module deals with specific topics in organic functional materials. The focus is on fundamental (photo)physical effects in organic molecular and polymeric semiconductors as well as their application in (opto)electronic components such as field effect transistors, organic light-emitting diodes, or organic solar cells as well as in non-linear optics.

Intended learning outcomes

The students are able to explain fundamental (photo)physical processes in organic semiconductors. He/She can explain the synthesis of these semiconductor materials as well as their application in (opto)electronic components such as field effect transistors, organic light-emitting diodes or in organic photovoltaics as well as in nonlinear optics.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Ultrafast spectroscopy and quantumcontrol				08-PCM4-141-m01

Module coordinator	Module offered by
lecturer of the seminar "Ultrakurzzeitspektroskopie and Quantenkontrolle"	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	graduate	Prior successful completion of modules 08-PCM1a and 08-PCM1b is highly recommended.

Contents

This module discusses advanced topics in ultrafast spectroscopy and quantum control. It focuses on ultrashort laser pulses, time-resolved laser spectroscopy and coherent control.

Intended learning outcomes

Students are able to describe the generation of ultrashort laser pulses and to characterise them. They can explain the theory of time-resolved laser spectroscopy and name experimental methods. They can describe the principles and applications of quantum control.

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

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

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

written examination (approx. 90 minutes) or oral examination of one candidate each (approx. 20 minutes) or talk (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

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Physical chemistry of supramolecular assemblies				08-PCM5-141-m01

Module coordinator	Module offered by
lecturer of the seminar "Physikalische Chemie Supramolekularer Strukturen"	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	graduate	--

Contents

This module examines the basic interactions between molecules. It discusses the formation and physical-chemical properties of aggregates as well as key applications of supramolecular chemistry.

Intended learning outcomes

Students are able to explain the basic interactions between molecules demonstrating a high degree of expertise in the field. They can describe the formation and physical-chemical properties of aggregates. They can name modern applications of supramolecular chemistry.

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

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

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

written examination (approx. 90 minutes) or oral examination of one candidate each (approx. 20 minutes) or talk (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

Master's degree (1 major) Chemistry (2014)

Module title				**Abbreviation**
Molecular Biology				08-BC-MOLM-141-m01
Module coordinator			**Module offered by**	
holder of the Chair of Biochemistry			Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	undergraduate	--		
Contents				
Comprising a lecture and an exercise, this module discusses advanced topics in molecular physiology and functional biochemistry.				
Intended learning outcomes				
Students have developed a sound knowledge of molecular biology.				
Courses (type, number of weekly contact hours, language — if other than German)				
V + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 60 to 90 minutes) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes). Students will be informed about the method and length of the assessment prior to the course. Language of assessment: German or English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				**Abbreviation**
Molecular Biology Lab				08-BC-MOLP-141-m01
Module coordinator			**Module offered by**	
holder of the Chair of Biochemistry			Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
10	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	undergraduate	--		

Contents

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

Intended learning outcomes

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

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

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

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

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

Allocation of places

Biochemistry Bachelor's: 24 places. Chemistry Master's: 6 places.

Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Practical course Molecular Machines for advanced students				08-BC-VPMM-141-m01
Module coordinator			**Module offered by**	
holder of the Chair of Biochemistry			Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
10	numerical grade	08-BC-MOLP		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		

Contents

This module gives students the opportunity to explore a research topic. Selected methods and topics in molecular biology and biochemistry; cloning, mutagenesis, protein expression and purification, RNA-protein and protein-protein interactions, isolation and functional analysis of macromolecular complexes.

Intended learning outcomes

Students are able to explore a specific research topic and deliver an oral presentation on the results of their work.

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

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

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

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

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 40 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Practical course Protein Degradation in Eukaryotes for advanced students				08-BC-VPPD-141-m01
Module coordinator			**Module offered by**	
holder of the Chair of Biochemistry			Chair of Biochemistry	
ECTS	**Method of grading**		**Only after succ. compl. of module(s)**	
10	numerical grade		08-BC-MOLP	
Duration		**Module level**	**Other prerequisites**	
1 semester		graduate	--	
Contents				
This module gives students the opportunity to explore a research topic in the field of protein degradation in eukaryotes.				
Intended learning outcomes				
Students are able to explore a specific research topic and deliver an oral presentation on the results of their work.				
Courses (type, number of weekly contact hours, language — if other than German)				
P (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
log (approx. 20 pages) and talk (approx. 15 minutes) Language of assessment: German, English				
Allocation of places				
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Additional information				
Additional information on module duration: block placement with a duration of a minimum of 40 working days.				
Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Practical course RNA Biochemistry for advanced students				08-BC-VPRB-141-m01

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

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

Duration	Module level	Other prerequisites
1 semester	graduate	--

Contents

This module gives students the opportunity to explore a research topic in the field of RNA biochemistry. Ribosomes as "molecular machines", regulatory mechanisms of eukaryotic protein biosynthesis. Gradient centrifugation, in vitro translation in different cell-free systems.

Intended learning outcomes

Students are able to explore a specific research topic and deliver an oral presentation on the results of their work. They are able to familiarise themselves with different mechanisms of general and specific translation control with the help of different methods as well as to present their findings in an appropriate and understandable manner.

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

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

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

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

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 40 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Practical course Structural Biology for advanced students				08-BC-VPSB-141-m01
Module coordinator			**Module offered by**	
holder of the Chair of Biochemistry			Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
10	numerical grade	08-BC-MOLP		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		

Contents

This module discusses cloning and the expression of protein constructs for crystallisation. It teaches students the fundamental principles and techniques of crystallisation and crystal optimisation as well as crystallographic data collection.

Intended learning outcomes

Students have developed an understanding of the method of selecting protein constructs for crystallisation. They master fundamental skills and techniques for protein crystallisation as well as data collection and processing.

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

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

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

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

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 40 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Material Sciences 2 (Materials)				08-FS2-141-m01
Module coordinator			**Module offered by**	
Dean of Studies Funktionswerkstoffe (Functional Materials)			Chair of Chemical Technology of Material Synthesis	
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 deals with the fabrication and properties of the main material groups.				
Intended learning outcomes				
Students have developed a knowledge of the fabrication and properties of the main material groups and are able to apply that knowledge to research problems.				
Courses (type, number of weekly contact hours, language — if other than German)				
V + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Chemically and bio-inspired Nanotechnology for Material Synthesis				08-NTM-141-m01
Module coordinator			**Module offered by**	
holder of the Chair of Chemical Technology of Material Synthesis			Chair of Chemical Technology of Material Synthesis	
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 an introduction to the synthesis methods of sol-gel chemistry and discusses the methods of analysis used to characterise the generated materials. It also discusses the fundamental principles of biomineralisation and uses examples to introduce students to bio-inspired material synthesis.				
Intended learning outcomes				
Students have developed an advanced knowledge of sol-gel chemistry and biomineralisation.				
Courses (type, number of weekly contact hours, language — if other than German)				
V + V (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course.				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title			Abbreviation
Molecular Materials (Lecture)			08-FMM-CT-141-m01

Module coordinator		**Module offered by**
Dean of Studies Funktionswerkstoffe (Functional Materials)		Chair of Chemical Technology of Material Synthesis
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**
5	numerical grade	--
Duration	**Module level**	**Other prerequisites**
1 semester	graduate	--

Contents

This module discusses the theoretical principles of molecular and soft materials.

Intended learning outcomes

Students have developed a knowledge of the principles of molecular and soft materials and are able to apply that knowledge to research problems.

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

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

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

presentation (approx. 30 minutes) and examination

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				**Abbreviation**
Polymer Chemistry				03-FU-PM1-141-m01
Module coordinator			**Module offered by**	
holder of the Chair of Functional Materials in Medicine and Dentistry			Faculty of Medicine	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		

Contents

Basic methods of polymerisation: free radical polymerisations, polyadditions, ionic polymerisations, controlled radical polymerisations; characterisation of polymers and polymer analytics: gel permeation chromatography, endgroup analysis, mass spectrometry, rheology.

Intended learning outcomes

The students are familiar with the fundamentals of polymer chemistry and the related methods for their characterisation.

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

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

- 03-FU-PM1-1-141: V (no information on SWS (weekly contact hours) and course language available)
- 03-FU-PM1-2-122: P (no information on SWS (weekly contact hours) and course language available)

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

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

Assessment in module component 03-FU-PM1-1-141: Polymer Chemistry (Lecture)

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

Assessment in module component 03-FU-PM1-2-122: Polymer Chemistry (Practical course)

- 2 ECTS, Method of grading: (not) successfully completed
- Vortestate (pre-experiment exams, approx. 15 minutes each) and logs (approx. 5 pages each)
- Assessment offered: once a year, summer semester
- Language of assessment: German, English if agreed upon with the examiner

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Organo- and Biocatalysis				08-HKM1-141-m01

Module coordinator	**Module offered by**
lecturer of the seminar "Organo- and Biokatalyse"	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	graduate	--

Contents

This module provides students with deeper insights into topics in organic compounds and enzymes in catalytic processes. Organocatalysis: enantioselective implementation, principles, green chemistry, substance classes and application areas. Biocatalysis: effects of enzymes in view of different aspects, especially regarding organic synthesis.

Intended learning outcomes

Students are able to categorise organocatalysts and explain their effects and areas of application. They can describe the structure and applications of enzymes in organic synthesis. They are able to mechanistically describe and analyse the effects of enzymes.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Advanced organometallic chemistry and its application in homogeneous catalysis				08-HKM2-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Spezielle Metallorganische Chemie and deren Anwendung in der Homogenkatalyse"			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	graduate	--		
Contents				
This module examines elementary organic compounds of transition metals with homogeneous catalytic applications.				
Intended learning outcomes				
Students can describe and analyse the structure, reactivity and analysis of elementary organic compounds. They are able to characterise special substance classes. They can formulate homogeneous catalysis reactions.				
Courses (type, number of weekly contact hours, language — if other than German)				
S (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				**Abbreviation**
Advanced transition metal chemistry				08-HKM4-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Spezielle Übergangsmetallchemie"			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	graduate	--		

Contents

This module provides students with deeper insights into topics in the chemistry of transition metals and coordination chemistry. It also provides an introduction to bioinorganic chemistry and discusses recent developments in transition metal chemistry.

Intended learning outcomes

Students are able to explain transition metals and coordination compounds demonstrating a high degree of expertise in the field. They can explain the fundamental principles of bioinorganic chemistry.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title			**Abbreviation**
Pharmaceutical/Medicinal Chemistry 1			08-MCM2a-141-m01
Module coordinator		**Module offered by**	
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)		Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	graduate	--	

Contents

Chemistry of drugs by field of indication; principles of drug development, strategies for active agent discovery; structure-activity relationships; molecular effect mechanisms; pharmacological principles of the drugs discussed in the module; drug analysis; drug synthesis; biotransformation, pharmacokinetics of individual drugs; history of drug development: discussion of specific examples.

Intended learning outcomes

Students have developed a knowledge of pharmaceutical/medicinal chemistry.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Pharmaceutical/Medicinal Chemistry 2				08-MCM2b-141-m01
Module coordinator			**Module offered by**	
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)			Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**		**Only after succ. compl. of module(s)**	
5	numerical grade		--	
Duration		**Module level**	**Other prerequisites**	
1 semester		graduate	--	

Contents

Chemistry of drugs by field of indication; principles of drug development, strategies for active agent discovery; structure-activity relationships; molecular effect mechanisms; pharmacological principles of the drugs discussed in the module; drug analysis; drug synthesis; biotransformation, pharmacokinetics of individual drugs; history of drug development: discussion of specific examples.

Intended learning outcomes

Students have developed a knowledge of pharmaceutical/medicinal chemistry.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Bioorganic Chemistry				08-SCM3-141-m01

Module coordinator	Module offered by
lecturer of lecture "Bioorganische Chemie" (Bioorganic 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	graduate	--

Contents

This module discusses topics at the interface of organic chemistry, biology and medicine. It focuses on molecular interactions and recognition, molecular diversity, active agent development, new aspects of DNA, RNA, proteins and carbohydrates.

Intended learning outcomes

Students are able to describe molecular interactions and detection mechanisms of bioorganic chemistry. They can explain the molecular diversity of biological systems. They can characterise the fabrication of agents. They can describe modern aspects of DNA, RNA, proteins and carbohydrates.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Theoretical Chemistry (Basics)				08-TCM1-141-m01

Module coordinator			**Module offered by**
lecturer of lecture "Theoretische Chemie"			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	graduate	--	

Contents

This module introduces students to the fundamental principles of theoretical chemistry.

Intended learning outcomes

Students are able to describe the mathematical and physical principles underlying the quantum chemical and quantum dynamical approaches of theoretical chemistry.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Computational Chemistry				08-TCM2-141-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Computational Chemistry"			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	graduate		--	
Contents				
This module introduces students to the fundamental principles of computational chemistry.				
Intended learning outcomes				
Students are able to explain the theoretical principles of computational chemistry and to apply methods in computational chemistry.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Material Sciences 1 (Principles)				08-FS1-141-m01
Module coordinator			**Module offered by**	
Dean of Studies Funktionswerkstoffe (Functional Materials)			Chair of Chemical Technology of Material Synthesis	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	undergraduate	--		

Contents

This module discusses the fundamental relations between chemical bonding, the structure, the microstructure and the properties of materials.

Intended learning outcomes

Students have become familiar with the fundamental relations between chemical bonding, the structure, the microstructure and the properties of materials. They have developed the ability to apply them to research problems.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Supramolecular Chemistry (Basics)				08-SCM1-102-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Organischen Chemie"			Faculty of Chemistry and Pharmacy	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		

Contents

This module introduces students to the fundamental principles of supramolecular chemistry. It focuses on interactions between molecules, molecular recognition by receptors, complexes, supramolecular polymers, coordination polymers and networks, liquid crystals, self-assembly in aqueous media, synthetic ion channels and modern applications of supramolecular chemistry.

Intended learning outcomes

Students are able to explain interactions between molecules demonstrating a high degree of expertise in the field as well as to describe the formation, structure and polymers of coordination compounds. They are able to describe the self-assembly of polymers in aqueous media as well as to identify the characteristics of synthetic ion channels. They can name modern applications of supramolecular chemistry.

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

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

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

written examination (approx. 90 minutes) or oral examination of one candidate each (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)

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Functional Materials (2012)

Module title				Abbreviation
Chemical Dynamics				08-PCM2-102-m01

Module coordinator	Module offered by
lecturer of seminar "Chemische Dynamik" (Chemical Dynamics)	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	graduate	--

Contents

This module gives students the opportunity to explore advanced topics in chemical kinetics and reaction dynamics in more detail. It discusses methods and models for investigating and describing chemical reactions.

Intended learning outcomes

Students are able to discuss advanced topics in chemical kinetics and reaction dynamics. They can describe methods and models for the investigation of chemical reactions.

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

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

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

written examination (90 minutes) or oral examination of one candidate each (20 minutes) or talk (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

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Computational Mathematics (2012)

Module title				Abbreviation
Nanoscale Materials				08-PCM3-102-m01

Module coordinator	**Module offered by**
lecturer of the seminar "Nanoskalige Materialien"	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	graduate	--

Contents

This module discusses advanced topics in nanoscale materials. It focuses on the structure, properties, fabrication, modern characterisation methods and application areas of nanoscale materials.

Intended learning outcomes

Students are able to characterise nanoscale materials. They are able to name analytical methods and application areas of nanoscale materials.

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

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

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

written examination (90 minutes) or oral examination of one candidate each (20 minutes) or talk (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

Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Computational Mathematics (2012)
Master's degree (1 major) Functional Materials (2012)

Module title				Abbreviation
Clinical and Analytical Chemistry				08-PH-KAC-092-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Klinisch-analytische Chemie" (Clinical and Analytical Chemistry)			Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**		**Only after succ. compl. of module(s)**	
5	numerical grade		--	
Duration		**Module level**	**Other prerequisites**	
1 semester		undergraduate	--	
Contents				
This module discusses advanced topics in clinical analytical chemistry.				
Intended learning outcomes				
Students have developed an advanced knowledge of molecular biology.				
Courses (type, number of weekly contact hours, language — if other than German)				
V (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
written examination (120 minutes)				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Biochemistry (2012) Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2010) Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Clinical and Analytical Chemistry (practical course)				08-PH-KACP-092-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Klinisch-analytische Chemie" (Clinical and Analytical Chemistry)			Institute of Pharmacy and Food 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 covers practical topics in clinical chemistry and clinical diagnostics as well as the related analytical methods.

Intended learning outcomes

Students have developed a knowledge of clinical analytical chemistry and are able to apply it to practical 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 is creditable for bonus)

examination talks (Testate, approx. 15 minutes each), log (approx. 5 to 10 pages)

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Biochemistry (2012)
Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Lab Course Materials Science				08-FMM-MP-102-m01
Module coordinator			**Module offered by**	
lecturers specialisation subject Funktionsmaterialien (Functional Materials)			Chair of Chemical Technology of Material Synthesis	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	(not) successfully completed	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		
Contents				
Ten selected experiments in materials science.				
Intended learning outcomes				
Students have developed an advanced proficiency in the performance of experiments in materials science.				
Courses (type, number of weekly contact hours, language — if other than German)				
P (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
Vortestate (pre-experiment exams) and Nachtestate (post-experiment exams) (15 minutes), assessment of practical performance, log (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)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2010) Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Project Work				08-FMM-PA-102-m01
Module coordinator			**Module offered by**	
head of the research group offering the module			Chair of Chemical Technology of Material Synthesis	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	(not) successfully completed	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		
Contents				
This module gives students the opportunity to explore a research topic under the guidance of a supervisor and to describe their findings.				
Intended learning outcomes				
Students have developed an advanced proficiency in the performance of experiments in materials science.				
Courses (type, number of weekly contact hours, language — if other than German)				
P (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
talk (approx. 15 minutes) and log (approx. 15 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)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2010) Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Practical course medicinal chemistry				08-MCM1-102-m01
Module coordinator			**Module offered by**	
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)			Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**		**Only after succ. compl. of module(s)**	
10	(not) successfully completed		--	
Duration		**Module level**	**Other prerequisites**	
1 semester		graduate	--	
Contents				
Selected methods and topics in medicinal chemistry (synthesis, testing, analysis, theory, pharmacokinetics).				
Intended learning outcomes				
Students have developed a knowledge of medicinal chemistry and are able to apply it to practical 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 is creditable for bonus)				
Vortestate (pre-experiment exams) and Nachtestate (post-experiment exams) (approx. 20 minutes), assessment of practical performance, written report (approx. 30 to 50 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)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2010) Master's degree (1 major) Chemistry (2014) Master's degree (1 major) FOKUS Pharmacy (2012)				

Module title				Abbreviation
Supramolecular Chemistry (Practical Course)				08-SCM2-102-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Supramolekularen Chemie (Organische Chemie/Physikalische Chemie)"			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	graduate	--		
Contents				
This module gives students the opportunity to perform some of the key experiments in supramolecular chemistry. They will perform syntheses of host-guest complexes, dye aggregates and nanoparticles and use advanced analytical methods to characterise them.				
Intended learning outcomes				
Students are able to perform syntheses of host-guest complexes and use spectroscopic methods to analyse and characterise them. They are able to produce nanoparticles and to characterise them microscopically.				
Courses (type, number of weekly contact hours, language — if other than German)				
P (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
practical work, logs (approx. 5 pages each) Language of assessment: German or English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2010) Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Programming in Theoretical Chemistry				08-TCM3-102-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Programmieren in Theoretischer Chemie"			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	graduate	--		

Contents

This module provides an introduction to the fundamentals of programming in theoretical chemistry and discusses its application areas.

Intended learning outcomes

Students are able to explain and use one of the programming languages typically used in theoretical chemistry as well as to name its application areas.

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

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

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

completion and discussion of approx. 5 programming exercises as well as talk (approx. 45 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

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Computational Mathematics (2012)

Module title				Abbreviation
Polymers II				03-PM2-122-m01

Module coordinator	Module offered by
holder of the Chair of Functional Materials in Medicine and Dentistry	Faculty of Medicine

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

Duration	Module level	Other prerequisites
1 semester	graduate	--

Contents

In-depth knowledge and practical application of: - free radical polymerisation, polyaddition - ionic polymerisations - controlled radical polymerisation - polymer characterisation (e. g. gel permeation chromatography, end-group analysis, mass spectrometry) - current aspects of polymer research (e. g. block-copolymers, polymer topographies, polymer functionalisation).

Intended learning outcomes

Students acquire an advanced knowledge of polymer synthesis, modification and characterisation.

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

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

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

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (20 minutes) or c) talk (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

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Technology of Functional Materials (2010)
Master's degree (1 major) Functional Materials (2012)

Module title				Abbreviation
Laser Spectroscopy				08-PCM1a-132-m01
Module coordinator			**Module offered by**	
lecturer of seminar "Laserspektroskopie" (Laser 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	graduate	--		

Contents

This module introduces students to the fundamental principles of laser spectroscopy. It discusses absorption and emission spectroscopy.

Intended learning outcomes

Students are able to explain the components and operating principles of lasers as well as the optical principles of laser technology. They are able to describe the principles of absorption and emission spectroscopy.

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

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

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

written examination (90 minutes) or oral examination (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)

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Advanced Physical Chemistry (Lab)				08-PCM1b-132-m01
Module coordinator			**Module offered by**	
lecturer of seminar "Laserspektroskopie" (Laser Spectroscopy)			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	graduate	--		

Contents

This module gives students the opportunity to use modern experimental methods in physical chemistry in the laboratory. After a safety briefing, the students autonomously conduct experiments in the laboratory. Students will be expected to take tests and write lab reports to demonstrate their knowledge.

Intended learning outcomes

Students have developed a high level of proficiency in modern experimental methods in physical chemistry.
They are able to analyse the resulting measurements and write a lab report.

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

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

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

Vortestate (pre-experiment exams) and Nachtestate (post-experiment exams) (approx. 15 minutes) and log (approx. 15 pages)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 20 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Physical Chemistry (Advanced Lab)				08-PCM6-132-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)**	
5	(not) successfully completed	08-PCM1	
Duration	**Module level**	**Other prerequisites**	
1 semester	graduate	--	

Contents

This module gives students the opportunity to get involved in the work of one of the research groups based at the Institute of Physical Chemistry and learn some advanced synthesis and analytical methods.

Intended learning outcomes

Students have become proficient in the research methods typically used by the relevant physical chemistry research group. They are able to analyse their findings and thus help answer topical questions in physical chemistry.

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

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

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

presentation (approx. 20 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 20 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title			Abbreviation
Principles of drug design			08-MCM3-132-m01

Module coordinator	Module offered by
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)	Institute of Pharmacy and Food Chemistry

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

Duration	Module level	Other prerequisites
1 semester	graduate	--

Contents

Fundamentals: drug targets (types and classification), target validation, effect mechanisms, protein-ligand interactions, lead finding; lead optimisation. Experimental methods: bioassays, HTS, combinatorial chemistry, naturally occurring substances. Theoretical methods: molecular modelling, structure-based drug design, pharmacophore models, docking, virtual screening, simulation methods, de novo design. Ligand-based drug design. QSAR. Predictions of pharmacokinetic and toxicological components (ADME). Case examples, prodrug strategies, bioisosterism, SAR.

Intended learning outcomes

Students master the theoretical and experimental methods and aspects of drug design.

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

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

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

presentation with discussion (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

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Practical course Homogeneous catalysis in Inorganic Chemistry				08-HKM3AC-132-m01

Module coordinator	Module offered by
lecturer of the seminar "Spezielle Metallorganische Chemie and deren Anwendung in der Homogenkatalyse"	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	graduate	--

Contents

This module gives students the opportunity to enhance their skills in advanced synthesis and analytical methods in homogeneous catalysis. The focus will be on catalyst synthesis and characterisation, spectral analysis and crystallography. Students will be expected to conduct their work in the lab independently, write a lab report documenting their findings and deliver a presentation.

Intended learning outcomes

Students are able to use advanced synthesis and analytical methods in homogeneous catalysis in the lab and to interpret their findings. They are able to write a lab report documenting their findings and deliver a presentation.

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

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

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

practical work with lab report (approx. 10 pages) and talk (approx. 15 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 20 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title	Abbreviation
Practical course Homogeneous catalysis in Organic Chemistry	08-HKM3OC-132-m01

Module coordinator	Module offered by
lecturer of the seminar "Spezielle Metallorganische Chemie and deren Anwendung in der Homogenkatalyse"	Institute of Organic Chemistry

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

Duration	Module level	Other prerequisites
1 semester	graduate	--

Contents

This module gives students the opportunity to enhance their skills in advanced synthesis and analytical methods in homogeneous catalysis. The focus will be on catalyst synthesis and characterisation, spectral analysis and crystallography. Students will be expected to conduct their work in the lab independently, write a lab report documenting their findings and deliver a presentation.

Intended learning outcomes

Students are able to use advanced synthesis and analytical methods in homogeneous catalysis in the lab and to interpret their findings. They are able to write a lab report documenting their findings and deliver a presentation.

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

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

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

practical work with lab report (approx. 10 pages) and talk (approx. 15 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 20 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Theoretical Chemistry - Project course wave-packet dynamics				08-TCAP1-132-m01

Module coordinator	Module offered by
head of the research group offering the module	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	graduate	--

Contents

This module gives students the opportunity to get involved in the work of one of the research groups based at the Institute of Theoretical Chemistry and learn some of the methods typically used in the discipline. The focus will be on wave packet dynamics.

Intended learning outcomes

Students have learned some of the methods typically used in theoretical chemistry and, in particular, in wave packet dynamics. They are able to explain issues that are relevant to the field of wave packet dynamics.

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

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

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

presentation (approx. 30 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 4 weeks.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title	Abbreviation
Theoretical Chemistry - Project coursewave function based methods	08-TCAP2-132-m01

Module coordinator	**Module offered by**
head of the research group offering the module	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	graduate	--

Contents

This module gives students the opportunity to get involved in the work of one of the research groups based at the Institute of Theoretical Chemistry and learn some of the methods typically used in the discipline. The focus will be on wave function methods.

Intended learning outcomes

Students have learned some of the methods typically used in theoretical chemistry and, in particular, in wave function methods. They are able to explain issues that are relevant to the field of wave function methods.

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

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

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

presentation (approx. 30 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 4 weeks.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Theoretical Chemistry - Project course Computational Photochemistry				08-TCAP3-132-m01

Module coordinator	Module offered by
head of the research group offering the module	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	graduate	--

Contents

This module gives students the opportunity to get involved in the work of one of the research groups based at the Institute of Theoretical Chemistry and learn some of the methods typically used in the discipline. The focus will be on theoretical photochemistry.

Intended learning outcomes

Students have learned some of the methods typically used in theoretical chemistry and, in particular, in theoretical photochemistry. They are able to explain issues that are relevant to the field of theoretical photochemistry.

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

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

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

presentation (approx. 30 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 4 weeks.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Other additional qualifications

(10 ECTS credits)

Module title			**Abbreviation**
Tutoring 1 (practical course)			08-WRM1-132-m01
Module coordinator		**Module offered by**	
Dean of Studies Chemie (Chemistry)		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	graduate	Using activities performed under a research assistant contract for this module is not permitted. The exercise must accompany a different course than the exercise held in module 08-WRM2.	
Contents			
This module gives students the opportunity to teach a tutorial accompanying a lecture offered by the Faculty of Chemistry and Pharmacy and learn how to present and teach scientific topics in an appropriate manner.			
Intended learning outcomes			
Students are able to teach students in earlier stages of their degrees and tailor their teaching to those students' needs.			
Courses (type, number of weekly contact hours, language — if other than German)			
Ü (no information on SWS (weekly contact hours) and course language available)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
preparation of materials for demonstrations and exercises (approx. 120 hours total) Language of assessment: German or English			
Allocation of places			
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Additional information			
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Workload			
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Teaching cycle			
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Referred to in LPO I (examination regulations for teaching-degree programmes)			
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Module appears in			
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2014)			

Module title				Abbreviation
Tutoring 2 (practical course)				08-WRM2-132-m01
Module coordinator			**Module offered by**	
Dean of Studies Chemie (Chemistry)			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	graduate	Using activities performed under a research assistant contract for this module is not permitted. The exercise must accompany a different course than the exercise held in module 08-WRM1.		

Contents

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

Intended learning outcomes

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

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

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

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

preparation of materials for demonstrations and exercises (approx. 120 hours total)
Language of assessment: German or English

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Foreign Studies (short)				08-APM1-132-m01
Module coordinator			**Module offered by**	
Erasmus programme coordinator Chemie (Chemistry)			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	graduate	Admission prerequisite to assessment: regular attendance of placement (a maximum of 2 incidents of absence); consultation with course advisory service prior to placement highly recommended; not to be combined with 08-APM2.		
Contents				
Practical course to be completed at universities abroad. Students may complete this course in the context of exchange programmes such as Erasmus etc. The contents of the course should correspond to the contents of a lab course offered in the context of the Master's programme in Chemistry (120 ECTS credits); please consult with the competent coordinator in advance.				
Intended learning outcomes				
Students are familiar with procedures and processes used at universities in countries other than Germany. They have acquired subject-specific skills as well as language and interpersonal skills.				
Courses (type, number of weekly contact hours, language — if other than German)				
P (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
report (2 pages); proof of having completed lab course Language of assessment: German or English; language of the respective placement country where required				
Allocation of places				
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Additional information				
Additional information on module duration: block placement abroad with a duration of a minimum of 20 working days.				
Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Foreign Studies (long)				08-APM2-132-m01
Module coordinator			**Module offered by**	
Erasmus programme coordinator Chemie (Chemistry)			Faculty of Chemistry and Pharmacy	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
10	(not) successfully completed	--		
Duration	**Module level**	**Other prerequisites**		
2 semester	graduate	Admission prerequisite to assessment: regular attendance of placement (a maximum of 2 incidents of absence); consultation with course advisory service prior to placement highly recommended; not to be combined with 08-APM1.		
Contents				
Practical course to be completed at universities abroad. Students may complete this course in the context of exchange programmes such as Erasmus etc. The contents of the course should correspond to the contents of a lab course offered in the context of the Master's programme in Chemistry (120 ECTS credits); please consult with the competent coordinator in advance.				
Intended learning outcomes				
Students are familiar with procedures and processes used at universities in countries other than Germany. They have acquired subject-specific skills as well as language and interpersonal skills.				
Courses (type, number of weekly contact hours, language — if other than German)				
P (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
report (2 pages); proof of having completed lab course Language of assessment: German or English; language of the respective placement country where required				
Allocation of places				
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Additional information				
Additional information on module duration: block placement abroad with a duration of a minimum of 40 working days.				
Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Chemistry-related courses outside of the Natural Sciences				08-CHPM1-141-m01
Module coordinator			**Module offered by**	
Dean of Studies Chemie (Chemistry)			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	graduate		Please consult with course advisory service.	
Contents				
This module gives students the opportunity to transfer credits from chemistry-related courses that are offered by other Faculties and are not explicitly included in the academic regulations for their programmes. Students MUST consult with their course advisors in advance.				
Intended learning outcomes				
Students have developed the knowledge and skills taught in the courses attended by them.				
Courses (type, number of weekly contact hours, language — if other than German)				
A (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
assessment or successful completion as certified by the lecturer 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				
Master's degree (1 major) Chemistry (2014)				

Module title			**Abbreviation**
Chemistry-related courses within the Natural Sciences			08-CHPM2-141-m01
Module coordinator			**Module offered by**
Dean of Studies Chemie (Chemistry)			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	graduate	Please consult with course advisory service.	

Contents

This module gives students the opportunity to transfer credits from chemistry-related courses that are offered by other Faculties and are not explicitly included in the academic regulations for their programmes. Students MUST consult with their course advisors in advance.

Intended learning outcomes

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

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

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

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

assessment or successful completion as certified by the lecturer
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

Master's degree (1 major) Chemistry (2014)

Compulsory Courses (double degree)

(5 ECTS credits)

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

Contents

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

Intended learning outcomes

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

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

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

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

written examination (approx. 90 minutes)

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

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

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

Module title				Abbreviation
Advanced chemical practical course				08-VPM-DA-132-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)**		
2	(not) successfully completed	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		
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 (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
written report (approx. 3 pages) 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				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2014)				

Compulsory Electives (double degree)

(55 ECTS credits)

Students must choose two focuses (focus 1 with 30 ECTS credits, focus 2 with 25 ECTS credits).

Inorganic Chemistry

(25 ECTS credits)

Compulsory Courses

(20 ECTS credits)

Module title				**Abbreviation**
Advanced Inorganic Chemistry				08-ACM1-141-m01
Module coordinator			**Module offered by**	
Managing Director of the Institute of Inorganic Chemistry			Institute of Inorganic Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
10	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
2 semester	graduate	--		

Contents

This module discusses advanced topics in main group chemistry and transition metal chemistry. It focuses on special compounds of the main group elements (MGEs), bonding situations of MGEs and MGE compounds, the chemistry of transition metals and coordination chemistry.

Intended learning outcomes

Students are able to characterise and explain special compounds of the main group elements. They can describe the chemical properties of transition metals and analyse the structure as well as chemical and physical aspects of coordination compounds.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title			**Abbreviation**
Inorganic Chemistry practical course for advanced			08-ACPM-132-m01
Module coordinator		**Module offered by**	
focus point coordinator "Inorganic 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	graduate	--	

Contents

This module gives students the opportunity to enhance their skills in advanced synthesis and analytical methods in inorganic chemistry. The focus will be on working under inert atmospheres, purification methods, spectral analysis and crystallography. Students will be expected to conduct their work in the lab independently, write a lab report documenting their findings and deliver a presentation.

Intended learning outcomes

Students are able to use advanced synthesis and analytical methods in inorganic chemistry in the lab and to interpret their findings. They are able to write a lab report documenting their findings and deliver a presentation.

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

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

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

practical work with lab report (approx. 20 pages) and talk (approx. 15 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 40 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Compulsory Electives

(ECTS credits)

Module title				Abbreviation
Bioanorganic Chemistry				08-ACM2-141-m01
Module coordinator			**Module offered by**	
lecturer of seminar "Anorganische Aspekte der Biochemie and Medizinischen Chemie" (Inorganic Aspects of Biochemistry and Medicinal 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	graduate	--		

Contents

This module introduces students to the fundamental principles of bioinorganic chemistry (BIC). It discusses the methods of BIC, structures and effects of metalliferous enzymes and applications of BIC in the fields of diagnosis and therapy.

Intended learning outcomes

Students are able to describe the principles of, and methods in, BIC. They can explain the structure and effects of metalliferous enzymes and describe applications of BIC in biochemistry and medicine.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Solid state chemistry and inorganic materials				08-ACM3-141-m01
Module coordinator			**Module offered by**	
lecturer of seminar "Festkörperchemie and Anorganische Materialien" (Solid State Chemistry and Inorganic Materials)			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		graduate	--	

Contents

This module provides an introduction to solid-state chemistry. It focuses on the structure, chemical and physical properties, synthesis methods and selected materials of solids.

Intended learning outcomes

Students are able to describe the structure and properties of solids. They can explain methods for solid-state synthesis. They can describe important aspects of selected materials regarding the corresponding solids.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				**Abbreviation**
Advanced organometallic chemistry and its application in homogeneous catalysis				08-HKM2-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Spezielle Metallorganische Chemie and deren Anwendung in der Homogenkatalyse"			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	graduate	--		
Contents				
This module examines elementary organic compounds of transition metals with homogeneous catalytic applications.				
Intended learning outcomes				
Students can describe and analyse the structure, reactivity and analysis of elementary organic compounds. They are able to characterise special substance classes. They can formulate homogeneous catalysis reactions.				
Courses (type, number of weekly contact hours, language — if other than German)				
S (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title			**Abbreviation**
Computational Chemistry			08-TCM2-141-m01
Module coordinator		**Module offered by**	
lecturer of lecture "Computational Chemistry"		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	graduate	--	

Contents

This module introduces students to the fundamental principles of computational chemistry.

Intended learning outcomes

Students are able to explain the theoretical principles of computational chemistry and to apply methods in computational chemistry.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Advanced NMR- and Mass Spectrometry				08-OCM-NMRMS-141-m01

Module coordinator	Module offered by
lab course supervisor	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	graduate	--

Contents

This module equips students with an advanced knowledge of NMR and mass spectrometry. It offers deeper insights into the theoretical principles of the two measuring techniques and includes exercises that give students the opportunity to learn how to evaluate complicated spectra and use a spectrometer.

Intended learning outcomes

Students are able to discuss NMR and mass spectroscopy demonstrating a high degree of expertise in the field. They are able to experiment with both spectrometers and analyse complicated spectra.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Organic Chemistry

(25 ECTS credits)

Compulsory Courses

(15 ECTS credits)

Module title				Abbreviation
Modern Synthetic Methods				08-OCM-SYNT-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar			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	graduate	--		
Contents				
This module discusses modern stereoselective synthesis methods. It focuses on selected total syntheses, organometallic chemistry and catalysis.				
Intended learning outcomes				
Students are able to stereoselectively plan complex chemical syntheses and to stereochemically analyse them. They can explain total syntheses. They can describe aspects of organometallic chemistry and catalysis in synthesis chemistry.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Advanced NMR- and Mass Spectrometry				08-OCM-NMRMS-141-m01
Module coordinator			**Module offered by**	
lab course supervisor			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	graduate	--		

Contents

This module equips students with an advanced knowledge of NMR and mass spectrometry. It offers deeper insights into the theoretical principles of the two measuring techniques and includes exercises that give students the opportunity to learn how to evaluate complicated spectra and use a spectrometer.

Intended learning outcomes

Students are able to discuss NMR and mass spectroscopy demonstrating a high degree of expertise in the field. They are able to experiment with both spectrometers and analyse complicated spectra.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Advanced Research Project				08-OCM-AKP1-122-m01
Module coordinator			**Module offered by**	
head of the research group offering the module			Institute of Organic Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	(not) successfully completed	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		
Contents				
This module gives students the opportunity to get involved in the work of one of the research groups based at the Institute of Organic Chemistry and learn some advanced synthesis and analytical methods.				
Intended learning outcomes				
Students are able to describe and use some of the synthesis and analytical methods typically used by the research group as well as to describe theoretical aspects.				
Courses (type, number of weekly contact hours, language — if other than German)				
P (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
talk (approx. 15 minutes) and log (approx. 15 to 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)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2014)				

Compulsory Electives

(ECTS credits)

Module title				**Abbreviation**
Modern Aspects of Natural Product Chemistry and Biological Chemistry				08-OCM-NAT-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar			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	graduate	--		

Contents

This module discusses advanced topics in natural product chemistry and biological chemistry.

Intended learning outcomes

Students are able to discuss advanced topics in natural product chemistry and biological chemistry.

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

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

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

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

Allocation of places

Chemistry Master's: no restrictions. Biochemistry Master's: 20 places. Places will be allocated by lot.

Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Organic Functional Materials				08-OCM-FM-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Organische Funktionsmaterialien"			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	graduate		--	

Contents

The module deals with specific topics in organic functional materials. The focus is on fundamental (photo)physical effects in organic molecular and polymeric semiconductors as well as their application in (opto)electronic components such as field effect transistors, organic light-emitting diodes, or organic solar cells as well as in nonlinear optics.

Intended learning outcomes

The students are able to explain fundamental (photo)physical processes in organic semiconductors. He/She can explain the synthesis of these semiconductor materials as well as their application in (opto)electronic components such as field effect transistors, organic light-emitting diodes or in organic photovoltaics as well as in nonlinear optics.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				**Abbreviation**
Organo- and Biocatalysis				08-HKM1-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Organo- and Biokatalyse"			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	graduate	--		

Contents

This module provides students with deeper insights into topics in organic compounds and enzymes in catalytic processes. Organocatalysis: enantioselective implementation, principles, green chemistry, substance classes and application areas. Biocatalysis: effects of enzymes in view of different aspects, especially regarding organic synthesis.

Intended learning outcomes

Students are able to categorise organocatalysts and explain their effects and areas of application. They can describe the structure and applications of enzymes in organic synthesis. They are able to mechanistically describe and analyse the effects of enzymes.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Supramolecular Chemistry (Basics)				08-SCM1-102-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Organischen Chemie"			Faculty of Chemistry and Pharmacy	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		

Contents

This module introduces students to the fundamental principles of supramolecular chemistry. It focuses on interactions between molecules, molecular recognition by receptors, complexes, supramolecular polymers, coordination polymers and networks, liquid crystals, self-assembly in aqueous media, synthetic ion channels and modern applications of supramolecular chemistry.

Intended learning outcomes

Students are able to explain interactions between molecules demonstrating a high degree of expertise in the field as well as to describe the formation, structure and polymers of coordination compounds. They are able to describe the self-assembly of polymers in aqueous media as well as to identify the characteristics of synthetic ion channels. They can name modern applications of supramolecular chemistry.

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

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

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

written examination (approx. 90 minutes) or oral examination of one candidate each (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)

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Functional Materials (2012)

Module title				Abbreviation
Bioorganic Chemistry				08-SCM3-141-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Bioorganische Chemie" (Bioorganic 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	graduate	--		

Contents

This module discusses topics at the interface of organic chemistry, biology and medicine. It focuses on molecular interactions and recognition, molecular diversity, active agent development, new aspects of DNA, RNA, proteins and carbohydrates.

Intended learning outcomes

Students are able to describe molecular interactions and detection mechanisms of bioorganic chemistry. They can explain the molecular diversity of biological systems. They can characterise the fabrication of agents. They can describe modern aspects of DNA, RNA, proteins and carbohydrates.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Computational Chemistry				08-TCM2-141-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Computational Chemistry"			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	graduate	--		
Contents				
This module introduces students to the fundamental principles of computational chemistry.				
Intended learning outcomes				
Students are able to explain the theoretical principles of computational chemistry and to apply methods in computational chemistry.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Clinical and Analytical Chemistry (practical course)				08-PH-KACP-092-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Klinisch-analytische Chemie" (Clinical and Analytical Chemistry)			Institute of Pharmacy and Food 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 covers practical topics in clinical chemistry and clinical diagnostics as well as the related analytical methods.

Intended learning outcomes

Students have developed a knowledge of clinical analytical chemistry and are able to apply it to practical 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 is creditable for bonus)

examination talks (Testate, approx. 15 minutes each), log (approx. 5 to 10 pages)

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Biochemistry (2012)
Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)

Physical Chemistry

(25 ECTS credits)

Compulsory Courses

(20 ECTS credits)

Module title				Abbreviation
Laser Spectroscopy				08-PCM1a-132-m01
Module coordinator			**Module offered by**	
lecturer of seminar "Laserspektroskopie" (Laser 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	graduate	--		
Contents				
This module introduces students to the fundamental principles of laser spectroscopy. It discusses absorption and emission spectroscopy.				
Intended learning outcomes				
Students are able to explain the components and operating principles of lasers as well as the optical principles of laser technology. They are able to describe the principles of absorption and emission spectroscopy.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
written examination (90 minutes) or oral examination (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)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Advanced Physical Chemistry (Lab)				08-PCM1b-132-m01
Module coordinator			**Module offered by**	
lecturer of seminar "Laserspektroskopie" (Laser Spectroscopy)			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	graduate	--		

Contents

This module gives students the opportunity to use modern experimental methods in physical chemistry in the laboratory. After a safety briefing, the students autonomously conduct experiments in the laboratory. Students will be expected to take tests and write lab reports to demonstrate their knowledge.

Intended learning outcomes

Students have developed a high level of proficiency in modern experimental methods in physical chemistry. They are able to analyse the resulting measurements and write a lab report.

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

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

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

Vortestate (pre-experiment exams) and Nachtestate (post-experiment exams) (approx. 15 minutes) and log (approx. 15 pages)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 20 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Chemical Dynamics				08-PCM2-102-m01
Module coordinator			**Module offered by**	
lecturer of seminar "Chemische Dynamik" (Chemical Dynamics)			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	graduate	--		

Contents

This module gives students the opportunity to explore advanced topics in chemical kinetics and reaction dynamics in more detail. It discusses methods and models for investigating and describing chemical reactions.

Intended learning outcomes

Students are able to discuss advanced topics in chemical kinetics and reaction dynamics. They can describe methods and models for the investigation of chemical reactions.

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

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

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

written examination (90 minutes) or oral examination of one candidate each (20 minutes) or talk (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

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Computational Mathematics (2012)

Module title				Abbreviation
Physical Chemistry (Advanced Lab)				08-PCM6-132-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)**		
5	(not) successfully completed	08-PCM1		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		
Contents				
This module gives students the opportunity to get involved in the work of one of the research groups based at the Institute of Physical Chemistry and learn some advanced synthesis and analytical methods.				
Intended learning outcomes				
Students have become proficient in the research methods typically used by the relevant physical chemistry research group. They are able to analyse their findings and thus help answer topical questions in physical chemistry.				
Courses (type, number of weekly contact hours, language — if other than German)				
P (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
presentation (approx. 20 minutes) Language of assessment: German or English				
Allocation of places				
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Additional information				
Additional information on module duration: block placement with a duration of a minimum of 20 working days.				
Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2014)				

Compulsory Electives

(ECTS credits)

Module title				**Abbreviation**
Nanoscale Materials				08-PCM3-102-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Nanoskalige Materialien"			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	graduate	--		
Contents				
This module discusses advanced topics in nanoscale materials. It focuses on the structure, properties, fabrication, modern characterisation methods and application areas of nanoscale materials.				
Intended learning outcomes				
Students are able to characterise nanoscale materials. They are able to name analytical methods and application areas of nanoscale materials.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
written examination (90 minutes) or oral examination of one candidate each (20 minutes) or talk (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				
Bachelor' degree (1 major) Nanostructure Technology (2010) Bachelor' degree (1 major) Nanostructure Technology (2012) Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2010) Master's degree (1 major) Chemistry (2014) Master's degree (1 major) Mathematics (2012) Master's degree (1 major) Computational Mathematics (2012) Master's degree (1 major) Functional Materials (2012)				

Module title				Abbreviation
Ultrafast spectroscopy and quantumcontrol				08-PCM4-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Ultrakurzzeitspektroskopie and Quantenkontrolle"			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	graduate	Prior successful completion of modules 08-PCM1a and 08-PCM1b is highly recommended.		
Contents				
This module discusses advanced topics in ultrafast spectroscopy and quantum control. It focuses on ultrashort laser pulses, time-resolved laser spectroscopy and coherent control.				
Intended learning outcomes				
Students are able to describe the generation of ultrashort laser pulses and to characterise them. They can explain the theory of time-resolved laser spectroscopy and name experimental methods. They can describe the principles and applications of quantum control.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
written examination (approx. 90 minutes) or oral examination of one candidate each (approx. 20 minutes) or talk (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				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Physical chemistry of supramolecular assemblies				08-PCM5-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Physikalische Chemie Supramolekularer Strukturen"			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	graduate	--		
Contents				
This module examines the basic interactions between molecules. It discusses the formation and physical-chemical properties of aggregates as well as key applications of supramolecular chemistry.				
Intended learning outcomes				
Students are able to explain the basic interactions between molecules demonstrating a high degree of expertise in the field. They can describe the formation and physical-chemical properties of aggregates. They can name modern applications of supramolecular chemistry.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
written examination (approx. 90 minutes) or oral examination of one candidate each (approx. 20 minutes) or talk (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				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Theoretical Chemistry (Basics)				08-TCM1-141-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Theoretische Chemie"			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	graduate	--		
Contents				
This module introduces students to the fundamental principles of theoretical chemistry.				
Intended learning outcomes				
Students are able to describe the mathematical and physical principles underlying the quantum chemical and quantum dynamical approaches of theoretical chemistry.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Computational Chemistry				08-TCM2-141-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Computational Chemistry"			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		graduate	--	

Contents

This module introduces students to the fundamental principles of computational chemistry.

Intended learning outcomes

Students are able to explain the theoretical principles of computational chemistry and to apply methods in computational chemistry.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Programming in Theoretical Chemistry				08-TCM3-102-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Programmieren in Theoretischer Chemie"			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	graduate	--		

Contents

This module provides an introduction to the fundamentals of programming in theoretical chemistry and discusses its application areas.

Intended learning outcomes

Students are able to explain and use one of the programming languages typically used in theoretical chemistry as well as to name its application areas.

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

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

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

completion and discussion of approx. 5 programming exercises as well as talk (approx. 45 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

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Computational Mathematics (2012)

Module title			Abbreviation
Theoretical Chemistry - Project course wave-packet dynamics			08-TCAP1-132-m01
Module coordinator		**Module offered by**	
head of the research group offering the module		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	graduate	--	

Contents

This module gives students the opportunity to get involved in the work of one of the research groups based at the Institute of Theoretical Chemistry and learn some of the methods typically used in the discipline. The focus will be on wave packet dynamics.

Intended learning outcomes

Students have learned some of the methods typically used in theoretical chemistry and, in particular, in wave packet dynamics. They are able to explain issues that are relevant to the field of wave packet dynamics.

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

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

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

presentation (approx. 30 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 4 weeks.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title			**Abbreviation**
Theoretical Chemistry - Project coursewave function based methods			08-TCAP2-132-m01
Module coordinator			**Module offered by**
head of the research group offering the module			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	graduate	--	

Contents

This module gives students the opportunity to get involved in the work of one of the research groups based at the Institute of Theoretical Chemistry and learn some of the methods typically used in the discipline. The focus will be on wave function methods.

Intended learning outcomes

Students have learned some of the methods typically used in theoretical chemistry and, in particular, in wave function methods. They are able to explain issues that are relevant to the field of wave function methods.

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

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

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

presentation (approx. 30 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 4 weeks.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Theoretical Chemistry - Project course Computational Photochemistry				08-TCAP3-132-m01
Module coordinator			**Module offered by**	
head of the research group offering the module			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	graduate	--		
Contents				
This module gives students the opportunity to get involved in the work of one of the research groups based at the Institute of Theoretical Chemistry and learn some of the methods typically used in the discipline. The focus will be on theoretical photochemistry.				
Intended learning outcomes				
Students have learned some of the methods typically used in theoretical chemistry and, in particular, in theoretical photochemistry. They are able to explain issues that are relevant to the field of theoretical photochemistry.				
Courses (type, number of weekly contact hours, language — if other than German)				
P (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
presentation (approx. 30 minutes) Language of assessment: German or English				
Allocation of places				
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Additional information				
Additional information on module duration: 4 weeks.				
Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Material Sciences 1 (Principles)				08-FS1-141-m01

Module coordinator	Module offered by
Dean of Studies Funktionswerkstoffe (Functional Materials)	Chair of Chemical Technology of Material Synthesis

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

This module discusses the fundamental relations between chemical bonding, the structure, the microstructure and the properties of materials.

Intended learning outcomes

Students have become familiar with the fundamental relations between chemical bonding, the structure, the microstructure and the properties of materials. They have developed the ability to apply them to research problems.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Lab Course Materials Science				08-FMM-MP-102-m01
Module coordinator			**Module offered by**	
lecturers specialisation subject Funktionsmaterialien (Functional Materials)			Chair of Chemical Technology of Material Synthesis	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	(not) successfully completed	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		
Contents				
Ten selected experiments in materials science.				
Intended learning outcomes				
Students have developed an advanced proficiency in the performance of experiments in materials science.				
Courses (type, number of weekly contact hours, language — if other than German)				
P (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
Vortestate (pre-experiment exams) and Nachtestate (post-experiment exams) (15 minutes), assessment of practical performance, log (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)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2010) Master's degree (1 major) Chemistry (2014)				

Biochemistry

(25 ECTS credits)

Compulsory Courses

(15 ECTS credits)

Module title				**Abbreviation**
Molecular Biology				08-BC-MOLM-141-m01
Module coordinator			**Module offered by**	
holder of the Chair of Biochemistry			Chair of Biochemistry	
ECTS	**Method of grading**		**Only after succ. compl. of module(s)**	
5	numerical grade		--	
Duration		**Module level**	**Other prerequisites**	
1 semester		undergraduate	--	
Contents				
Comprising a lecture and an exercise, this module discusses advanced topics in molecular physiology and functional biochemistry.				
Intended learning outcomes				
Students have developed a sound knowledge of molecular biology.				
Courses (type, number of weekly contact hours, language — if other than German)				
V + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 60 to 90 minutes) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes). Students will be informed about the method and length of the assessment prior to the course. Language of assessment: German or English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Molecular Biology Lab				08-BC-MOLP-141-m01

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

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

Duration	Module level	Other prerequisites
1 semester	undergraduate	--

Contents

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

Intended learning outcomes

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

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

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

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

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

Allocation of places

Biochemistry Bachelor's: 24 places. Chemistry Master's: 6 places.

Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Compulsory Electives

(ECTS credits)

Specialist Lab Course

(10 ECTS credits)

<table>
<tr><td colspan="4">Module title</td><td>Abbreviation</td></tr>
<tr><td colspan="4">Practical course Molecular Machines for advanced students</td><td>08-BC-VPMM-141-m01</td></tr>
<tr><td colspan="3">Module coordinator</td><td colspan="2">Module offered by</td></tr>
<tr><td colspan="3">holder of the Chair of Biochemistry</td><td colspan="2">Chair of Biochemistry</td></tr>
<tr><td>ECTS</td><td>Method of grading</td><td colspan="3">Only after succ. compl. of module(s)</td></tr>
<tr><td>10</td><td>numerical grade</td><td colspan="3">08-BC-MOLP</td></tr>
<tr><td>Duration</td><td>Module level</td><td colspan="3">Other prerequisites</td></tr>
<tr><td>1 semester</td><td>graduate</td><td colspan="3">--</td></tr>
<tr><td colspan="5">Contents</td></tr>
<tr><td colspan="5">This module gives students the opportunity to explore a research topic. Selected methods and topics in molecular biology and biochemistry; cloning, mutagenesis, protein expression and purification, RNA-protein and protein-protein interactions, isolation and functional analysis of macromolecular complexes.</td></tr>
<tr><td colspan="5">Intended learning outcomes</td></tr>
<tr><td colspan="5">Students are able to explore a specific research topic and deliver an oral presentation on the results of their work.</td></tr>
<tr><td colspan="5">Courses (type, number of weekly contact hours, language — if other than German)</td></tr>
<tr><td colspan="5">P (no information on SWS (weekly contact hours) and course language available)</td></tr>
<tr><td colspan="5">Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)</td></tr>
<tr><td colspan="5">log (approx. 20 pages) and talk (approx. 15 minutes)
Language of assessment: German, English</td></tr>
<tr><td colspan="5">Allocation of places</td></tr>
<tr><td colspan="5">--</td></tr>
<tr><td colspan="5">Additional information</td></tr>
<tr><td colspan="5">Additional information on module duration: block placement with a duration of a minimum of 40 working days.</td></tr>
<tr><td colspan="5">Workload</td></tr>
<tr><td colspan="5">--</td></tr>
<tr><td colspan="5">Teaching cycle</td></tr>
<tr><td colspan="5">--</td></tr>
<tr><td colspan="5">Referred to in LPO I (examination regulations for teaching-degree programmes)</td></tr>
<tr><td colspan="5">--</td></tr>
<tr><td colspan="5">Module appears in</td></tr>
<tr><td colspan="5">Master's degree (1 major) Chemistry (2014)</td></tr>
</table>

Module title				Abbreviation
Practical course Protein Degradation in Eukaryotes for advanced students				08-BC-VPPD-141-m01
Module coordinator			**Module offered by**	
holder of the Chair of Biochemistry			Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
10	numerical grade	08-BC-MOLP		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		
Contents				
This module gives students the opportunity to explore a research topic in the field of protein degradation in eukaryotes.				
Intended learning outcomes				
Students are able to explore a specific research topic and deliver an oral presentation on the results of their work.				
Courses (type, number of weekly contact hours, language — if other than German)				
P (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
log (approx. 20 pages) and talk (approx. 15 minutes) Language of assessment: German, English				
Allocation of places				
--				
Additional information				
Additional information on module duration: block placement with a duration of a minimum of 40 working days.				
Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title			Abbreviation
Practical course RNA Biochemistry for advanced students			08-BC-VPRB-141-m01

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

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

Duration	Module level	Other prerequisites
1 semester	graduate	--

Contents

This module gives students the opportunity to explore a research topic in the field of RNA biochemistry. Ribosomes as "molecular machines", regulatory mechanisms of eukaryotic protein biosynthesis. Gradient centrifugation, in vitro translation in different cell-free systems.

Intended learning outcomes

Students are able to explore a specific research topic and deliver an oral presentation on the results of their work. They are able to familiarise themselves with different mechanisms of general and specific translation control with the help of different methods as well as to present their findings in an appropriate and understandable manner.

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

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

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

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

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 40 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Practical course Structural Biology for advanced students				08-BC-VPSB-141-m01

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

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

Duration	Module level	Other prerequisites
1 semester	graduate	--

Contents

This module discusses cloning and the expression of protein constructs for crystallisation. It teaches students the fundamental principles and techniques of crystallisation and crystal optimisation as well as crystallographic data collection.

Intended learning outcomes

Students have developed an understanding of the method of selecting protein constructs for crystallisation. They master fundamental skills and techniques for protein crystallisation as well as data collection and processing.

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

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

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

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

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 40 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Other Courses

(ECTS credits)

Module title			Abbreviation
Principles of drug design			08-MCM3-132-m01
Module coordinator		**Module offered by**	
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)		Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	graduate	--	

Contents

Fundamentals: drug targets (types and classification), target validation, effect mechanisms, protein-ligand interactions, lead finding; lead optimisation. Experimental methods: bioassays, HTS, combinatorial chemistry, naturally occurring substances. Theoretical methods: molecular modelling, structure-based drug design, pharmacophore models, docking, virtual screening, simulation methods, de novo design. Ligand-based drug design. QSAR. Predictions of pharmacokinetic and toxicological components (ADME). Case examples, prodrug strategies, bioisosterism, SAR.

Intended learning outcomes

Students master the theoretical and experimental methods and aspects of drug design.

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

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

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

presentation with discussion (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

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Bioanorganic Chemistry				08-ACM2-141-m01
Module coordinator			**Module offered by**	
lecturer of seminar "Anorganische Aspekte der Biochemie and Medizinischen Chemie" (Inorganic Aspects of Biochemistry and Medicinal 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		graduate	--	

Contents

This module introduces students to the fundamental principles of bioinorganic chemistry (BIC). It discusses the methods of BIC, structures and effects of metalliferous enzymes and applications of BIC in the fields of diagnosis and therapy.

Intended learning outcomes

Students are able to describe the principles of, and methods in, BIC. They can explain the structure and effects of metalliferous enzymes and describe applications of BIC in biochemistry and medicine.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title			Abbreviation
Modern Aspects of Natural Product Chemistry and Biological Chemistry			08-OCM-NAT-141-m01

Module coordinator	**Module offered by**
lecturer of the seminar	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	graduate	--

Contents

This module discusses advanced topics in natural product chemistry and biological chemistry.

Intended learning outcomes

Students are able to discuss advanced topics in natural product chemistry and biological chemistry.

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

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

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

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

Allocation of places

Chemistry Master's: no restrictions. Biochemistry Master's: 20 places. Places will be allocated by lot.

Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title					Abbreviation
Organo- and Biocatalysis					08-HKM1-141-m01
Module coordinator				**Module offered by**	
lecturer of the seminar "Organo- and Biokatalyse"				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		graduate	--		

Contents

This module provides students with deeper insights into topics in organic compounds and enzymes in catalytic processes. Organocatalysis: enantioselective implementation, principles, green chemistry, substance classes and application areas. Biocatalysis: effects of enzymes in view of different aspects, especially regarding organic synthesis.

Intended learning outcomes

Students are able to categorise organocatalysts and explain their effects and areas of application. They can describe the structure and applications of enzymes in organic synthesis. They are able to mechanistically describe and analyse the effects of enzymes.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Clinical and Analytical Chemistry				08-PH-KAC-092-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Klinisch-analytische Chemie" (Clinical and Analytical Chemistry)			Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**		**Only after succ. compl. of module(s)**	
5	numerical grade		--	
Duration		**Module level**	**Other prerequisites**	
1 semester		undergraduate	--	
Contents				
This module discusses advanced topics in clinical analytical chemistry.				
Intended learning outcomes				
Students have developed an advanced knowledge of molecular biology.				
Courses (type, number of weekly contact hours, language — if other than German)				
V (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
written examination (120 minutes)				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Biochemistry (2012) Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2010) Master's degree (1 major) Chemistry (2014)				

Module title			Abbreviation
Clinical and Analytical Chemistry (practical course)			08-PH-KACP-092-m01
Module coordinator			**Module offered by**
lecturer of lecture "Klinisch-analytische Chemie" (Clinical and Analytical Chemistry)			Institute of Pharmacy and Food 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 covers practical topics in clinical chemistry and clinical diagnostics as well as the related analytical methods.

Intended learning outcomes

Students have developed a knowledge of clinical analytical chemistry and are able to apply it to practical 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 is creditable for bonus)

examination talks (Testate, approx. 15 minutes each), log (approx. 5 to 10 pages)

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Biochemistry (2012)
Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)

Functional Materials

(25 ECTS credits)

Compulsory Courses

(20 ECTS credits)

Module title				Abbreviation
Lab Course Materials Science				08-FMM-MP-102-m01
Module coordinator			**Module offered by**	
lecturers specialisation subject Funktionsmaterialien (Functional Materials)			Chair of Chemical Technology of Material Synthesis	
ECTS	**Method of grading**		**Only after succ. compl. of module(s)**	
5	(not) successfully completed		--	
Duration		**Module level**	**Other prerequisites**	
1 semester		graduate	--	
Contents				
Ten selected experiments in materials science.				
Intended learning outcomes				
Students have developed an advanced proficiency in the performance of experiments in materials science.				
Courses (type, number of weekly contact hours, language — if other than German)				
P (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
Vortestate (pre-experiment exams) and Nachtestate (post-experiment exams) (15 minutes), assessment of practical performance, log (5 to 10 pages) 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)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2010) Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Project Work				08-FMM-PA-102-m01
Module coordinator			**Module offered by**	
head of the research group offering the module			Chair of Chemical Technology of Material Synthesis	
ECTS	**Method of grading**		**Only after succ. compl. of module(s)**	
5	(not) successfully completed		--	
Duration	**Module level**		**Other prerequisites**	
1 semester	graduate		--	
Contents				
This module gives students the opportunity to explore a research topic under the guidance of a supervisor and to describe their findings.				
Intended learning outcomes				
Students have developed an advanced proficiency in the performance of experiments in materials science.				
Courses (type, number of weekly contact hours, language — if other than German)				
P (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
talk (approx. 15 minutes) and log (approx. 15 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)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2010) Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Organic Functional Materials				08-OCM-FM-141-m01

Module coordinator	Module offered by
lecturer of the seminar "Organische Funktionsmaterialien"	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	graduate	--

Contents

The module deals with specific topics in organic functional materials. The focus is on fundamental (photo)physical effects in organic molecular and polymeric semiconductors as well as their application in (opto)electronic components such as field effect transistors, organic light-emitting diodes, or organic solar cells as well as in nonlinear optics.

Intended learning outcomes

The students are able to explain fundamental (photo)physical processes in organic semiconductors. He/She can explain the synthesis of these semiconductor materials as well as their application in (opto)electronic components such as field effect transistors, organic light-emitting diodes or in organic photovoltaics as well as in nonlinear optics.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Material Sciences 1 (Principles)				08-FS1-141-m01
Module coordinator			**Module offered by**	
Dean of Studies Funktionswerkstoffe (Functional Materials)			Chair of Chemical Technology of Material Synthesis	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	undergraduate	--		

Contents

This module discusses the fundamental relations between chemical bonding, the structure, the microstructure and the properties of materials.

Intended learning outcomes

Students have become familiar with the fundamental relations between chemical bonding, the structure, the microstructure and the properties of materials. They have developed the ability to apply them to research problems.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Compulsory Electives

(ECTS credits)

Module title				Abbreviation
Material Sciences 2 (Materials)				08-FS2-141-m01
Module coordinator			**Module offered by**	
Dean of Studies Funktionswerkstoffe (Functional Materials)			Chair of Chemical Technology of Material Synthesis	
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 deals with the fabrication and properties of the main material groups.				
Intended learning outcomes				
Students have developed a knowledge of the fabrication and properties of the main material groups and are able to apply that knowledge to research problems.				
Courses (type, number of weekly contact hours, language — if other than German)				
V + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title			Abbreviation
Chemically and bio-inspired Nanotechnology for Material Synthesis			08-NTM-141-m01

Module coordinator	Module offered by
holder of the Chair of Chemical Technology of Material Synthesis	Chair of Chemical Technology of Material Synthesis

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 an introduction to the synthesis methods of sol-gel chemistry and discusses the methods of analysis used to characterise the generated materials. It also discusses the fundamental principles of biomineralisation and uses examples to introduce students to bio-inspired material synthesis.

Intended learning outcomes

Students have developed an advanced knowledge of sol-gel chemistry and biomineralisation.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title	Abbreviation
Nanoscale Materials	08-PCM3-102-m01

Module coordinator	Module offered by
lecturer of the seminar "Nanoskalige Materialien"	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	graduate	--

Contents

This module discusses advanced topics in nanoscale materials. It focuses on the structure, properties, fabrication, modern characterisation methods and application areas of nanoscale materials.

Intended learning outcomes

Students are able to characterise nanoscale materials. They are able to name analytical methods and application areas of nanoscale materials.

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

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

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

written examination (90 minutes) or oral examination of one candidate each (20 minutes) or talk (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

Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Computational Mathematics (2012)
Master's degree (1 major) Functional Materials (2012)

Module title				Abbreviation
Supramolecular Chemistry (Basics)				08-SCM1-102-m01

Module coordinator	**Module offered by**
lecturer of lecture "Organischen Chemie"	Faculty of Chemistry and Pharmacy

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

Duration	**Module level**	**Other prerequisites**
1 semester	graduate	--

Contents

This module introduces students to the fundamental principles of supramolecular chemistry. It focuses on interactions between molecules, molecular recognition by receptors, complexes, supramolecular polymers, coordination polymers and networks, liquid crystals, self-assembly in aqueous media, synthetic ion channels and modern applications of supramolecular chemistry.

Intended learning outcomes

Students are able to explain interactions between molecules demonstrating a high degree of expertise in the field as well as to describe the formation, structure and polymers of coordination compounds. They are able to describe the self-assembly of polymers in aqueous media as well as to identify the characteristics of synthetic ion channels. They can name modern applications of supramolecular chemistry.

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

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

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

written examination (approx. 90 minutes) or oral examination of one candidate each (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)

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Functional Materials (2012)

Module title				Abbreviation
Computational Chemistry				08-TCM2-141-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Computational Chemistry"			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	graduate		--	
Contents				
This module introduces students to the fundamental principles of computational chemistry.				
Intended learning outcomes				
Students are able to explain the theoretical principles of computational chemistry and to apply methods in computational chemistry.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Molecular Materials (Lecture)				08-FMM-CT-141-m01
Module coordinator			**Module offered by**	
Dean of Studies Funktionswerkstoffe (Functional Materials)			Chair of Chemical Technology of Material Synthesis	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		
Contents				
This module discusses the theoretical principles of molecular and soft materials.				
Intended learning outcomes				
Students have developed a knowledge of the principles of molecular and soft materials and are able to apply that knowledge to research problems.				
Courses (type, number of weekly contact hours, language — if other than German)				
V + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
presentation (approx. 30 minutes) and examination				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Solid state chemistry and inorganic materials				08-ACM3-141-m01
Module coordinator			**Module offered by**	
lecturer of seminar "Festkörperchemie and Anorganische Materialien" (Solid State Chemistry and Inorganic Materials)			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	graduate	--		

Contents

This module provides an introduction to solid-state chemistry. It focuses on the structure, chemical and physical properties, synthesis methods and selected materials of solids.

Intended learning outcomes

Students are able to describe the structure and properties of solids. They can explain methods for solid-state synthesis. They can describe important aspects of selected materials regarding the corresponding solids.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Polymer Chemistry				03-FU-PM1-141-m01
Module coordinator			**Module offered by**	
holder of the Chair of Functional Materials in Medicine and Dentistry			Faculty of Medicine	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		

Contents

Basic methods of polymerisation: free radical polymerisations, polyadditions, ionic polymerisations, controlled radical polymerisations; characterisation of polymers and polymer analytics: gel permeation chromatography, endgroup analysis, mass spectrometry, rheology.

Intended learning outcomes

The students are familiar with the fundamentals of polymer chemistry and the related methods for their characterisation.

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

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

- 03-FU-PM1-1-141: V (no information on SWS (weekly contact hours) and course language available)
- 03-FU-PM1-2-122: P (no information on SWS (weekly contact hours) and course language available)

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

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

Assessment in module component 03-FU-PM1-1-141: Polymer Chemistry (Lecture)

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

Assessment in module component 03-FU-PM1-2-122: Polymer Chemistry (Practical course)

- 2 ECTS, Method of grading: (not) successfully completed
- Vortestate (pre-experiment exams, approx. 15 minutes each) and logs (approx. 5 pages each)
- Assessment offered: once a year, summer semester
- Language of assessment: German, English if agreed upon with the examiner

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Polymers II				03-PM2-122-m01

Module coordinator	Module offered by
holder of the Chair of Functional Materials in Medicine and Dentistry	Faculty of Medicine

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

Duration	Module level	Other prerequisites
1 semester	graduate	--

Contents

In-depth knowledge and practical application of: - free radical polymerisation, polyaddition - ionic polymerisations - controlled radical polymerisation - polymer characterisation (e. g. gel permeation chromatography, end-group analysis, mass spectrometry) - current aspects of polymer research (e. g. block-copolymers, polymer topographies, polymer functionalisation).

Intended learning outcomes

Students acquire an advanced knowledge of polymer synthesis, modification and characterisation.

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

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

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

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (20 minutes) or c) talk (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

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Technology of Functional Materials (2010)
Master's degree (1 major) Functional Materials (2012)

Homogeneous Catalysis

(25 ECTS credits)

Compulsory Courses

(20 ECTS credits)

Module title				Abbreviation
Organo- and Biocatalysis				08-HKM1-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Organo- and Biokatalyse"			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	graduate	--		
Contents				
This module provides students with deeper insights into topics in organic compounds and enzymes in catalytic processes. Organocatalysis: enantioselective implementation, principles, green chemistry, substance classes and application areas. Biocatalysis: effects of enzymes in view of different aspects, especially regarding organic synthesis.				
Intended learning outcomes				
Students are able to categorise organocatalysts and explain their effects and areas of application. They can describe the structure and applications of enzymes in organic synthesis. They are able to mechanistically describe and analyse the effects of enzymes.				
Courses (type, number of weekly contact hours, language — if other than German)				
S (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Advanced organometallic chemistry and its application in homogeneous catalysis				08-HKM2-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Spezielle Metallorganische Chemie and deren Anwendung in der Homogenkatalyse"			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	graduate	--		
Contents				
This module examines elementary organic compounds of transition metals with homogeneous catalytic applications.				
Intended learning outcomes				
Students can describe and analyse the structure, reactivity and analysis of elementary organic compounds. They are able to characterise special substance classes. They can formulate homogeneous catalysis reactions.				
Courses (type, number of weekly contact hours, language — if other than German)				
S (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Practical course Homogeneous catalysis in Inorganic Chemistry				08-HKM3AC-132-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Spezielle Metallorganische Chemie and deren Anwendung in der Homogenkatalyse"			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	graduate		--	

Contents

This module gives students the opportunity to enhance their skills in advanced synthesis and analytical methods in homogeneous catalysis. The focus will be on catalyst synthesis and characterisation, spectral analysis and crystallography. Students will be expected to conduct their work in the lab independently, write a lab report documenting their findings and deliver a presentation.

Intended learning outcomes

Students are able to use advanced synthesis and analytical methods in homogeneous catalysis in the lab and to interpret their findings. They are able to write a lab report documenting their findings and deliver a presentation.

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

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

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

practical work with lab report (approx. 10 pages) and talk (approx. 15 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 20 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Practical course Homogeneous catalysis in Organic Chemistry				08-HKM3OC-132-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Spezielle Metallorganische Chemie and deren Anwendung in der Homogenkatalyse"			Institute of Organic Chemistry	
ECTS	**Method of grading**		**Only after succ. compl. of module(s)**	
5	(not) successfully completed		--	
Duration		**Module level**	**Other prerequisites**	
1 semester		graduate	--	
Contents				
This module gives students the opportunity to enhance their skills in advanced synthesis and analytical methods in homogeneous catalysis. The focus will be on catalyst synthesis and characterisation, spectral analysis and crystallography. Students will be expected to conduct their work in the lab independently, write a lab report documenting their findings and deliver a presentation.				
Intended learning outcomes				
Students are able to use advanced synthesis and analytical methods in homogeneous catalysis in the lab and to interpret their findings. They are able to write a lab report documenting their findings and deliver a presentation.				
Courses (type, number of weekly contact hours, language — if other than German)				
P (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
practical work with lab report (approx. 10 pages) and talk (approx. 15 minutes) Language of assessment: German or English				
Allocation of places				
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Additional information				
Additional information on module duration: block placement with a duration of a minimum of 20 working days.				
Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2014)				

Compulsory Electives

(ECTS credits)

Module title				Abbreviation
Advanced transition metal chemistry				08-HKM4-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Spezielle Übergangsmetallchemie"			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	graduate	--		
Contents				
This module provides students with deeper insights into topics in the chemistry of transition metals and coordination chemistry. It also provides an introduction to bioinorganic chemistry and discusses recent developments in transition metal chemistry.				
Intended learning outcomes				
Students are able to explain transition metals and coordination compounds demonstrating a high degree of expertise in the field. They can explain the fundamental principles of bioinorganic chemistry.				
Courses (type, number of weekly contact hours, language — if other than German)				
S (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title	Abbreviation
Chemical Dynamics	08-PCM2-102-m01

Module coordinator	Module offered by
lecturer of seminar "Chemische Dynamik" (Chemical Dynamics)	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	graduate	--

Contents

This module gives students the opportunity to explore advanced topics in chemical kinetics and reaction dynamics in more detail. It discusses methods and models for investigating and describing chemical reactions.

Intended learning outcomes

Students are able to discuss advanced topics in chemical kinetics and reaction dynamics. They can describe methods and models for the investigation of chemical reactions.

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

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

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

written examination (90 minutes) or oral examination of one candidate each (20 minutes) or talk (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

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Computational Mathematics (2012)

Module title			Abbreviation
Modern Synthetic Methods			08-OCM-SYNT-141-m01

Module coordinator	Module offered by
lecturer of the seminar	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	graduate	--

Contents

This module discusses modern stereoselective synthesis methods. It focuses on selected total syntheses, organometallic chemistry and catalysis.

Intended learning outcomes

Students are able to stereoselectively plan complex chemical syntheses and to stereochemically analyse them. They can explain total syntheses. They can describe aspects of organometallic chemistry and catalysis in synthesis chemistry.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title			**Abbreviation**
Computational Chemistry			08-TCM2-141-m01
Module coordinator		**Module offered by**	
lecturer of lecture "Computational Chemistry"		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	graduate	--	
Contents			
This module introduces students to the fundamental principles of computational chemistry.			
Intended learning outcomes			
Students are able to explain the theoretical principles of computational chemistry and to apply methods in computational chemistry.			
Courses (type, number of weekly contact hours, language — if other than German)			
S + Ü (no information on SWS (weekly contact hours) and course language available)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English			
Allocation of places			
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Additional information			
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Workload			
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Teaching cycle			
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Referred to in LPO I (examination regulations for teaching-degree programmes)			
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Module appears in			
Master's degree (1 major) Chemistry (2014)			

Module title	Abbreviation
Polymer Chemistry	03-FU-PM1-141-m01

Module coordinator	Module offered by
holder of the Chair of Functional Materials in Medicine and Dentistry	Faculty of Medicine

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

Duration	Module level	Other prerequisites
1 semester	graduate	--

Contents

Basic methods of polymerisation: free radical polymerisations, polyadditions, ionic polymerisations, controlled radical polymerisations; characterisation of polymers and polymer analytics: gel permeation chromatography, endgroup analysis, mass spectrometry, rheology.

Intended learning outcomes

The students are familiar with the fundamentals of polymer chemistry and the related methods for their characterisation.

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

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

- 03-FU-PM1-1-141: V (no information on SWS (weekly contact hours) and course language available)
- 03-FU-PM1-2-122: P (no information on SWS (weekly contact hours) and course language available)

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

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

Assessment in module component 03-FU-PM1-1-141: Polymer Chemistry (Lecture)

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

Assessment in module component 03-FU-PM1-2-122: Polymer Chemistry (Practical course)

- 2 ECTS, Method of grading: (not) successfully completed
- Vortestate (pre-experiment exams, approx. 15 minutes each) and logs (approx. 5 pages each)
- Assessment offered: once a year, summer semester
- Language of assessment: German, English if agreed upon with the examiner

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in
Master's degree (1 major) Chemistry (2014)

Medicinal Chemistry

(25 ECTS credits)

Compulsory Courses

(10 ECTS credits)

Module title				**Abbreviation**
Practical course medicinal chemistry				08-MCM1-102-m01
Module coordinator			**Module offered by**	
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)			Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
10	(not) successfully completed	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		

Contents

Selected methods and topics in medicinal chemistry (synthesis, testing, analysis, theory, pharmacokinetics).

Intended learning outcomes

Students have developed a knowledge of medicinal chemistry and are able to apply it to practical 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 is creditable for bonus)

Vortestate (pre-experiment exams) and Nachtestate (post-experiment exams) (approx. 20 minutes), assessment of practical performance, written report (approx. 30 to 50 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)

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) FOKUS Pharmacy (2012)

Compulsory Electives

(ECTS credits)

Module title				Abbreviation
Pharmaceutical/Medicinal Chemistry 1				08-MCM2a-141-m01
Module coordinator			**Module offered by**	
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)			Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		
Contents				
Chemistry of drugs by field of indication; principles of drug development, strategies for active agent discovery; structure-activity relationships; molecular effect mechanisms; pharmacological principles of the drugs discussed in the module; drug analysis; drug synthesis; biotransformation, pharmacokinetics of individual drugs; history of drug development: discussion of specific examples.				
Intended learning outcomes				
Students have developed a knowledge of pharmaceutical/medicinal chemistry.				
Courses (type, number of weekly contact hours, language — if other than German)				
V (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course.				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title			Abbreviation
Pharmaceutical/Medicinal Chemistry 2			08-MCM2b-141-m01
Module coordinator		**Module offered by**	
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)		Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	graduate	--	

Contents

Chemistry of drugs by field of indication; principles of drug development, strategies for active agent discovery; structure-activity relationships; molecular effect mechanisms; pharmacological principles of the drugs discussed in the module; drug analysis; drug synthesis; biotransformation, pharmacokinetics of individual drugs; history of drug development: discussion of specific examples.

Intended learning outcomes

Students have developed a knowledge of pharmaceutical/medicinal chemistry.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Principles of drug design				08-MCM3-132-m01
Module coordinator			**Module offered by**	
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)			Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		
Contents				
Fundamentals: drug targets (types and classification), target validation, effect mechanisms, protein-ligand interactions, lead finding; lead optimisation. Experimental methods: bioassays, HTS, combinatorial chemistry, naturally occurring substances. Theoretical methods: molecular modelling, structure-based drug design, pharmacophore models, docking, virtual screening, simulation methods, de novo design. Ligand-based drug design. QSAR. Predictions of pharmacokinetic and toxicological components (ADME). Case examples, prodrug strategies, bioisosterism, SAR.				
Intended learning outcomes				
Students master the theoretical and experimental methods and aspects of drug design.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
presentation with discussion (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				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Clinical and Analytical Chemistry				08-PH-KAC-092-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Klinisch-analytische Chemie" (Clinical and Analytical Chemistry)			Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	undergraduate	--		
Contents				
This module discusses advanced topics in clinical analytical chemistry.				
Intended learning outcomes				
Students have developed an advanced knowledge of molecular biology.				
Courses (type, number of weekly contact hours, language — if other than German)				
V (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
written examination (120 minutes)				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Biochemistry (2012) Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2010) Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Clinical and Analytical Chemistry (practical course)				08-PH-KACP-092-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Klinisch-analytische Chemie" (Clinical and Analytical Chemistry)			Institute of Pharmacy and Food 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 covers practical topics in clinical chemistry and clinical diagnostics as well as the related analytical methods.

Intended learning outcomes

Students have developed a knowledge of clinical analytical chemistry and are able to apply it to practical 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 is creditable for bonus)

examination talks (Testate, approx. 15 minutes each), log (approx. 5 to 10 pages)

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Biochemistry (2012)
Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Modern Synthetic Methods				08-OCM-SYNT-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar			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	graduate		--	

Contents

This module discusses modern stereoselective synthesis methods. It focuses on selected total syntheses, organometallic chemistry and catalysis.

Intended learning outcomes

Students are able to stereoselectively plan complex chemical syntheses and to stereochemically analyse them. They can explain total syntheses. They can describe aspects of organometallic chemistry and catalysis in synthesis chemistry.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title			Abbreviation
Modern Aspects of Natural Product Chemistry and Biological Chemistry			08-OCM-NAT-141-m01

Module coordinator	Module offered by
lecturer of the seminar	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	graduate	--

Contents

This module discusses advanced topics in natural product chemistry and biological chemistry.

Intended learning outcomes

Students are able to discuss advanced topics in natural product chemistry and biological chemistry.

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

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

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

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

Allocation of places

Chemistry Master's: no restrictions. Biochemistry Master's: 20 places. Places will be allocated by lot.

Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Bioanorganic Chemistry				08-ACM2-141-m01
Module coordinator			**Module offered by**	
lecturer of seminar "Anorganische Aspekte der Biochemie and Medizinischen Chemie" (Inorganic Aspects of Biochemistry and Medicinal 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	graduate	--		
Contents				
This module introduces students to the fundamental principles of bioinorganic chemistry (BIC). It discusses the methods of BIC, structures and effects of metalliferous enzymes and applications of BIC in the fields of diagnosis and therapy.				
Intended learning outcomes				
Students are able to describe the principles of, and methods in, BIC. They can explain the structure and effects of metalliferous enzymes and describe applications of BIC in biochemistry and medicine.				
Courses (type, number of weekly contact hours, language — if other than German)				
S (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Molecular Biology				08-BC-MOLM-141-m01
Module coordinator			**Module offered by**	
holder of the Chair of Biochemistry			Chair of Biochemistry	
ECTS	**Method of grading**		**Only after succ. compl. of module(s)**	
5	numerical grade		--	
Duration	**Module level**		**Other prerequisites**	
1 semester	undergraduate		--	
Contents				
Comprising a lecture and an exercise, this module discusses advanced topics in molecular physiology and functional biochemistry.				
Intended learning outcomes				
Students have developed a sound knowledge of molecular biology.				
Courses (type, number of weekly contact hours, language — if other than German)				
V + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 60 to 90 minutes) or b) log (approx. 20 pages) or c) oral examination of one candidate each (approx. 20 minutes) or d) oral examination in groups of up to 3 candidates (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) presentation (approx. 30 minutes). Students will be informed about the method and length of the assessment prior to the course. Language of assessment: German or English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title				Abbreviation
Practical course Structural Biology for advanced students				08-BC-VPSB-141-m01
Module coordinator			**Module offered by**	
holder of the Chair of Biochemistry			Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
10	numerical grade	08-BC-MOLP		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		

Contents

This module discusses cloning and the expression of protein constructs for crystallisation. It teaches students the fundamental principles and techniques of crystallisation and crystal optimisation as well as crystallographic data collection.

Intended learning outcomes

Students have developed an understanding of the method of selecting protein constructs for crystallisation. They master fundamental skills and techniques for protein crystallisation as well as data collection and processing.

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

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

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

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

Allocation of places

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Additional information

Additional information on module duration: block placement with a duration of a minimum of 40 working days.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Supramolecular Chemistry

(25 ECTS credits)

Compulsory Courses

(10 ECTS credits)

Module title				Abbreviation
Supramolecular Chemistry (Basics)				08-SCM1-102-m01

Module coordinator	Module offered by
lecturer of lecture "Organischen Chemie"	Faculty of Chemistry and Pharmacy

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

Duration	Module level	Other prerequisites
1 semester	graduate	--

Contents

This module introduces students to the fundamental principles of supramolecular chemistry. It focuses on interactions between molecules, molecular recognition by receptors, complexes, supramolecular polymers, coordination polymers and networks, liquid crystals, self-assembly in aqueous media, synthetic ion channels and modern applications of supramolecular chemistry.

Intended learning outcomes

Students are able to explain interactions between molecules demonstrating a high degree of expertise in the field as well as to describe the formation, structure and polymers of coordination compounds. They are able to describe the self-assembly of polymers in aqueous media as well as to identify the characteristics of synthetic ion channels. They can name modern applications of supramolecular chemistry.

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

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

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

written examination (approx. 90 minutes) or oral examination of one candidate each (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)

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Functional Materials (2012)

Module title			**Abbreviation**
Supramolecular Chemistry (Practical Course)			08-SCM2-102-m01
Module coordinator			**Module offered by**
lecturer of lecture "Supramolekularen Chemie (Organische Chemie/Physikalische Chemie)"			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	graduate	--	
Contents			
This module gives students the opportunity to perform some of the key experiments in supramolecular chemistry. They will perform syntheses of host-guest complexes, dye aggregates and nanoparticles and use advanced analytical methods to characterise them.			
Intended learning outcomes			
Students are able to perform syntheses of host-guest complexes and use spectroscopic methods to analyse and characterise them. They are able to produce nanoparticles and to characterise them microscopically.			
Courses (type, number of weekly contact hours, language — if other than German)			
P (no information on SWS (weekly contact hours) and course language available)			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)			
practical work, logs (approx. 5 pages each) Language of assessment: German or English			
Allocation of places			
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Additional information			
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Workload			
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Teaching cycle			
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Referred to in LPO I (examination regulations for teaching-degree programmes)			
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Module appears in			
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2010) Master's degree (1 major) Chemistry (2014)			

Compulsory Electives

(ECTS credits)

No less than one of the two modules 08-SCM3 or 08-PCM5 must be completed in the focus.

Module title				Abbreviation
Bioorganic Chemistry				08-SCM3-141-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Bioorganische Chemie" (Bioorganic 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	graduate	--		

Contents

This module discusses topics at the interface of organic chemistry, biology and medicine. It focuses on molecular interactions and recognition, molecular diversity, active agent development, new aspects of DNA, RNA, proteins and carbohydrates.

Intended learning outcomes

Students are able to describe molecular interactions and detection mechanisms of bioorganic chemistry. They can explain the molecular diversity of biological systems. They can characterise the fabrication of agents. They can describe modern aspects of DNA, RNA, proteins and carbohydrates.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Physical chemistry of supramolecular assemblies				08-PCM5-141-m01
Module coordinator			**Module offered by**	
lecturer of the seminar "Physikalische Chemie Supramolekularer Strukturen"			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	graduate	--		

Contents

This module examines the basic interactions between molecules. It discusses the formation and physical-chemical properties of aggregates as well as key applications of supramolecular chemistry.

Intended learning outcomes

Students are able to explain the basic interactions between molecules demonstrating a high degree of expertise in the field. They can describe the formation and physical-chemical properties of aggregates. They can name modern applications of supramolecular chemistry.

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

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

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

written examination (approx. 90 minutes) or oral examination of one candidate each (approx. 20 minutes) or talk (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

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Bioanorganic Chemistry				08-ACM2-141-m01
Module coordinator			**Module offered by**	
lecturer of seminar "Anorganische Aspekte der Biochemie and Medizinischen Chemie" (Inorganic Aspects of Biochemistry and Medicinal 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	graduate	--		

Contents

This module introduces students to the fundamental principles of bioinorganic chemistry (BIC). It discusses the methods of BIC, structures and effects of metalliferous enzymes and applications of BIC in the fields of diagnosis and therapy.

Intended learning outcomes

Students are able to describe the principles of, and methods in, BIC. They can explain the structure and effects of metalliferous enzymes and describe applications of BIC in biochemistry and medicine.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Principles of drug design				08-MCM3-132-m01
Module coordinator			**Module offered by**	
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)			Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
5	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	--		

Contents

Fundamentals: drug targets (types and classification), target validation, effect mechanisms, protein-ligand interactions, lead finding; lead optimisation. Experimental methods: bioassays, HTS, combinatorial chemistry, naturally occurring substances. Theoretical methods: molecular modelling, structure-based drug design, pharmacophore models, docking, virtual screening, simulation methods, de novo design. Ligand-based drug design. QSAR. Predictions of pharmacokinetic and toxicological components (ADME). Case examples, prodrug strategies, bioisosterism, SAR.

Intended learning outcomes

Students master the theoretical and experimental methods and aspects of drug design.

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

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

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

presentation with discussion (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

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title	Abbreviation
Computational Chemistry	08-TCM2-141-m01

Module coordinator	**Module offered by**
lecturer of lecture "Computational Chemistry"	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	graduate	--

Contents

This module introduces students to the fundamental principles of computational chemistry.

Intended learning outcomes

Students are able to explain the theoretical principles of computational chemistry and to apply methods in computational chemistry.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Organic Functional Materials				08-OCM-FM-141-m01

Module coordinator	Module offered by
lecturer of the seminar "Organische Funktionsmaterialien"	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	graduate	--

Contents

The module deals with specific topics in organic functional materials. The focus is on fundamental (photo)physical effects in organic molecular and polymeric semiconductors as well as their application in (opto)electronic components such as field effect transistors, organic light-emitting diodes, or organic solar cells as well as in nonlinear optics.

Intended learning outcomes

The students are able to explain fundamental (photo)physical processes in organic semiconductors. He/She can explain the synthesis of these semiconductor materials as well as their application in (opto)electronic components such as field effect transistors, organic light-emitting diodes or in organic photovoltaics as well as in nonlinear optics.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Nanoscale Materials				08-PCM3-102-m01

Module coordinator	**Module offered by**
lecturer of the seminar "Nanoskalige Materialien"	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	graduate	--

Contents

This module discusses advanced topics in nanoscale materials. It focuses on the structure, properties, fabrication, modern characterisation methods and application areas of nanoscale materials.

Intended learning outcomes

Students are able to characterise nanoscale materials. They are able to name analytical methods and application areas of nanoscale materials.

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

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

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

written examination (90 minutes) or oral examination of one candidate each (20 minutes) or talk (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

Bachelor' degree (1 major) Nanostructure Technology (2010)
Bachelor' degree (1 major) Nanostructure Technology (2012)
Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Computational Mathematics (2012)
Master's degree (1 major) Functional Materials (2012)

Theoretical Chemistry

(25 ECTS credits)

Compulsory Courses

(10 ECTS credits)

Module title				Abbreviation
Theoretical Chemistry (Basics)				08-TCM1-141-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Theoretische Chemie"			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	graduate	--		
Contents				
This module introduces students to the fundamental principles of theoretical chemistry.				
Intended learning outcomes				
Students are able to describe the mathematical and physical principles underlying the quantum chemical and quantum dynamical approaches of theoretical chemistry.				
Courses (type, number of weekly contact hours, language — if other than German)				
S + Ü (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2: approx. 30 minutes, groups of 3: approx. 40 minutes) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes). Students will be informed about the type and length of assessment prior to the course. Language of assessment: German, English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2014)				

Module title			Abbreviation
Programming in Theoretical Chemistry			08-TCM3-102-m01

Module coordinator	Module offered by
lecturer of lecture "Programmieren in Theoretischer Chemie"	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	graduate	--

Contents

This module provides an introduction to the fundamentals of programming in theoretical chemistry and discusses its application areas.

Intended learning outcomes

Students are able to explain and use one of the programming languages typically used in theoretical chemistry as well as to name its application areas.

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

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

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

completion and discussion of approx. 5 programming exercises as well as talk (approx. 45 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

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2010)
Master's degree (1 major) Chemistry (2014)
Master's degree (1 major) Mathematics (2012)
Master's degree (1 major) Mathematics (2010)
Master's degree (1 major) Computational Mathematics (2012)

Compulsory Electives

(ECTS credits)

Module title	Abbreviation
Theoretical Chemistry - Project course wave-packet dynamics	08-TCAP1-132-m01

Module coordinator	Module offered by
head of the research group offering the module	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	graduate	--

Contents

This module gives students the opportunity to get involved in the work of one of the research groups based at the Institute of Theoretical Chemistry and learn some of the methods typically used in the discipline. The focus will be on wave packet dynamics.

Intended learning outcomes

Students have learned some of the methods typically used in theoretical chemistry and, in particular, in wave packet dynamics. They are able to explain issues that are relevant to the field of wave packet dynamics.

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

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

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

presentation (approx. 30 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 4 weeks.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Theoretical Chemistry - Project coursewave function based methods				08-TCAP2-132-m01
Module coordinator			**Module offered by**	
head of the research group offering the module			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	graduate	--		
Contents				
This module gives students the opportunity to get involved in the work of one of the research groups based at the Institute of Theoretical Chemistry and learn some of the methods typically used in the discipline. The focus will be on wave function methods.				
Intended learning outcomes				
Students have learned some of the methods typically used in theoretical chemistry and, in particular, in wave function methods. They are able to explain issues that are relevant to the field of wave function methods.				
Courses (type, number of weekly contact hours, language — if other than German)				
P (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
presentation (approx. 30 minutes) Language of assessment: German or English				
Allocation of places				
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Additional information				
Additional information on module duration: 4 weeks.				
Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2014)				

Module title			Abbreviation
Theoretical Chemistry - Project course Computational Photochemistry			08-TCAP3-132-m01
Module coordinator		**Module offered by**	
head of the research group offering the module		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	graduate	--	

Contents

This module gives students the opportunity to get involved in the work of one of the research groups based at the Institute of Theoretical Chemistry and learn some of the methods typically used in the discipline. The focus will be on theoretical photochemistry.

Intended learning outcomes

Students have learned some of the methods typically used in theoretical chemistry and, in particular, in theoretical photochemistry. They are able to explain issues that are relevant to the field of theoretical photochemistry.

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

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

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

presentation (approx. 30 minutes)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 4 weeks.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Module title				Abbreviation
Computational Chemistry				08-TCM2-141-m01
Module coordinator			**Module offered by**	
lecturer of lecture "Computational Chemistry"			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	graduate	--		

Contents

This module introduces students to the fundamental principles of computational chemistry.

Intended learning outcomes

Students are able to explain the theoretical principles of computational chemistry and to apply methods in computational chemistry.

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

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

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

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

Allocation of places

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Additional information

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Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2014)

Module title			**Abbreviation**
Principles of drug design			08-MCM3-132-m01
Module coordinator		**Module offered by**	
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)		Institute of Pharmacy and Food Chemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	graduate	--	

Contents

Fundamentals: drug targets (types and classification), target validation, effect mechanisms, protein-ligand interactions, lead finding; lead optimisation. Experimental methods: bioassays, HTS, combinatorial chemistry, naturally occurring substances. Theoretical methods: molecular modelling, structure-based drug design, pharmacophore models, docking, virtual screening, simulation methods, de novo design. Ligand-based drug design. QSAR. Predictions of pharmacokinetic and toxicological components (ADME). Case examples, prodrug strategies, bioisosterism, SAR.

Intended learning outcomes

Students master the theoretical and experimental methods and aspects of drug design.

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

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

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

presentation with discussion (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

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)

Key Area 1 (double degree)

(30 ECTS credits)

Key Area 2 (double degree)

(25 ECTS credits)

Courses at partner university abroad

(30 ECTS credits)

Module title				Abbreviation
Courses at the partner university				08-VPU-141-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)**		
30	(not) successfully completed	--		
Duration	**Module level**	**Other prerequisites**		
2 semester	graduate	Please consult with course advisory service.		
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)				
V (no information on SWS (weekly contact hours) and course language available)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)				
assessment or successful completion as certified by the lecturer; methods of assessment: a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (approx. 20 to 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes); students will be informed about the method and length of the assessment prior to the course Language of assessment: German or English				
Allocation of places				
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Additional information				
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Workload				
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Teaching cycle				
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Referred to in LPO I (examination regulations for teaching-degree programmes)				
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Module appears in				
Master's degree (1 major) Chemistry (2013) Master's degree (1 major) Chemistry (2014)				

Thesis

(30 ECTS credits)

Module title				Abbreviation
Master-Thesis				08-MA-132-m01
Module coordinator			**Module offered by**	
degree programme coordinator Chemie (Chemistry)			Faculty of Chemistry and Pharmacy	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**		
30	numerical grade	--		
Duration	**Module level**	**Other prerequisites**		
1 semester	graduate	Where applicable, specific modules as specified by supervisor.		

Contents

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

Intended learning outcomes

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

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

no courses assigned

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

written thesis (approx. 60 to 80 pages)
Language of assessment: German or English

Allocation of places

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Additional information

Additional information on module duration: 6 months.

Workload

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Teaching cycle

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

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Module appears in

Master's degree (1 major) Chemistry (2013)
Master's degree (1 major) Chemistry (2014)