

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: 2026 Responsible: Faculty of Chemistry and Pharmacy



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Compulsory Electives	10 or 15	235
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Learning Outcomes

German contents and learning outcome available but not translated yet.

Wissenschaftliche Befähigung

- Nach erfolgreichem Abschluss des Master-Studiums verfügen die Absolvent/innen über vertiefte Kenntnisse des wissenschaftlichen Arbeitens in der Forschung und Anwendung der Chemie. Sie haben sich dabei auf drei der angebotenen Schwerpunkte (Anorganische Chemie, Organische Chemie, Physikalische Chemie, Biochemie, Funktionsmaterialien, Homogenkatalyse, Medizinische Chemie, Supramolekulare Chemie oder Theoretische Chemie) spezialisiert, indem sie die diesen Schwerpunkten zugeordneten Module (Vorlesungen, Seminare und Praktika) absolviert haben. Sie besitzen neben den vertieften fachspezifischen Kenntnissen auch Abstraktionsvermögen, analytisches Denken, Problemlösungskompetenz und die Fähigkeit, komplexe Zusammenhänge zu strukturieren. Die Grundlagen hierfür werden in den o.g. Veranstaltungen vermittelt und mittels Klausuren, Kolloquien, Protokollen oder Referaten überprüft.
- Die Absolvent/innen besitzen nach Erlangung des Masters die Kompetenzen, ein gegebenes wissenschaftliches Problem planvoll und nach den Regeln der guten wissenschaftlichen Praxis zu bearbeiten, darunter unter anderem sich unter Zuhilfenahme der Kenntnisse in der Literaturrecherche in neue Aufgabengebiete einzuarbeiten und Veröffentlichungen in internationalen Journalen im Kontext der wissenschaftlichen Literatur kritisch einzuordnen und zu bewerten. Sie sind in der Lage, das erworbene Wissen selbständig anzuwenden und auf neue Aufgabenstellungen zu übertragen, Experimente auf Grundlage chemischer Methoden strukturiert und in vorgegebenem zeitlichem Rahmen durchzuführen und zu dokumentieren, die ermittelten Daten kritisch zu analysieren und die Ergebnisse schriftlich zusammenzufassen. Außerdem können Sie ihre selbständig durchgeführten Projekte vor einem Publikum darstellen und die gewählte Methodik in fachlicher Diskussion verteidigen. Vermittelt werden diese Fähigkeiten im Rahmen von Forschungspraktika und der Master-Arbeit. Das Erreichen der Ziele wird durch Praktikums-Protokolle, die Master-Thesis sowie die Präsentation der entsprechenden Ergebnisse überprüft.

Befähigung zur Aufnahme einer Erwerbstätigkeit

- Die Absolvent/innen besitzen Abstraktionsvermögen, Problemlösungskompetenz und die Fähigkeit, komplexe Zusammenhänge in analytischer Herangehensweise zu strukturieren. Die Grundlagen hierfür werden in Vorlesungen, Seminaren und Praktika der verschiedenen Disziplinen der Chemie vermittelt und mittels Klausuren, Kolloquien, Referaten oder Protokollen überprüft.
- Die Absolvent/innen sind in der Lage, ihr theoretisches Wissen in der Praxis anzuwenden und können mit den erlernten wissenschaftlichen Methoden auch unbekannte Probleme aus unterschiedlichen fachlichen Perspektiven analysieren und bearbeiten. Sie sind es dabei gewohnt, in einem Team aus Kommiliton/innen, Kolleg/innen und/oder Wissenschaftler/innen konstruktiv und zielorientiert zusammenzuarbeiten. Der Praxisbezug ist durch einen hohen Anteil an Laborpraktika sowohl Kurspraktika als auch individuelle Forschungspraktika und nicht zuletzt durch die Master-Arbeit gegeben. Der Erfolg wird durch Praktikumsprotokolle und die Master-Thesis überprüft.
- Als teilweise interdisziplinärer Studiengang fördert der Master-Studiengang Chemie, bei entsprechender Wahl der Schwerpunktkombination, von Beginn an fachübergreifendes Lernen, Denken und Verstehen. Ein Teil der Lehrveranstaltungen wird auf Englisch angeboten und fördert somit die Kommunikations-Kompetenz in dieser international anerkannten Wissenschafts-Sprache. Diese auf dem breiten Fundament der im Bachelor Chemie erworbenen Kompetenzen aufbauende, vertiefte und spezialisierte Wissensbasis und Methodenkompetenz sowie die eingeübte Teamfähigkeit und Weltoffenheit können die Absolvent/innen gewinnbringend in ihrer Berufspraxis einsetzen.



Persönlichkeitsentwicklung

- Die Absolvent/innen sind bereit und in der Lage, Verantwortung für ihr Handeln und für andere zu übernehmen. Sie verfügen über die kommunikativen Fähigkeiten, komplexe Sachverhalte und Standpunkte im Team zu entwickeln, zielgruppengerecht darzustellen und reflektiert gegenüber abweichenden Positionen zu verteidigen und weiterzuentwickeln. Diese Fähigkeiten zur Übernahme von Verantwortung, Diskussionsbereitschaft und Teamfähigkeit sowie Eigenverantwortung und Selbständigkeit, erlernen und beweisen die Studierenden in erster Linie in den selbständig angefertigten Praktikums-Protokollen und der Abschlussarbeit, deren Bewertung zeigt, in welchem Umfang die Ziele erreicht wurden.
- Das Curriculum des Masters Chemie ermöglicht den Studierenden, ein Erasmus-Studium oder ein Laborpraktikum an einer ausländischen Universität durchzuführen. Der Prüfungsausschuss Chemie wacht dabei über die Einhaltung der wissenschaftlichen Standards und ein adäquates Projekt. Die Studierenden erwerben dadurch wertvolle persönliche Erfahrungen und erweitern ihren sprachlichen und kulturellen Horizont.
- Erst die durch Übung und Ermutigung erlangte Fähigkeit zu Kritik und Reflexion (inklusive Selbstreflexion und Selbstkritik) ermöglicht eigenständiges Denken und selbstbestimmtes Handeln, das vor sich selbst und anderen begründet ist und rational kommuniziert werden kann. Diese Kritikfähigkeit und Fähigkeit zur Selbstreflexion erlernen die Studierenden durch das Feedback der Lehrenden und Studierenden zu ihren Seminarvorträgen, die im Masterstudium vermehrt stattfinden.

Befähigung zum gesellschaftlichen Engagement

• Absolvent/innen des Master Chemie werden durch ihr Studium in die Lage versetzt, zu gesellschaftlich kritisch und kontrovers diskutierten Fragen zu chemischen Themen, wissenschaftlich fundiert und begründet Position zu beziehen. Sie sind sich darüber hinaus bei ihrer Arbeit ihrer ethischen Verantwortung gegenüber der Gesellschaft und der Umwelt bewusst und reflektieren ihr Handeln stets kritisch. Vor allem im Rahmen der individuellen, mehrwöchigen bis ganzsemestrigen Laborpraktika und der Abschlussarbeit setzen sich die Studierenden mit aktuellen Forschungsthemen selbständig und kritisch auseinander. Hierzu gehört auch die Reflexion möglicher Folgen der eigenen Arbeit für Umwelt und Gesellschaft sowie das Nachdenken über die damit zusammenhängenden ethischen Fragestellungen. Die Bewertungen der Praktikums-Protokolle und der Abschlussarbeit zeigen, in welchem Umfang die Ziele erreicht wurden.



Abbreviations used

Course types: $\mathbf{E} = \text{field trip}$, $\mathbf{K} = \text{colloquium}$, $\mathbf{O} = \text{conversatorium}$, $\mathbf{P} = \text{placement/lab course}$, $\mathbf{R} = \text{project}$, $\mathbf{S} = \text{seminar}$, $\mathbf{T} = \text{tutorial}$, $\ddot{\mathbf{U}} = \text{exercise}$, $\mathbf{V} = \text{lecture}$

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:

ASP02015

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

??-???-2025 (2025-??)

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 Focuses

(75 ECTS credits)

Students must take three focuses (focuses 1 through 3 pursuant to Section 3 Subsection 2 Sentence 2 FSB (subject-specific provisions)) worth 25 ECTS credits each; provisions on available combinations are set out in Section 3 Subsection 2 Sentence 8 FSB.



Inorganic Chemistry

(25 ECTS credits)



Compulsory Courses

(20 ECTS credits)



08-ACM1-161-m01						
Module offered by						
Institute of Inorganic Chemistry						
ompl. of module(s)						
es						
emistry and transition metal chemistry. It focuses on onding situations of MGEs and MGE compounds, the						
pounds of the main group elements. They can describe he structure as well as chemical and physical aspects						
erman)						
S (3) + S (3) Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)						
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English						
Allocation of places						
Additional information						
1						

300 h

Teaching cycle

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



Module title					Abbreviation		
Inorganic Chemistry practical course for advanced				08-ACPM-161-m01			
Module	e coord	linator		Module offered by			
focus p	focus point coordinator "Inorganic Chemistry" Institute of Inorganic Chemistry		ic Chemistry				
ECTS	Meth	od of grading	Only after succ. compl. of module(s)				
10	(not)	successfully completed					
Duratio	on	Module level	Other prerequisites	i			
1 seme	ster	graduate					
Conten	ıts						
tral ana	alvsis a						
a lab re	eport d	and crystallography. Stud ocumenting their finding	ents will be expected	to conduct their wo	eres, purification methods, spec-		
a lab re Intend Studen	eport d ed lear nts are	nd crystallography. Stud ocumenting their finding: ning outcomes able to use advanced syn	ents will be expected s and deliver a prese athesis and analytica	I to conduct their wontation.	eres, purification methods, spec- rk in the lab independently, write		
a lab re Intende Studen terpret	ed lear ed lear its are their fi	nd crystallography. Stud ocumenting their finding: ning outcomes able to use advanced syn	ents will be expected s and deliver a prese on thesis and analytica write a lab report doc	I to conduct their wo ntation. I methods in inorgan cumenting their findi	eres, purification methods, spec- rk in the lab independently, write ic chemistry in the lab and to in-		
a lab re Intende Studen terpret Course P (24)	ed lear its are their fi	and crystallography. Stud ocumenting their findings ning outcomes able to use advanced syn andings. They are able to	ents will be expected s and deliver a prese on thesis and analytica write a lab report doc	I to conduct their wo ntation. I methods in inorgan cumenting their findi	eres, purification methods, spec- rk in the lab independently, write ic chemistry in the lab and to in-		
a lab re Intende Studen terpret Course P (24) Module	eport ded lear ats are at their fits (type, the taught)	and crystallography. Stud ocumenting their findings ning outcomes able to use advanced syn ndings. They are able to a number of weekly contact hours,	ents will be expected and deliver a present thesis and analytica write a lab report documents and anguage — if other than Ge	I to conduct their wontation. I methods in inorgan tumenting their finding	eres, purification methods, spectrk in the lab independently, write		

Additional information

Additional information on module duration: block taught lab course with approx. 40 working days.

Workload

300 h

Teaching cycle

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



Compulsory Electives

(5 ECTS credits)



Module title					Abbreviation	
Bioinorganic Chemistry					08-ACM2-242-m01	
Module coordinator Module			Module offered by	offered by		
lecturer of the seminar "Bioinorganic Chemistry"			hemistry"	Institute of Inorganic Chemistry		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	numerical grade					
Duratio	on	Module level	Other prerequisites	1		
1 seme	ester	graduate				
Conter	nts					
	ds of B				chemistry (BIC). It discusses the ns of BIC in the fields of diagnosis	
Intend	ed lear	ning outcomes				
		able to describe the princus			explain the structure and effects medicine.	
Course	S (type, i	number of weekly contact hours,	language — if other than Ge	rman)		
S (3) Modul	e taugh	t in: German or English				
		sessment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if n	ot every semester, information on whether	
b) oral c) port	examir folio (a	mination (approx. 45 to 9 nation of one candidate e pprox. 30 hours total) assessment: German and	each (20 to 30 minute	es) or		
	tion of		,			
Additional information						
Workload						
150 h						
Teachi	ng cycl	e				

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



Modul	e title	,		,	Abbreviation
Solid s	tate ch	emistry and inorganic	materials		o8-ACM3-161-mo1
Modul	e coord	inator		Module offered by	J.
lecturer of seminar "Festkörperchemie and Anorga Materialien" (Solid State Chemistry and Inorganic als)				Institute of Inorgar	nic Chemistry
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)	
5	nume	rical grade			
Durati	on	Module level	Other prerequisites		
1 seme	ester	graduate			
Conte	nts				
			n to solid-state chemis selected materials of so		e structure, chemical and physical
Intend	ed lear	ning outcomes			
				•	xplain methods for solid-state the corresponding solids.
Course	es (type, i	number of weekly contact hou	rs, language — if other than Ge	rman)	
S (3)					
		sessment (type, scope, lan ole for bonus)	guage — if other than German,	examination offered — if n	ot every semester, information on whether
b) oral c) oral d) log e) pres	examir examir (approx sentatio		e each (20 to 30 minute o 3 candidates (approx)		ididate) or
Alloca	tion of	olaces			
Additio	onal inf	ormation			
Worklo	oad				
150 h					
Teachi	ng cycl	е			
Referre	ed to in	LPO I (examination regulat	ions for teaching-degree progra	ammes)	



Module title Abbreviation							
Special Topics in Inorganic Chemistry 08-ACMS-211-mo					08-ACMS-211-m01		
Modul	e coord	inator		Module offered by			
Person	(s) resp	onsible for the focus Ino	rganic Chemistry	Institute of Inorgan	ic Chemistry		
ECTS	Metho	od of grading	Only after succ. con	ıpl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	graduate					
Conter	ıts						
The mo	odule co	overs current and/or spec	cial topics in Inorgani	c Chemistry.			
Intend	ed lear	ning outcomes					
Course S (2) + Metho	es (type, r Ü (1) d of ass		anguage — if other than Ger	man)	ot every semester, information on whether		
b) oralc) orald) log (e) pres	a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English						
Allocat	tion of p	olaces					
Additional information							
Workload							
150 h							
Teaching cycle							
·							

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



Modul	e title	_			Abbreviation			
Advan	ced org	anometallic chemistry a	08-HKM2-161-m01					
lysis								
Modul	e coord	inator		Module offered by				
		seminar "Spezielle Meta wendung in der Homoger		Institute of Inorgan	ic Chemistry			
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)				
5	nume	rical grade						
Duration	on	Module level	Other prerequisites					
1 seme	ester	graduate						
Conter	nts							
This m tions.	odule e	xamines elementary org	anic compounds of tra	ansition metals with	homogeneous catalytic applica-			
Intend	ed lear	ning outcomes						
					nentary organic compounds. They neous catalysis reactions.			
Course	es (type, r	number of weekly contact hours,	language — if other than Ger	rman)				
S (3) Modul	e taugh	t in: German or English						
		sessment (type, scope, langua le for bonus)	age — if other than German, o	examination offered — if no	ot every semester, information on whether			
b) oral c) oral d) log e) pres	examir examin (approx sentatio	mination (approx. 90 to a nation of one candidate e nation in groups of up to g . 20 pages) or n (approx. 30 minutes) ssessment: German and	each (20 to 30 minute 3 candidates (approx.	= -	didate) or			
Allocat	tion of p	olaces						
Additio	onal inf	ormation						
Workload								
150 h								
Teachi	ing cycl	e						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)							
	territoria de la communicación regulations for teaching degree programmes)							



Organic Chemistry

(25 ECTS credits)



Compulsory Courses

(15 ECTS credits)



Module title					Abbreviation
Modern Synthetic Methods					08-0CM-SYNT-161-m01
Module coordinator				Module offered by	
lecture	r of the	seminar		Institute of Organic	Chemistry
ECTS	Method of grading Only after succ. con			pl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	its				
This module discusses modern stereoselective synthesis methods. It focuses on selected total syntheses, organometallic chemistry and catalysis.					
Intended learning outcomes					
Studer	its are a	able to stereoselectively	plan complex chemic	al syntheses and to	stereochemically analyse them.

sis chemistry.

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

 $S(2) + \ddot{U}(1)$

Module taught in: German or English

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

They can explain total syntheses. They can describe aspects of organometallic chemistry and catalysis in synthe-

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

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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



Module title Abbreviation						
Advanced Research Project Organic Chemistry 08-OCM-AKP1-161-mo1						
Modul	e coord	inator		Module offered by		
head o	f the re	search group offering the	e module	Institute of Organic	Chemistry	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
10	(not)	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts					
		ives students the opport f Organic Chemistry and			f the research groups based at ytical methods.	
Intend	ed learı	ning outcomes				
		able to describe and use well as to describe theor		s and analytical met	hods typically used by the rese-	
		number of weekly contact hours,		rman)		
P (20) Modul	e taugh	t in: German or English				
		sessment (type, scope, langua le for bonus)	${\sf ge-if}$ other than German,	examination offered — if no	ot every semester, information on whether	
		5 to 20 pages) and talk (ssessment: German and				
Alloca	tion of p	olaces				
Additio	onal inf	ormation				
Workload						
300 h						
Teaching cycle						
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		



Compulsory Electives

(10 ECTS credits)



Modul	e title			Abbreviation		
Moder	n Aspe	cts of Biological Cher	mistry		08-0CM-BIO-242-m01	
Modul	e coord	inator		Module offered by		
I	lecturer of the seminar "Modern Aspects of Biological Chemistry"			Institute of Organic Chemistry		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	Duration Module level		Other prerequisites	Other prerequisites		
1 seme	1 semester graduate					
Conter	Contents					

The course deals with advanced topics of biological chemistry that build on fundamental knowledge of organic chemistry, bioorganic chemistry, biochemistry and molecular biology. Key concepts in the course cover the chemistry of the genetic code, and methods to analyse and interfere with gene expression and secondary metabolism. We will cover genetic code expansion, including unnatural base pairs and unnatural amino acids, including their chemical synthesis and enzymatic incorporation. We will also cover combinatorial synthesis methods and directed evolution and display technologies. This includes in vitro selection and in vitro evolution of functional nucleic acids (aptamers, ribozymes, deoxyribozymes), mRNA display, phage display, directed evolution of proteins/enzymes, antibodies, nanobodies, sequencing methods, DNA/RNA origami and nanotechnology, as well as combinatorial polyketide synthesis and non-ribosomal peptide synthesis.

Intended learning outcomes

The students will have a detailed understanding of modern concepts in functional nucleic acids and engineered proteins, including their synthesis and analysis. They will be able to discuss a wide variety of relevant methods and explain chemical relationships at the molecular level with biochemical/biotechnological questions and apply them to corresponding problems. The students will be able to critically examine information and new developments in the field of biological chemistry.

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

S (3)

Module taught in: German or English

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

- a) written examination (approx. 45 to 90 minutes) or
- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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

Master's with 1 major Chemistry (2026)	JMU Würzburg • generated 25-Nov-2025 • exam.	page 28 / 345
	reg. data record Master (120 ECTS) Chemie - 2026	



Module title Abbreviation						
Organi	c Funct	tional Materials			08-0CM-FM-161-m01	
Module	coord	linator		Module offered by		
lecture	r of the	e seminar "Organisch	e Funktionsmaterialien"	Institute of Organic	Chemistry	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts	,	·			
sical ef	fects in	n organic molecular a	and polymeric semicondu	ctors as well as their	is on fundamental (photo)phy- application in (opto)electronic anic solar cells as well as in nor	
Intend	ed lear	ning 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)						
Course						

module is creditable for bonus)

a) written examination (approx. 90 to 180 minutes) or

- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or
- d) log (approx. 20 pages) or
- e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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



Module	title				Abbreviation		
Special Topics in Organic Chemistry 08-0CMS-211-m01							
Module	coord	inator		Module offered by			
Person	(s) resp	oonsible for the focus Or	ganic Chemistry	Institute of Organic	Chemistry		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
The mo	dule co	overs current and/or spe	cial topics in Organic	Chemistry.			
Intende	ed lear	ning outcomes					
quired	knowle		fic contexts, knows tl	ne application areas	He/she is able to classify the acand can assess the relevance for		
		number of weekly contact hours,	language — if other than Ge	rman)			
S (2) +	Ü (1)						
			age — if other than German,	examination offered — if no	ot every semester, information on whether		
b) oral (c) oral (d) log (e) pres	a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English						
Allocat	Allocation of places						
Additional information							
							
Workload							

150 h

Teaching cycle

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



Module title Abbreviation							
Organo- and Biocatalysis					08-HKM1-152-m01		
Modul	e coord	inator		Module offered by			
lecture	r of the	seminar "Organo- an	d Biokatalyse"	Faculty of Chemist	ry and Pharmacy		
ECTS	Metho	od of grading	Only after succ. co	mpl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisite	S			
1 seme	ster	graduate					
Conter	nts		•				
Studer scribe	ed lear nts are a the stru	acture and application	is of enzymes in organi		reas of application. They can deable to mechanistically describe		
		he effects of enzymes					
	!S (type, r	number of weekly contact hou	urs, language — if other than G	erman)			
		sessment (type, scope, landle for bonus)	nguage — if other than Germar	, examination offered — if n	ot every semester, information on whether		
a) written examination (approx. 45 to 90 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate) Language of assessment: German and/or English							
Allocat	tion of p	places					
Additio	Additional information						

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes})}$



	_		O METOLETIN (33 g, \	ster 3 with 1 major, 120 Let 3 credits	
Module title Abbreviation						
Suprar	molecul	ar Chemistry (Basics)			08-SCM1-161-m01	
Modul	e coord	inator		Module offered by		
lecture sics)"	er of the	seminar "Supramolecula	ar Chemistry (Ba-	Institute of Organic	: Chemistry	
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts					
nation dern a	polyme pplicati		rystals, self-assemb		pramolecular polymers, coordi, , synthetic ion channels and mo-	
field as describ	s well a be the s	s to describe the formati	on, structure and pol s in aqueous media a	ymers of coordinations well as to identify	nigh degree of expertise in the on compounds. They are able to the characteristics of synthetic /.	
Course	es (type, r	number of weekly contact hours,	anguage — if other than Ge	rman)		
S (3) Modul	e taugh	t in: German or English				
		sessment (type, scope, langua ble for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
b) oral	a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (approx. 20 minutes) Language of assessment: German and/or English					
Alloca	Allocation of places					
Additio	onal inf	ormation				

Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title					Abbreviation	
Bioorg	anic Ch	nemistry			08-SCM3-152-m01	
Module	e coord	inator		Module offered by		
lecturer of lecture "Bioorganische Chemie" (Bioorganic Chemistry)				Institute of Organic Chemistry		
ECTS	Meth	od of grading	Only after succ. cor	ompl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites	3		
1 seme	ster	graduate				
Contents						
Bioorganic chemistry unites the central questions of organic chemistry, biochemistry, medicinal chemistry and spectroscopy with a focus on biomolecules. At the core of bioorganic chemistry is the synthesis and purposeful						

Bioorganic chemistry unites the central questions of organic chemistry, biochemistry, medicinal chemistry and spectroscopy with a focus on biomolecules. At the core of bioorganic chemistry is the synthesis and purposeful manipulation of biomolecules, such as nucleic acids, peptides, proteins, carbohydrates and lipids. This includes the framework of structure-function relationships and the fundamental understanding of biological mechanisms, to enable applications towards biomaterials, biosensing, bioimaging, clinical diagnostics and therapeutics.

Key concepts covered in the course are nucleic acid chemistry, peptide chemistry, carbohydrate chemistry, bioorthogonal reactions, molecular diversity, solid-phase synthesis, molecular recognition and interactions (ligand-receptor interactions, signal transduction)

Intended learning outcomes

The students will have a molecular understanding of the structure and reactivity of biomolecules. The students obtain knowledge of modern synthetic methods in bioorganic chemistry and can explain principles of molecular interactions and recognition mechanisms. They can describe modern aspects of nucleic acids, proteins, carbohydrates and lipids.

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

S (3)

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

- a) written examination (approx. 45 to 90 minutes) or
- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title					Abbreviation
Basics and Applications of Quantum Chemistry					08-TCM2-161-m01
Module coordinator				Module offered by	
lecturer of lecture "Computational Chemistry"				Institute of Physical and Theoretical Chemistry	
ECTS	Meth	od of grading	Only after succ. compl. of module(s)		
5	nume	rical 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 (2) + Ü (2)					
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)					
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English					
Allocation of places					
Additional information					
Workload					
150 h					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					



Physical Chemistry

(25 ECTS credits)



Compulsory Courses

(10 ECTS credits)



Module title					Abbreviation
Laser S	pectro	scopy			08-PCM1a-161-m01
Module	coord	inator	_	Module offered by	
lecture copy)	r of ser	minar "Laserspektrosko	ppie" (Laser Spectros-	Institute of Physica	ll and Theoretical Chemistry
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
		ntroduces students to spectroscopy.	the fundamental princi	ples of laser spectro	scopy. It discusses absorption
Intend	ed lear	ning outcomes			
					as well as the optical principles emission spectroscopy.
Course	S (type, r	number of weekly contact hou	s, language — if other than Ge	rman)	
S (2) + Module		t in: German or English			
		sessment (type, scope, lang ole for bonus)	guage — if other than German,	examination offered — if no	ot every semester, information on whether
b) oral	examir	mination (approx. 90 n nation of one candidate assessment: German ar	e each (approx. 20 mini	utes)	
Allocat	ion of _l	places			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	e			
Referre	d to in	LPO I (examination regulat	ons for teaching-degree progra	ammes)	



Module	title				Abbreviation	
Advanced Physical Chemistry (Lab)					08-PCM1b-161-m01	
Module coordinator				Module offered by		
lecturer of seminar "Laserspektroskopie copy)		ie" (Laser Spectros-	- Institute of Physical and Theoretical Chemistry			
ECTS	Metho	od of grading	Only after succ. compl. of module(s)			
5	(not)	successfully completed				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	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 (4)

Module taught in: German or English

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

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

Language of assessment: German and/or English

Allocation of places

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Additional information

Additional information on module duration: block taught lab course with approx. 20 working days.

Workload

150 h

Teaching cycle

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



Compulsory Electives

(15 ECTS credits)



Module title Statistical Machanics and Boastion Dynamics					Abbreviation	
Statistical Mechanics and Reaction Dynamics 08-PCM2-161-m01						
Module	e coord	inator		Module offered by		
lecture mics)	r of sen	ninar "Chemische Dynam	ik" (Chemical Dyna-	Institute of Physica	l and Theoretical Chemistry	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	its					
clude t	he func		atistical thermodynar		namics. Topics to be covered in- state theory, uni- and bimolecular	
Intende	ed learı	ning outcomes				
		e become familiar with se			d reaction dynamics. They have ynamics.	
Course	S (type, n	umber of weekly contact hours, I	anguage — if other than Ger	rman)		
S (2) + Module		t in: German or English				
		sessment (type, scope, langua le for bonus)	ge — if other than German, (examination offered — if no	ot every semester, information on whether	
b) oral c) talk	examin (approx	mination (approx. 90 mir lation of one candidate e k. 30 minutes) ssessment: German and	ach (approx. 20 minu	utes) or		
Allocat			,			
Additional information						
Workload						
150 h						
Teaching cycle						

 $\textbf{Referred to in LPO I} \ \ (\text{exa} \underline{\text{mination regulations for teaching-degree programmes})}$



Module title Abbreviation						
Nanoscale Materials 08-PCM3-161-				o8-PCM3-161-mo1		
e coord	inator		Module offered by			
r of the	seminar "Nanoskalige M	aterialien"	Institute of Physica	l and Theoretical Chemistry		
Metho	od of grading	Only after succ. com	ipl. of module(s)			
nume	rical grade					
on	Module level	Other prerequisites				
ster	graduate					
ıts						
	•					
ed learı	ning outcomes					
		scale materials. They	are able to name ar	nalytical methods and applicati-		
S (type, n	number of weekly contact hours, l	anguage — if other than Ger	man)			
	t in: German or English					
		ge — if other than German, ϵ	examination offered — if no	ot every semester, information on whether		
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) talk (approx. 30 minutes) Language of assessment: German and/or English						
Allocation of places						
Additional information						
Workload						
150 h						
	e coord r of the nume nume ster ts odule d dern ch ed learn as of na es (type, r Ü (1) e taugh d of ass s creditab en examin (approx age of a ble for tion of p	rof the seminar "Nanoskalige M Method of grading numerical grade Module level ester graduate nts odule discusses advanced topic dern characterisation methods a med learning outcomes nts are able to characterise nano as of nanoscale materials. So (type, number of weekly contact hours, I Ü (1) e taught in: German or English d of assessment (type, scope, langual screditable for bonus) ten examination (approx. 90 min examination of one candidate e (approx. 30 minutes) age of assessment: German and able for bonus tion of places	e coordinator or of the seminar "Nanoskalige Materialien" Method of grading numerical grade on Module level other prerequisites ester graduate other characterisation methods and application areas ed learning outcomes outs are able to characterise nanoscale materials. They as of nanoscale materials. es (type, number of weekly contact hours, language — if other than Ger Ü (1) e taught in: German or English d of assessment (type, scope, language — if other than German, of screditable for bonus) ten examination (approx. 90 minutes) or examination of one candidate each (approx. 20 minutes) age of assessment: German and/or English able for bonus tion of places	e coordinator module offered by for of the seminar "Nanoskalige Materialien" Method of grading numerical grade module level on Module level or of the graduate on Module level or of module level or of module level or of the seminar "Nanoskalige Materialien" Module of grading numerical grade on Module level or of the prerequisites ester graduate on Module level or of the prerequisites ester graduate on State of manoscale materials. It focuses on the dern characterisation methods and application areas of nanoscale materials are able to characterise nanoscale materials. They are able to name and as of nanoscale materials. (b) (1) to (1) to (1) to (1) to (1) to (2) to (3) to (4) to (4) to (5) to (5) to (7) to (7) to (8) to		

Teaching cycle

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



Module title Abbreviation						
Ultrafast spectroscopy and quantum-control 08-PCM4-242-mo1						
Module coordinator Module offered by						
lecturer c	of the seminar "Nanoska	lige Materialien"	Institute of P	hysical and Theoretical Chemistry		
ECTS N	Method of grading	Only after succ.	compl. of module	e(s)		
5 n	numerical grade					
Duration	Module level	Other prerequis	ites			
1 semest	er graduate	Prior completion	of modules o8-P	CM1a and o8-PCM1b recommended.		
Contents	1					
	lule discusses advanced ses, time-resolved laser			antum control. It focuses on ultrashor		
Intended	learning outcomes					
Courses (S (2) + Ü		hours, language — if other tha	n German)			
Method o	aught in: German or Eng of assessment (type, scope reditable for bonus)		nan, examination offere	d — if not every semester, information on whether		
b) talk (a c) portfol	camination of one candi pprox. 30 minutes) or io (approx. 50 hours tot e of assessment: Germa	al)	ninutes) or			
Allocatio	n of places					
 Addition:	al information					
Workload						
150 h						
Teaching cycle						



					1	
Module title					Abbreviation	
Physic	al Chen	nistry of Supramolecular	Assemblies		08-PCM5-161-m01	
Module	e coord	inator		Module offered by		
	r of the Strukt	seminar "Physikalische uren"	Chemie Supramole-	Institute of Physica	l and Theoretical Chemistry	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	its					
		xamines the basic intera of aggregates as well as			he formation and physical-cheministry.	
Intend	ed lear	ning outcomes				
in the f dern ap	ield. Th oplicati	ney can describe the form ons of supramolecular ch	ation and physical-cl nemistry.	hemical properties o	trating a high degree of expertise of aggregates. They can name mo-	
		number of weekly contact hours, l	anguage — if other than Ger	man)		
S (2) + Module		t in: German or English				
Metho	d of ass		ge — if other than German, o	examination offered — if no	ot every semester, information on whether	
b) oral c) talk	examir (approx	mination (approx. 90 min nation of one candidate e k. 30 minutes) ssessment: German and	ach (approx. 20 minı	utes) or		
Allocat	ion of p	olaces				
Additional information						
Worklo	Workload					
150 h						
Teachi	Teaching cycle					
						

 $\textbf{Referred to in LPO I} \ \ (\text{exa} \underline{\text{mination regulations for teaching-degree programmes})}$



Modul	e title			Abbreviation		
Physic	Physical Chemistry (Advanced Lab)				08-PCM6-161-m01	
Modul	e coord	inator		Module offered by	•	
lecture	ers Phys	ikalische Chemie (Physic	cal Chemistry)	Institute of Physica	l and Theoretical Chemistry	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	(not)	successfully completed				
Durati	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conte	nts		•			
		rives students the opport of Physical Chemistry and			f the research groups based at lytical methods.	
Intend	ed lear	ning outcomes				
					relevant physical chemistry resequestions in physical chemistry.	
Course	es (type, r	number of weekly contact hours,	anguage — if other than Ge	rman)		
P (4) Modul	e taugh	t in: German or English				
		sessment (type, scope, langua	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
		(approx. 20 minutes) ssessment: German and	or English			
Alloca	Allocation of places					
Additio	Additional information					
Additio	Additional information on module duration: block taught lab course with approx. 20 working days.					
Workle	Workload					
150 h	150 h					
_						

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title Abbreviation					Abbreviation	
Special Topics in Physical Chemistry 08-PCMS-211-mo1					08-PCMS-211-m01	
Module	e coord	inator		Module offered by		
Person	(s) resp	oonsible for the focus Phy	sical Chemistry	Institute of Physica	l and Theoretical Chemistry	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
The mo	dule c	overs current and/or spe	cial topics in Physica	Chemistry.		
Intend	ed lear	ning outcomes				
quired various	knowle exper		fic contexts, knows the danalysis methods.	ne application areas	He/she is able to classify the ac- and can assess the relevance for	
S (2) +	Ü (1)					
		sessment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
b) oralc) orald) log (e) pres	examir examir (approx entatio	mination (approx. 90 to 1 nation of one candidate e nation in groups of up to 3 s. 20 pages) or on (approx. 30 minutes) assessment: German and	ach (20 to 30 minute 3 candidates (approx		didate) or	
Allocat	ion of	places				
Additional information						
Workload						
150 h						
Teaching cycle						

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



		,					
Module	e title				Abbreviation		
Quantı	ım Dyn	amics			08-TCM4-161-m01		
Module	e coord	inator		Module offered by			
lecture	r of lec	ture "Quantendynamik"		Institute of Physica	l and Theoretical Chemistry		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	its						
		ent Schrödinger equation adiabatic states, non-adia			ion theory, adiabatic theorem, al dynamics.		
Intend	ed lear	ning outcomes					
in mole	ecules.				nuclear and electronic dynamics w them to carry out applications		
Course	S (type, r	number of weekly contact hours,	anguage — if other than Ger	rman)			
S (2) +	Ü (2)						
		sessment (type, scope, langua	ge — if other than German, o	examination offered — if no	ot every semester, information on whether		
b) oral c) oral d) log (e) pres	a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English						
Allocat	Allocation of places						
Additio	Additional information						

Workload

150 h
Teaching cycle

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



Module title Abbreviation							
Basics and Applications of Quantum Chemistry					08-TCM2-161-m01		
Module coordinator				Module offered by			
lecture	r of lec	ture "Computational Ch	emistry"	Institute of Physica	l and Theoretical Chemistry		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conter	ts						
This m	odule i	ntroduces students to t	he fundamental princi	oles of computation	al chemistry.		
Intend	ed lear	ning outcomes					
		able to explain the theo emistry.	retical principles of co	mputational chemis	try and to apply methods in com-		
Course	S (type, ı	number of weekly contact hours	, language — if other than Ge	rman)			
S (2) +	Ü (2)						
		sessment (type, scope, languals)	uage — if other than German,	examination offered — if no	ot every semester, information on whether		
b) oral c) oral d) log (e) pres	examir examir approx entatio	mination (approx. 90 to nation of one candidate nation in groups of up to s. 20 pages) or on (approx. 30 minutes) assessment: German an	each (20 to 30 minute 3 candidates (approx		didate) or		
Allocat	ion of	places					
Additio	nal inf	ormation					
Workload							
150 h							
	Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)							



Biochemistry

(25 ECTS credits)



Compulsory Courses

(15 ECTS credits)



Molecu		Module title Abbreviation				
	lar Biology				08-BC-MOL-222-m01	
Module	coordinator			Module offered by		
holder (of the Chair of Bio	chemistry		Chair of Biochemistr	ry	
ECTS	Method of gradin	g	Only after succ. con	npl. of module(s)		
5	numerical grade					
Duratio	n Module lev	/el	Other prerequisites			
1 semes	ster undergrad	uate				
Content	ts					
The mo	dule covers specif	ic topics of m	nolecular physiology a	and functional bioche	emistry in lectures and exercices	
Intende	d learning outcon	nes				
After at	tending the modu	le events, stu	dents have sound kn	owledge in molecular	r biology.	
Courses	(type, number of week	ly contact hours,	language — if other than Ge	rman)		
V (2) + Ü	Ü (1)					
Module	taught in: German	1	_			
	of assessment (ty creditable for bonus)	pe, scope, langua	age — if other than German,	examination offered — if not	every semester, information on whether	
	en examination (a _l	pprox. 45 to 9	o minutes) or			
b) log (10 to 20 pages) or						
c) oral examination of one candidate each (20 to 30 minutes) or d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or						
e) presentation (20 to 30 minutes) or						
f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but wi						
not exceed a maximum of 4 hours) Language of assessment: German and/or English						

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

Teaching cycle: Once a year, summer semester

 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes})}$



Module title					Abbreviation
Molecular Biology laboratory course					08-BC-MOLP-172-m01
Module coordinator				Module offered by	
holder of the Chair of Biochemistry Ch				Chair of Biochemistry	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)	
10	nume	rical grade			
Durati	Duration Module level Other prerequisit		Other prerequisites	5	
1 semester undergraduate					
Conto	Contonts				

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)

P (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)

- a) written examination (approx. 45 to 90 minutes) or
- b) log (10 to 20 pages) or
- c) oral examination of one candidate each (20 to 30 minutes) or
- d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or
- e) presentation (20 to 30 minutes) or
- f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)

Language of assessment: German and/or English

Assessment offered: Once a year, winter semester

Allocation of places

Biochemie (Biochemistry) 24 places.

Selection process Biochemie (Biochemistry), Bachelor's (180 ECTS credits): Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

Chemie (Chemistry), Master's and MINT-Lehramt PLUS Master's: 6 places. Selection process: 1. Applications of Master's degree programme Chemie (Chemistry) (120 ECTS credits) will be considered first: Places will be allocated according to the number of subject semesters. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available. 2. In case that there are places left after procedure 1 is finished completely, theses places will be distributed among the students in the Master's degree programme MINT-Lehramt PLUS as follows: Places will be allocated according to the number of subject semesters. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

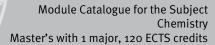
Additional information

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Workload

300 h

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



Compulsory Electives

(10 ECTS credits)



Module title	Abbreviation			
Research Internship Biochemistry fo	08-BC-FPMC-242-mo1			
Module coordinator		Module offered by	1	
focus point coordinator "Biochemistr	y"	Chair of Biochemistry		
ECTS Method of grading	Only after succ. co	mpl. of module(s)		
(not) successfully completed	o8-BC-MOLP			
Duration Module level	Other prerequisite	s		
ı semester graduate				
Contents				
This lab course is based in a biochen	nistry and/or molecula	ar biology research g	roup at the University of	

Intended learning outcomes

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

burg. Please consult with the competent coordinator in advance regarding contents to be covered. The course gives students the opportunity to actively engage with methods in biochemistry and/or molecular biology. Stu-

dents will be expected to write a lab report documenting their experiments and findings.

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

P (10)

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

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

Allocation of places

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Additional information

Additional information on module duration: block taught lab course with approx. 40 working days.

Workload

300 h

Teaching cycle

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



Modul	Module title Abbreviation					
Specia	l Topics	s in Biochemistry			08-BCMS-211-m01	
Modul	Module coordinator M			Module offered by		
Person	(s) resp	onsible for the focus Bio	chemistry	Chair of Biochemis	try	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conter	its					
The mo	dule co	overs current and/or spec	cial topics in Biochen	nistry.		
Intend	ed learı	ning outcomes				
rious e	xperim	ental syntheses as well a number of weekly contact hours, I	s measurement and	analysis methods.	d can assess the relevance for va-	
S (2) +	Ü (1)					
		sessment (type, scope, langua le for bonus)	ge — if other than German, (examination offered — if no	ot every semester, information on whether	
b) oral c) oral d) log (e) pres	a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English					
Allocat	ion of p	olaces				
Additional information						
Worklo	Workload					
150 h						
Teachi	Feaching cycle					

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



Module	Module title Abbreviation				
Bioino	rganic (Chemistry			08-ACM2-242-m01
Module	Module coordinator			Module offered by	I.
lecture	r of the	seminar "Bioinorganic C	hemistry"	Institute of Inorgan	ic Chemistry
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites	i	
1 seme	ster	graduate			
Conten	ts		,		
	ds of BI			_	chemistry (BIC). It discusses the ns of BIC in the fields of diagnosis
Intend	ed lear	ning outcomes			
		able to describe the princ us enzymes and describe			xplain the structure and effects medicine.
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ge	rman)	
S (3) Module	e taugh	t in: German or English			
		sessment (type, scope, langua ole for bonus)	${\sf ge-if}$ other than German,	examination offered — if no	ot every semester, information on whether
b) oral c) portf	examir olio (a	mination (approx. 45 to 9 nation of one candidate e pprox. 30 hours total) ssessment: German and	ach (20 to 30 minute	s) or	
Allocat					
Additional information					
Workload					
150 h					
Teachi	ng cycl	e			
					

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



Module title					Abbreviation
Organo- and Biocatalysis				08-HKM1-152-m01	
Module coordinator Module offered by					
lecture	r of the	seminar "Organo- and	d Biokatalyse"	Faculty of Chemist	ry and Pharmacy
ECTS	Metho	od of grading	Only after succ. co	mpl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites	5	
1 seme	ster	graduate			
Conter	its				
synthe	sis.	on areas. Biocatalysis: ning outcomes	effects of enzymes in v	riew of different aspe	ects, especially regarding organic
scribe	the stru		s of enzymes in organic		reas of application. They can de- able to mechanistically describe
Course	S (type, r	number of weekly contact hou	ırs, language — if other than Ge	erman)	
S (3)					
		sessment (type, scope, lar le for bonus)	guage — if other than German,	examination offered $-$ if n	ot every semester, information on whether
a) written examination (approx. 45 to 90 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate) Language of assessment: German and/or English					
Allocation of places					
					
Additional information					
					
Workland					

Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes})}$



Module title					Abbreviation
Modern Aspects of Biological Chemistry			try		08-0CM-BIO-242-m01
Modul	e coord	inator		Module offered by	
	lecturer of the seminar "Modern Aspects of Biological Chomistry"		cts of Biological Che-	Institute of Organic Chemistry	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duration Module level Other prerequisi		Other prerequisites			
1 semester graduate					
Conter	Contents				

The course deals with advanced topics of biological chemistry that build on fundamental knowledge of organic chemistry, bioorganic chemistry, biochemistry and molecular biology. Key concepts in the course cover the chemistry of the genetic code, and methods to analyse and interfere with gene expression and secondary metabolism. We will cover genetic code expansion, including unnatural base pairs and unnatural amino acids, including their chemical synthesis and enzymatic incorporation. We will also cover combinatorial synthesis methods and directed evolution and display technologies. This includes in vitro selection and in vitro evolution of functional nucleic acids (aptamers, ribozymes, deoxyribozymes), mRNA display, phage display, directed evolution of proteins/enzymes, antibodies, nanobodies, sequencing methods, DNA/RNA origami and nanotechnology, as well as combinatorial polyketide synthesis and non-ribosomal peptide synthesis.

Intended learning outcomes

The students will have a detailed understanding of modern concepts in functional nucleic acids and engineered proteins, including their synthesis and analysis. They will be able to discuss a wide variety of relevant methods and explain chemical relationships at the molecular level with biochemical/biotechnological questions and apply them to corresponding problems. The students will be able to critically examine information and new developments in the field of biological chemistry.

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

S (3)

Module taught in: German or English

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

- a) written examination (approx. 45 to 90 minutes) or
- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate)

Language of assessment: German and/or English

Allocation of places

Additional information

Workload

150 h

Teaching cycle

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

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Module title				Abbreviation	
Modern Drug Research 1: Basics and Drug Design				08-MCM3-242-m01	
Module coordinator				Module offered by	
lecturers of Pharmaceutical Chemistry			nistry	Institute of Pharmacy and Food Chemistry	
ECTS	TS Method of grading Only after succ. cor		mpl. of module(s)		
5	nume	rical grade			
Duration Module level Other prerequisite		S			
1 semester graduate					
Contents					

Contents

Fundamentals: Phases of drug development, principles of drug action, pharmacokinetics and biotransformation; strategies of drug discovery, drug targets, chemical space of drug discovery, protein-ligand interactions, structure-activity-relationships (SAR), bioisosterism, prodrug strategies.

Experimental methods: binding assays, enzymatic assays, biophysical methods, high-throughput-screening (HTS).

Theoretical methods and drug design: virtual screening, ligand-based methods, QSAR, pharmacophore models, structure-based drug design, docking, simulation methods, machine learning (AI).

Case studies (drug discovery, design and optimization)

Intended learning outcomes

The students master the fundamentals of drug development, the strategies of drug discovery and the applied theoretical and experimental methods. They can understand and critically question the essential content of current scientifc publications in drug research. They are able to carry out a basic virtual screen and to evaluate its results.

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

 $S(2) + \ddot{U}(1)$

Module taught in: German or English

 $\textbf{Method of assessment} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language}) \ (\textbf{type}, \textbf{language}) \$ module is creditable for bonus)

- a) presentation (approx. 30 minutes) or
- b) written examination (approx. 45 to 90 minutes)

Language of assessment: German and/or English

Allocation of places

22 places.

- 16 places for students of the Master's degree programme Chemie (Chemistry): Places will be allocated according to the same number of subject semesters; students who have chosen Medizinische Chemie (Medicinal Chemistry) as their focus will be given preferential consideration.
- 6 places for students of the Master's degree programme Biochemie (Biochemistry): Places will be allocated according to the number of subject semesters; among applicants with the same number of subject semesters, places will be allocated by lot.
- 2 places for students of the Master's degree programme MINT-Lehramt PLUS: Places will be allocated according to the number of subject semesters; among applicants with the same number of subject semesters, places will be allocated by lot; a waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

Workload

150 h

Teaching cycle

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



Module	Module title Abbreviation					
Clinica	l-analy	tical Chemistry			08-PH-KAC-152-m01	
Module	coord	inator		Module offered by		
		ture "Klinisch-analytisch l Chemistry)	e Chemie" (Clinical	Institute of Pharma	ncy and Food Chemistry	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
This mo	odule d	liscusses advanced topi	cs in clinical analytica	ıl chemistry.		
Intende	ed lear	ning outcomes				
Studen	ts have	e developed an advance	d knowledge of molec	cular biology.		
Course	S (type, r	number of weekly contact hours,	language — if other than Ge	rman)		
V (3)						
		Sessment (type, scope, langua le for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether	
written	exami	nation (approx. 120 minu	ıtes)			
Allocat	ion of p	places				
Additio	nal inf	ormation				
Workload						
150 h						
Teaching cycle						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					

Functional Materials

(25 ECTS credits)



Compulsory Courses

(20 ECTS credits)



Modul	e title				Abbreviation	
Lab Co	urse M	aterial Science			08-FMM-MP-161-m01	
Module coordinator				Module offered by		
	ers spec l Materi	ialisation subject Funkti als)	onsmaterialien (Fun-	Chair of Chemical 1	Fechnology of Material Synthesis	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	(not)	successfully completed				
Durati	on	Module level	Other prerequisites	i		
1 seme	ester	graduate				
Conte	nts					
Ten se	lected e	experiments in materials	science.			
Intend	ed lear	ning outcomes				
Studer	nts have	e developed an advanced	d proficiency in the pe	erformance of experi	ments in materials science.	
Course	es (type, r	number of weekly contact hours,	language — if other than Ge	rman)		
P (8)						
		sessment (type, scope, langua ole for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether	
pages	each) a	chtestate (pre and post- nd assessment of practions ssessment: German and	cal performance (2 to		minutes each, log approx. 5 to 10 ions)	
Alloca	tion of	places				
Addition	onal inf	ormation				
Workload						
150 h						
Teaching cycle						
						
Referred to in LPO I (examination regulations for teaching-degree programmes)						



Module title					Abbreviation		
Project Work					08-FMM-PA-161-m01		
Module coordinator				Module offered by	I.		
head o	of the re	search group offering the	e module	Chair of Chemical T	echnology of Material Synthesis		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
5	(not)	successfully completed					
Duratio	on	Module level	Other prerequisites				
1 seme	ester	graduate					
Conter	ıts						
		gives students the opport findings.	unity to explore a res	earch topic under th	e guidance of a supervisor and to		
Intend	ed lear	ning outcomes					
Studer	nts have	e developed an advanced	proficiency in the pe	erformance of experi	ments in materials science.		
Course	es (type, r	number of weekly contact hours,	anguage — if other than Ger	rman)			
P (10)							
		sessment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
		5 pages) and talk (appro					
Allocat	tion of	places	,				
Additio	onal inf	ormation					
Worklo	oad						
150 h	150 h						
Teachi	ng cycl	e					
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	immes)			



modute ti	Module title Abbreviation					
Organic Functional Materials 08-OCM-FM-161-mo1						
Module co	oordinator		Module offered by			
lecturer o	f the seminar "Organisc	he Funktionsmaterialien"	Institute of Organic Chemistry			
ECTS M	ethod of grading	Only after succ. cor	npl. of module(s)			
5 ni	umerical grade					
Duration	Module level	Other prerequisites	,			
1 semeste	er graduate					
Contents						
sical effec	ts in organic molecular nts such as field effect t	and polymeric semicondu	materials. The focus is on fundamental (photo)phy- ictors as well as their application in (opto)electronic mitting diodes, or organic solar cells as well as in non			
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.						
near optic	Courses (type, number of weekly contact hours, language — if other than German)					
	ype, number of weekly contact					

a) written examination (approx. 90 to 180 minutes) or

- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or
- d) log (approx. 20 pages) or
- e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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



Module title					Abbreviation
Polymer Chemistry 1 (Lecture and Practical Course)					03-FU-PM1-152-m01
Module coordinator				Module offered by	I.
holder of the Chair of Functional Materials in Medicine a Dentistry			rials in Medicine and	Faculty of Medicine	2
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Durati	on	Module level	Other prerequisites		
1 seme	ester	undergraduate			
Conte	nts				
radica	l polym		ion of polymers and p		onic polymerisations, controlled el permeation chromatography,
Intend	led lear	ning outcomes			
The st	udents	acquire fundamentals of	polymer chemistry ar	nd the related metho	ods for their characterisation.
Course	es (type, r	number of weekly contact hours,	language — if other than Ger	rman)	
V (2) +	P (2)				
		sessment (type, scope, langua le for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether
a) assessment and b) Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical assignments (2 to 4 random examinations) Language of assessment: German and/or English Assessment offered: Once a year, summer semester creditable for bonus					
Alloca	tion of	olaces			
Additi	onal inf	ormation			
Workle	oad				
150 h					
Teachi	ing cycl	e			
Referr	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	



Compulsory Electives

(5 ECTS credits)



Module title	Abbreviation	
Material Science 1 (Basic introduction)		o8-FU-MaWi1-212-mo1

Module coordinator	Module offered by
holder of the Chair of Chemical Technology of Material Syn-	Chair of Chemical Technology of Material Synthesis
thesis	

ECTS Method of grading		od of grading	Only after succ. compl. of module(s)
5	numerical grade		-
Duratio	n	Module level	Other prerequisites
2 semester		undergraduate	-
*			

Contents

Part A Structure of materials

The students learn about the atomic structure of solid materials.

Part B Metallic Materials

The students learn about the structure of metallic materials as well as their mechanical properties including deformation and failure mechanism as well as the analysis of mechanical properties. In addition, the corrosion and corrosion protection of metallic materials is introduced.

Part C Numerical Methods

The students are introduced to numerical methods like finite element methods (FEM) and Monte-Carlo-Simulation.

Intended learning outcomes

The students know the structure of solids, thermodynamic properties like enthalpy and entropy, the laws of diffusion and lattice defects. They are familiar with deformation and corrosion mechanisms in metals. The students acquire knowledge about thermodynamic of solids. They understand phase transitions, alloys and phase separation of metals. The students can explain the deformation as well as hardening due to dislocations of metals. The students can apply FEM to simple problems and perform simulations based on the Monte-Carlo-method.

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

 $V(2) + \ddot{U}(1) + V(2)$

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

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

Language of assessment: German and/or English

Allocation of places

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Additional information

Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$

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	reg. data record Master (120 ECTS) Chemie - 2026	



Module title					Abbreviation
Material Science 2 (The Material Groups)					o8-FU-MaWi2-152-mo1
Module coordinator				Module offered by	I.
holder of the Chair of Chemical Technology of Mathesis			ology of Material Syn-	Chair of Chemical 1	Fechnology of Material Synthesis
ECTS	6 Method of grading Only after succ. compl. of module(s)				
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	undergraduate			
Conter	nts				
Intend Studer	ed lear	olymer materials: therm ning outcomes e developed a knowleds knowledge to research p	ge of the fabrication an	·	e materials. main material groups and are able
Course	es (type, i	number of weekly contact hours	, language — if other than Ge	rman)	
V (3) +	Ü (1)				
		sessment (type, scope, lang ble for bonus)	uage — if other than German,	examination offered — if no	ot every semester, information on whether
b) oral c) oral d) log e) pres	examir examir (approx sentatio	mination (approx. 90 to nation of one candidate nation in groups of up to k. 20 pages) or on (approx. 30 minutes) assessment: German an	each (20 to 30 minute 3 candidates (approx		didate) or
	tion of				
Δdditi	onal inf	ormation			

Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title					Abbreviation				
Chemically and bio-inspired Nanotechnology for Material Synthesis 08-FU-NT-152-mo1					08-FU-NT-152-m01				
Modul	e coord	inator		Module offered by					
	e progra Matrieri	mme coordinator Funkti als)	onswerkstoffe (Func-	Chair of Chemical 1	Fechnology of Material Synthesis				
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)					
5	nume	rical grade							
Durati	on	Module level	Other prerequisites						
1 seme	ester	undergraduate							
Conte	nts								
ted ma	aterials.				tion and applications of the crea- materials, introduction to bio-in-				
Intend	led lear	ning outcomes							
Stude	nts have	e developed a sound kno	owledge of sol-gel che	emistry and biomine	ralisation.				
Course	es (type, r	number of weekly contact hours,	language — if other than Ge	rman)					
V (4)									
		sessment (type, scope, langu le for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English									
Alloca	tion of p	olaces							
Additional information									
Workl	oad								
150 h									
Teachi	ing cycl	e							
	-								

 $\textbf{Referred to in LPO I} \ \ (\text{exa} \underline{\text{mination regulations for teaching-degree programmes})}$



	_		D (NEXOTAGE) C		ster 3 with 1 major, 120 Ect3 credits
Module title				_	Abbreviation
Molecular Materials (Lecture)					o8-FU-MoMaV-152-mo1
Module	e coord	inator		Module offered by	
degree programme coordinator Funktionswerkstoffe (Functional Matrierials)			onswerkstoffe (Func-	Chair of Chemical Technology of Material Synthesis	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	its				
Chemic ticles,			ctions, supramolecula	r chemistry, molecu	ılar materials, colloids, nanopar-
Intend	ed lear	ning outcomes			
teraction	ons and elves w	d how they determine the	e properties of molecu	ılar materials. They l	rious inter and intramolecular inhave learned how to familiarise s it as well as to give and receive
Course	S (type, r	number of weekly contact hours,	language — if other than Ge	rman)	
V (3) +	S (1)				
		sessment (type, scope, langu ble for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether
[a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)] as well as talk (approx. 30 minutes), weighted 3:1 Language of assessment: German and/or English creditable for bonus					
Allocat	Allocation of places				
Additio	nal inf	ormation			
Worklo	ad				
150 h					
ı — —					

Teaching cycle

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title Abbreviation						
Polymers II					03-FU-PM2-222-m01	
Modul	e coord	inator		Module offered by		
holder Dentis		Chair of Functional Mater	ials in Medicine and	Chair of Chemical T	echnology of Material Synthesis	
ECTS	Metho	od of grading	Only after succ. con	ıpl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	ıts					
Basics racteriz		as advanced knowledge	about contemporary	issues of polymer s	ynthesis, -modification and cha-	
Intend	ed learı	ning outcomes				
The stu	udent h	as advanced knowledge	of the synthesis, mod	dification and charac	cterization of polymers.	
Course	es (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
V (2) +	P (2)					
		sessment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether	
b) oral c) talk Langua Assess	examir (approx age of a	mination (approx. 90 min nation of one candidate e k. 30 minutes) ssessment: German and, ffered: Once a year, winto bonus	ach (20 to 30 minute /or English	s) or		
Allocat	tion of p	olaces				
Additio	onal inf	ormation				
Worklo	Workload					
150 h	-					
Teachi	Teaching cycle					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
(



Module title					Abbreviation	
Nano4Med					03-FU-DDEL-222-m01	
Module	coord	inator		Module offered by		
holder Dentist		Chair of Functional M	aterials in Medicine and	Chair of Chemical	Technology of Material Synthesis	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites	i		
1 seme	ster					
Conten	ts					
			active substances into p release of active ingredie		ctionalization of the particle sy-	
Intende	ed lear	ning outcomes				
			active substances into p release of active ingredie		ctionalization of the particle sy-	
Course	S (type, r	number of weekly contact ho	ours, language — if other than Ge	rman)		
V (1) + I	Ü (1)					
		sessment (type, scope, la ble for bonus)	anguage — if other than German,	examination offered — if n	ot every semester, information on whether	
report o	on tech x. 90 m		. 10 pages) and b) preser		oractical course / project report / ninutes) or written examination	
Allocat	ion of _l	olaces				
	,					
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	е				
						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					



Module title					Abbreviation	
Biopolymers					03-BIOPOL-222-m01	
Module coordinator				Module offered by		
holder of the Chair of Macromolecular Chemistry			Chemistry	Faculty of Medicine	2	
ECTS	Meth	od of grading	Only after succ. compl. of module(s)			
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster					
Contents						
Organisms produce biologically active macromolecules (polysaccharides, proteins, nucleic acids, etc.) that perform (survival) important functions in structure, movement, recognition, metabolic and information storage. These naturally occurring polymers can also be isolated, chemically modified and commercialized for further appli-						

Intended learning outcomes

The student will acquire fundamental knowledge of naturally occurring macromolecules, their production, function, modification, and application in various biological contexts and everyday areas.

cations. In addition, novel macromolecules can additionally be synthetically derived from bio-based feedstocks,

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

which are increasingly used as sustainable and degradable biopolymers.

 $V(2) + \ddot{U}(1) + P(1)$

Module taught in: V, Ü: English

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 to 30 minutes) or
- c) talk (approx. 30 minutes)

Language of assessment: English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title Abbreviation							
Special Topics in the Field of Functional Materials 08-FMMS-211-m01							
Module coordinator Module offered by							
Person	(s) resp	onsible for the focus I	Functional Materials	Chair of Chemical	Technology of Material Synthesis		
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites	5			
1 seme	ster	graduate					
Conten	its						
The mo	dule c	overs current and/or s	pecial topics in the field	d of Functional Mate	rials.		
Intend	ed lear	ning outcomes					
thods.			tal syntheses, device p rs, language — if other than Ge	·	as measurement and analysis me-		
S (2) +	-	iumzer er weemy contact noc	s, anguage nomer than ec				
Metho	d of as		guage — if other than German,	examination offered — if n	ot every semester, information on whether		
b) oral c) oral d) log (e) pres	a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English						
Allocat	ion of	places					
	-						
Additio	nal inf	ormation					
							
Worklo	ad						
150 h							
Teachi	Teaching cycle						

 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes}})$



Module title Abbreviation						
Nanoscale Materials 08-PCM3-161-m01						
Module coordinator Module offered by					I.	
lecture	r of the	e seminar "Nanoskalige N	laterialien"	Institute of Physica	l and Theoretical Chemistry	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites	i		
1 seme	ster	graduate				
Conten	ts	,	•			
		discusses advanced topio haracterisation methods			ne structure, properties, fabricatirials.	
Intend	ed lear	ning outcomes				
		able to characterise nanc anoscale materials.	scale materials. They	are able to name a	nalytical methods and applicati-	
Course	S (type, i	number of weekly contact hours,	anguage — if other than Ge	rman)		
S (2) + Module		nt in: German or English				
		sessment (type, scope, langua ole for bonus)	${\sf ge-if}$ other than German,	examination offered — if no	ot every semester, information on whether	
b) oral c) talk	examin (approx age of a	mination (approx. 90 mir nation of one candidate e x. 30 minutes) assessment: German and bonus	ach (approx. 20 mini	utes) or		
Allocat	ion of	places	,			
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teaching cycle						

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



	D MECONE ABIDIT		, .		
Module title		Abbreviation			
Supramolecular Chemistry (Basics)			08-SCM1-161-m01		
Module coordinator		Module offered by			
lecturer of the seminar "Supramolecul sics)"	ar Chemistry (Ba-	Institute of Organic	Chemistry		
ECTS Method of grading	Only after succ. con	npl. of module(s)			
5 numerical grade					
Duration Module level	Other prerequisites	i			
1 semester graduate					
Contents					
This module introduces students to th actions between molecules, molecular nation polymers and networks, liquid dern applications of supramolecular c	recognition by receptorystals, self-assemb	tors, complexes, su	pramolecular polymers, coordi-		
Intended learning outcomes					
Students are able to explain interactio field as well as to describe the formati describe the self-assembly of polymer ion channels. They can name modern	on, structure and pol [,] s in aqueous media a	ymers of coordinations well as to identify	on compounds. They are able to the characteristics of synthetic		
Courses (type, number of weekly contact hours,	language — if other than Ge	rman)			
S (3) Module taught in: German or English					
Method of assessment (type, scope, langua module is creditable for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether		
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (approx. 20 minutes) Language of assessment: German and/or English					
Allocation of places					
Additional information					
Workload					

Teaching cycle

150 h

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

Communication regulations for teach



Module title Abbreviation					Abbreviation
Supran	nolecul	ar Soft Matter			08-SCM5-242-m01
Module coordinator Module offered by					
lecture	r of the	seminar "Supramole	cular Soft Matter"	Institute of Organic	Chemistry
ECTS	Metho	od of grading	Only after succ. co	npl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisite	3	
1 seme	ster	graduate			
Conten	ts				
the forr brid ma will be	nation aterials strengt	and characterization . Concepts such as na	of liquid crystals (LC's) anosegregation for the s	soft crystals, plastic of tructural control and	aterials. The main focus lies on crystals, LC-Elastomers and hy- stimuli responsive properties sotropic semi conductors and ion
Intende	ed lear	ning outcomes			
Students are able to understand the structural design of soft matter and the underlying formation principles. The students will be able to create new materials with tailored properties which are optimized for modern applications. In a practical part students learn to evaluate the quality of publications related to these topics.					
Courses (type, number of weekly contact hours, language — if other than German)					
S (2) + Ü (1)					
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether					

a) oral examination of one candidate each (20 to 30 minutes) or

- b) talk (approx. 30 minutes) or
- c) portfolio (approx. 30 hours total)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title					Abbreviation
Solid state chemistry and inorganic materials					o8-ACM3-161-mo1
Module coordinator				Module offered by	J.
lecturer of seminar "Festkörperchemie and Anorganische Materialien" (Solid State Chemistry and Inorganic Materials)				Institute of Inorgar	nic Chemistry
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)	
5	nume	rical grade			
Durati	on	Module level	Other prerequisites		
1 seme	ester	graduate			
Conte	nts				
			n to solid-state chemis selected materials of so		e structure, chemical and physical
Intend	ed lear	ning outcomes			
				•	xplain methods for solid-state the corresponding solids.
Course	es (type, i	number of weekly contact hou	rs, language — if other than Ge	rman)	
S (3)					
		sessment (type, scope, lan ole for bonus)	guage — if other than German,	examination offered — if n	ot every semester, information on whether
b) oral c) oral d) log e) pres	examir examir (approx sentatio		e each (20 to 30 minute o 3 candidates (approx)		ididate) or
Alloca	tion of	olaces			
Additio	onal inf	ormation			
Worklo	oad				
150 h					
Teachi	ng cycl	е			
Referre	ed to in	LPO I (examination regulat	ions for teaching-degree progra	ammes)	

Homogeneous Catalysis

(25 ECTS credits)



Compulsory Courses

(20 ECTS credits)



Module	e title				Abbreviation		
Organo	o- and I	Biocatalysis			08-HKM1-152-m01		
Module coordinator				Module offered	d by		
lecture	r of the	e seminar "Organo- a	nd Biokatalyse"	Faculty of Cher	nistry and Pharmacy		
ECTS	Meth	od of grading	Only after succ	compl. of module(s	s)		
5	nume	rical grade					
Duratio	on	Module level	Other prerequis	sites			
1 seme	ster	graduate					
Conten	ıts		•				
proces	ses. Or plicatio	ganocatalysis: enant	tioselective impleme	ntation, principles, g	ompounds and enzymes in catalytic green chemistry, substance classes aspects, especially regarding organic		
Intend	ed lear	ning 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.							
and an	Courses (type, number of weekly contact hours, language — if other than German)						
_	S (type, 1	number of weekly contact h	ours, language — Il other the	an German)			
Course	S (type, i	number of weekly contact h	ours, language — II other th	an German)			
Course S (3) Method	d of as				— if not every semester, information on whether		

- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate)

Language of assessment: German and/or English

Allocation of places

Additional information

Workload

150 h

Teaching cycle

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



Modul	e title		Abbreviation			
Advan	ced org	anometallic chemistry a	08-HKM2-161-m01			
Modul	e coord	inator		Module offered by		
		seminar "Spezielle Meta vendung in der Homoger		Institute of Inorgan	ic Chemistry	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conter	its					
This m tions.	odule e	xamines elementary orga	anic compounds of tra	ansition metals with	homogeneous catalytic applica-	
Intend	ed lear	ning outcomes	•			
					nentary organic compounds. They neous catalysis reactions.	
Course	S (type, r	umber of weekly contact hours,	anguage — if other than Ger	man)		
S (3) Modul	e taugh	t in: German or English				
		Gessment (type, scope, langua le for bonus)	ge — if other than German, 6	examination offered — if no	t every semester, information on whether	
b) oral c) oral d) log (e) pres	examir examin (approx entatio	mination (approx. 90 to 1 lation of one candidate e ation in groups of up to 3 . 20 pages) or n (approx. 30 minutes) ssessment: German and	ach (20 to 30 minute 3 candidates (approx.		didate) or	
Allocat	tion of p	olaces				
Additio	onal inf	ormation				
Worklo	Workload					
150 h						
Teachi	Teaching cycle					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					



Module title Abbreviation					Abbreviation	
Practical course "Homogeneous catalysis in Inorganic Che				mistry"	08-HKM3AC-161-m01	
Module	e coord	inator		Module offered by		
		seminar "Spezielle Meta vendung in der Homoger	-	Institute of Inorgan	ic Chemistry	
ECTS	Metho	od of grading	Only after succ. com	ipl. of module(s)		
5	(not)	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	its					
thods i	n homo stallog	ogeneous catalysis. The f	ocus will be on cataly expected to conduct the	st synthesis and ch	synthesis and analytical mearacterisation, spectral analysis ndependently, write a lab report	
Intend	ed learı	ning outcomes				
					eneous catalysis in the lab and to dings and deliver a presentation.	
Course	S (type, r	number of weekly contact hours, I	anguage — if other than Ger	man)		
P (6) Module	e taugh	t in: German or English				
		sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	et every semester, information on whether	
		tical course (approx. 10 p ssessment: German and		ox. 15 minutes)		
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	Workload					
150 h						
Teachi	Teaching cycle					
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		



Module title Abbreviation					Abbreviation	
Practical course "Homogeneous catalysis in Organic Chem				istry"	08-HKM3OC-161-m01	
Module	e coord	inator		Module offered by		
		seminar "Spezielle Meta vendung in der Homoger	•	Institute of Organic	Chemistry	
ECTS	Metho	od of grading	Only after succ. com	ipl. of module(s)		
5	(not)	successfully completed				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
thods i	n homo stallog	ogeneous catalysis. The f	ocus will be on cataly expected to conduct t	st synthesis and ch	synthesis and analytical me- aracterisation, spectral analysis ndependently, write a lab report	
Intend	ed lear	ning outcomes				
					eneous catalysis in the lab and to dings and deliver a presentation.	
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)		
P (6) Module	e taugh	t in: German or English				
		sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	et every semester, information on whether	
		tical course (approx. 10 p ssessment: German and		ox. 15 minutes)		
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
	-					
Worklo	ad					
150 h						
Teachi	Teaching cycle					
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		



Compulsory Electives

(5 ECTS credits)



Modul	e title	,			Abbreviation
Advanced transition metal chemistry 08-HKM4-161-mo1					
Modul	e coord	inator		Module offered by	
lecture	r of the	seminar "Spezielle Über	gangsmetallchemie"	Institute of Inorgan	ic Chemistry
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	its				
nation	chemis				of transition metals and coordi- l discusses recent developments
Intend	ed lear	ning outcomes			
		able to explain transition field. They can explain th			monstrating a high degree of ex- chemistry.
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
S (3)					
		sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether
b) oral c) oral d) log (e) pres	examir examin (approx entatio	mination (approx. 90 to 1 nation of one candidate e nation in groups of up to 3 . 20 pages) or n (approx. 30 minutes) ssessment: German and	ach (20 to 30 minute 3 candidates (approx.	•	didate) or
Allocat	ion of p	olaces			
Additio	onal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	e			
	-				

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module	Module title Abbreviation					
Sustainability in chemistry					08-HKM5-262-m01	
Module	coord	inator		Module offered by		
				Faculty of Chemistr	y and Pharmacy	
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster					
Conten	ts					
Intende	ed lear	ning outcomes				
Course	S (type, r	umber of weekly contact hours, l	anguage — if other than Ger	man)		
S (2) +						
		t in: English				
		sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether	
b) porti	folio (a	nination (approx. 45 to 9 pprox. 4o hours total) ssessment: English	o minutes) or			
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		



		,			
Module	title				Abbreviation
Specia	l Topic	s in Homogeneous Cataly	/sis		08-HKMS-211-m01
Module	coord	inator		Module offered by	
Person sis	(s) resp	oonsible for the focus Ho	mogeneous Cataly-	Institute of Inorgan	ic Chemistry
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
The mo	dule co	overs current and/or spe	cial topics in Homoge	eneous Catalysis.	
Intende	ed lear	ning outcomes			
the acc	juired k		-specific contexts, kn	ows the application	ysis. He/she is able to classify areas and can assess the relemethods.
Course	S (type, r	number of weekly contact hours,	anguage — if other than Ger	rman)	
S (2) +	Ü (1)				
		sessment (type, scope, langua	ge — if other than German,	examination offered — if no	ot every semester, information on whether
b) oral c) oral d) log (e) pres	examir examin approx entatio	mination (approx. 90 to 1 nation of one candidate e lation in groups of up to 3 . 20 pages) or n (approx. 30 minutes) ssessment: German and	ach (20 to 30 minute 3 candidates (approx		didate) or
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
			,		
Worklo	ad				
150 h					
Teachi	ng cycl	e			

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Modul	e title				Abbreviation
		chanics and Reaction Dy	vnamics		08-PCM2-161-m01
AA - J1		· · · · · · · · · · · · · · · · · · ·		88 - dd eff d.b	
	e coord		11 11 / 61 1 1 5	Module offered by	
lecture mics)	er of ser	ninar "Chemische Dynan	nik" (Chemical Dyna-	Institute of Physica	l and Theoretical Chemistry
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duration	on	Module level	Other prerequisites		
1 seme	ester	graduate			
Conter	nts				
clude t	the fund		atistical thermodynar		namics. Topics to be covered instate theory, uni- and bimolecular
Intend	ed lear	ning outcomes			
		e become familiar with se re able to apply the fund			d reaction dynamics. They have ynamics.
Course	es (type, r	number of weekly contact hours,	language — if other than Ge	man)	
S (2) +		t in: German or English			
			age — if other than German	evamination offered — if no	ot every semester, information on whether
		le for bonus)	ige in other than definally	examination onered in he	stevery semester, information on whether
b) oral c) talk	examir (approx	mination (approx. 90 mination of one candidate 6 (. 30 minutes) ssessment: German and	each (approx. 20 minu	utes) or	
Alloca	tion of p	olaces			
Additio	onal inf	ormation			
	-1				
Worklo	oad				
150 h					
	ng cycl	e			

 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes})}$



Modul	e title	,	Abbreviation			
Modern Synthetic Methods					08-OCM-SYNT-161-m01	
Module coordinator				Module offered by		
lecturer of the seminar				Institute of Organic Chemistry		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites	;		
1 seme	ster	graduate				
Contents						
		liscusses modern stere emistry and catalysis.	eoselective synthesis m	ethods. It focuses or	n selected total syntheses, orga-	

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)

 $S(2) + \ddot{U}(1)$

Module taught in: German or English

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

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

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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



Module title Abbreviation					
Basics	and Ap	oplications of Quantum	08-TCM2-161-m01		
Modul	e coord	linator		Module offered by	
lecture	lecturer of lecture "Computational Chemistry"			Institute of Physica	l and Theoretical Chemistry
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	·
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites	i	
1 seme	ester	graduate			
Conter	nts				
This m	odule i	ntroduces students to	the fundamental princi	ples of computation	al chemistry.
Intend	ed lear	ning outcomes			
		able to explain the theo emistry.	oretical principles of co	mputational chemis	try and to apply methods in com-
Course	S (type,	number of weekly contact hou	rs, language — if other than Ge	rman)	
S (2) +	Ü (2)				
		sessment (type, scope, lang ble for bonus)	guage — if other than German,	examination offered — if no	ot every semester, information on whether
b) oral c) oral d) log (e) pres	examii examir (approx entatic		e each (20 to 30 minute o 3 candidates (approx)		didate) or
Allocat	tion of	places			
 A 1 1***	1. (. ,.			
Additio	onal inf	ormation			
Worklo	nad				
150 h	<u> </u>				
Teachi	ng cvc	le			
	5 - 7 - 1	-			
Referre	ed to in	IPO I (examination regulation	ions for teaching-degree progra	ammac)	
Kelelle	u to ili	ter or (examination regulation	ions for teaching-degree progra		



Polymer Chemistry 1 (Lecture and Practical Course) O3-FU-PM1-152-mo1	Modul	le title				Abbreviation
holder of the Chair of Functional Materials in Medicine and Dentistry ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other prerequisites 1 semester undergraduate 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 acquire fundamentals of polymer chemistry and the related methods for their characterisation. Courses (type, number of weekly contact hours, language – if other than German) V (2) + P (2) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) assessment and b) Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical assignments (2 to 4 random examinations) Language of assessment: German and/or English Assessment offered: Once a year, summer semester creditable for bonus Allocation of places	Polym	er Chen	nistry 1 (Lecture and Prac		03-FU-PM1-152-m01	
Dentistry Dent	Modul	le coord	inator		Module offered by	L
Duration Module level Other prerequisites 1 semester undergraduate 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 acquire fundamentals of polymer chemistry and the related methods for their characterisation. Courses (type, number of weekly contact hours, language — if other than German) V (2) + P (2) Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus) a) assessment and b) Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical assignments (2 to 4 random examinations) Language of assessment: German and/or English Assessment offered: Once a year, summer semester creditable for bonus Allocation of places Additional information Workload 150 h Teaching cycle			Chair of Functional Mater	ials in Medicine and	Faculty of Medicine	2
Duration Module level undergraduate : Contents Basic methods of polymerisations: 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 acquire fundamentals of polymer chemistry and the related methods for their characterisation. Courses (type, number of weekly contact hours, language – if other than German) V (2) + P (2) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bronus) a) assessment and b) Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical assignments (2 to 4 random examinations) Language of assessment: German and/or English Assessment offered: Once a year, summer semester creditable for bonus Allocation of places Morkload 150 h Teaching cycle	ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
Teaching cycle Undergraduate	5	nume	rical grade			
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 acquire fundamentals of polymer chemistry and the related methods for their characterisation. Courses (type, number of weekly contact hours, language – if other than German) V (2) + P (2) Method of assessment (type, scope, language – if other than German, examination offered – if not every semester, information on whether module is creditable for bonus) a) assessment and b) Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical assignments (2 to 4 random examinations) Language of assessment: German and/or English Assessment offered: Once a year, summer semester creditable for bonus Allocation of places	Durati	on	Module level	Other prerequisites		
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 acquire fundamentals of polymer chemistry and the related methods for their characterisation. Courses (type, number of weekly contact hours, language — if other than German) V (2) + P (2) Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus) a) assessment and b) Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical assignments (2 to 4 random examinations) Language of assessment: German and/or English Assessment offered: Once a year, summer semester creditable for bonus Allocation of places Additional information Workload 150 h Teaching cycle	1 seme	ester	undergraduate			
radical polymerisations; characterisation of polymers and polymer analytics: gel permeation chromatography, endgroup analysis, mass spectrometry, rheology. Intended learning outcomes The students acquire fundamentals of polymer chemistry and the related methods for their characterisation. Courses (type, number of weekly contact hours, language — if other than German) V (2) + P (2) Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus) a) assessment and b) Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical assignments (2 to 4 random examinations) Language of assessment: German and/or English Assessment offered: Once a year, summer semester creditable for bonus Allocation of places Additional information Workload 150 h Teaching cycle	Conte	nts				
The students acquire fundamentals of polymer chemistry and the related methods for their characterisation. Courses (type, number of weekly contact hours, language — if other than German) V (2) + P (2) Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus) a) assessment and b) Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical assignments (2 to 4 random examinations) Language of assessment: German and/or English Assessment offered: Once a year, summer semester creditable for bonus Allocation of places Additional information Workload 150 h Teaching cycle	radica	l polym	erisations; characterisati	on of polymers and p		
Courses (type, number of weekly contact hours, language — if other than German) V (2) + P (2) Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus) a) assessment and b) Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical assignments (2 to 4 random examinations) Language of assessment: German and/or English Assessment offered: Once a year, summer semester creditable for bonus Allocation of places Workload 150 h Teaching cycle	Intend	led lear	ning outcomes			
Wethod of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus) a) assessment and b) Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical assignments (2 to 4 random examinations) Language of assessment: German and/or English Assessment offered: Once a year, summer semester creditable for bonus Allocation of places Workload 150 h Teaching cycle	The st	udents	acquire fundamentals of	polymer chemistry ar	nd the related metho	ods for their characterisation.
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) assessment and b) Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical assignments (2 to 4 random examinations) Language of assessment: German and/or English Assessment offered: Once a year, summer semester creditable for bonus Allocation of places Morkload 150 h Teaching cycle	Course	es (type, r	number of weekly contact hours,	language — if other than Ger	rman)	
module is creditable for bonus) a) assessment and b) Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical assignments (2 to 4 random examinations) Language of assessment: German and/or English Assessment offered: Once a year, summer semester creditable for bonus Allocation of places Additional information Workload 150 h Teaching cycle	V (2) +	P (2)				
each, log approx. 5 to 10 pages each) and assessment of practical assignments (2 to 4 random examinations) Language of assessment: German and/or English Assessment offered: Once a year, summer semester creditable for bonus Allocation of places Workload 150 h Teaching cycle				age — if other than German,	examination offered — if no	ot every semester, information on whether
Additional information Workload 150 h Teaching cycle	each, Langu Assess	log app age of a sment o	rox. 5 to 10 pages each) a ssessment: German and offered: Once a year, sum	and assessment of pr /or English		
Workload 150 h Teaching cycle	Alloca	tion of	places			
Workload 150 h Teaching cycle						
150 h Teaching cycle	Additi	onal inf	ormation	•		
150 h Teaching cycle				<u>-</u> -		
Teaching cycle	Workle	oad				
	150 h					
Referred to in LPO I (examination regulations for teaching-degree programmes)	Teachi	ing cycl	e			
Referred to in LPO I (examination regulations for teaching-degree programmes)						
	Referr	ed to in	LPO I (examination regulation	s for teaching-degree progra	ımmes)	



Medicinal Chemistry

(25 ECTS credits)



Compulsory Courses

(15 ECTS credits)



					T
Module					Abbreviation
Practic	al cour	se medicinal chemistry			08-MCM1-161-m01
Module	coord	inator		Module offered by	
lecture mistry)	rs Phar	mazeutische Chemie (Ph	armaceutical Che-	Institute of Pharma	cy and Food Chemistry
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)	
10	(not)	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Selecte	d meth	ods and topics in medic	inal chemistry (synth	esis, testing, analysi	is, theory, pharmacokinetics).
Intende	ed lear	ning outcomes			
Studen	ts have	e developed a knowledge	of medicinal chemis	try and are able to a	pply it to practical experiments.
Course	S (type, r	umber of weekly contact hours, I	anguage — if other than Ger	man)	
P (10)					
		t in: German or English			
		sessment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether
	-		•		minutes each, log approx. 5 to 10 ions) as well as report (30 to 50
Langua	ge of a	ssessment: German and	or English		
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
300 h					
Teachi	ng cycl	e			
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	



Modul	e title		Abbreviation			
Modern Drug Research 1: Basics and Drug Design					08-MCM3-242-m01	
Modul	e coord	linator		Module offered by		
lecturers of Pharmaceutical Chemistry			nistry	Institute of Pharma	Institute of Pharmacy and Food Chemistry	
ECTS	Meth	od of grading	Only after succ. co	ompl. of module(s)		
5	nume	rical grade				
Duratio	Duration Module level		Other prerequisit	Other prerequisites		
1 semester		graduate				
Contor	nte	•	•			

Fundamentals: Phases of drug development, principles of drug action, pharmacokinetics and biotransformation; strategies of drug discovery, drug targets, chemical space of drug discovery, protein-ligand interactions, structure-activity-relationships (SAR), bioisosterism, prodrug strategies.

Experimental methods: binding assays, enzymatic assays, biophysical methods, high-throughput-screening (HTS).

Theoretical methods and drug design: virtual screening, ligand-based methods, QSAR, pharmacophore models, structure-based drug design, docking, simulation methods, machine learning (AI).

Case studies (drug discovery, design and optimization)

Intended learning outcomes

The students master the fundamentals of drug development, the strategies of drug discovery and the applied theoretical and experimental methods. They can understand and critically question the essential content of current scientifc publications in drug research. They are able to carry out a basic virtual screen and to evaluate its results.

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

 $S(2) + \ddot{U}(1)$

Module taught in: German or English

 $\textbf{Method of assessment} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language}) \ (\textbf{type}, \textbf{language}) \$ module is creditable for bonus)

- a) presentation (approx. 30 minutes) or
- b) written examination (approx. 45 to 90 minutes)

Language of assessment: German and/or English

Allocation of places

22 places.

- 16 places for students of the Master's degree programme Chemie (Chemistry): Places will be allocated according to the same number of subject semesters; students who have chosen Medizinische Chemie (Medicinal Chemistry) as their focus will be given preferential consideration.
- 6 places for students of the Master's degree programme Biochemie (Biochemistry): Places will be allocated according to the number of subject semesters; among applicants with the same number of subject semesters, places will be allocated by lot.
- 2 places for students of the Master's degree programme MINT-Lehramt PLUS: Places will be allocated according to the number of subject semesters; among applicants with the same number of subject semesters, places will be allocated by lot; a waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

Workload

150 h

Teaching cycle

Master's with 1 major Chemistry (2026)	JMU Würzburg • generated 25-Nov-2025 • exam.	page 98 / 345
	reg. data record Master (120 ECTS) Chemie - 2026	



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



Compulsory Electives

(10 ECTS credits)



Module title			Abbreviation		
Pharmaceutical/Medicinal Chemistry 1 08-MCM2a-161-mo1					
Module coordinator	Module offered by				
ecturers Pharmazeutische Chemie (I nistry)	Pharmaceutical Che-	Institute of Pharma	ncy and Food Chemistry		
CTS Method of grading	Only after succ. con	npl. of module(s)			
numerical grade					
Ouration Module level	Other prerequisites	i			
semester graduate					
Contents					
Chemistry of drugs by field of indicat structure-activity relationships; mole n the module; drug analysis; drug sy drug development: discussion of spe	ecular effect mechanisr ynthesis; biotransform	ns; pharmacological	principles of the drugs discussed		
ntended learning outcomes					
Students have developed a knowled	ge of pharmaceutical/r	nedicinal chemistry.			
Courses (type, number of weekly contact hour	s, language — if other than Ge	rman)			
/ (3)					
Method of assessment (type, scope, lang nodule is creditable for bonus)	guage — if other than German,	examination offered — if no	ot every semester, information on whether		
a) written examination (approx. 90 to b) oral examination of one candidate c) oral examination in groups of up to d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) anguage of assessment: German ar	e each (20 to 30 minute o 3 candidates (approx		didate) or		
Allocation of places					
-					
Additional information					
-					
Vorkload					
.50 h					
Feaching cycle					
- -					



Module	title			Abbreviation	
Modern Aspects of Biological Chemistry					08-0CM-BIO-242-m01
Module coordinator				Module offered by	
lecturer of the seminar "Modern Aspects of Biologi mistry"			Aspects of Biological Che-	Institute of Organic	Chemistry
ECTS	Metho	d of grading	Only after succ. con	npl. of module(s)	
5	numer	rical grade			
Duration Module level		Other prerequisites	Other prerequisites		
1 semester graduate					
Conten	ts				

The course deals with advanced topics of biological chemistry that build on fundamental knowledge of organic chemistry, bioorganic chemistry, biochemistry and molecular biology. Key concepts in the course cover the chemistry of the genetic code, and methods to analyse and interfere with gene expression and secondary metabolism. We will cover genetic code expansion, including unnatural base pairs and unnatural amino acids, including their chemical synthesis and enzymatic incorporation. We will also cover combinatorial synthesis methods and directed evolution and display technologies. This includes in vitro selection and in vitro evolution of functional nucleic acids (aptamers, ribozymes, deoxyribozymes), mRNA display, phage display, directed evolution of proteins/enzymes, antibodies, nanobodies, sequencing methods, DNA/RNA origami and nanotechnology, as well as combinatorial polyketide synthesis and non-ribosomal peptide synthesis.

Intended learning outcomes

The students will have a detailed understanding of modern concepts in functional nucleic acids and engineered proteins, including their synthesis and analysis. They will be able to discuss a wide variety of relevant methods and explain chemical relationships at the molecular level with biochemical/biotechnological questions and apply them to corresponding problems. The students will be able to critically examine information and new developments in the field of biological chemistry.

 $\textbf{Courses} \ (\text{type, number of weekly contact hours, language} - \text{if other than German})$

S (3)

Module taught in: German or English

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

- a) written examination (approx. 45 to 90 minutes) or
- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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



Module title				Abbreviation	
Modern Drug Research 2: Technologies - Targets - Modaliti			es - Targets - Modaliti	es	08-MCM4-242-m01
Module coordinator				Module offered by	
lecturers of Pharmaceutical Chemistry			•	Institute of Pharmacy and Food Chemistry	
ECTS	ECTS Method of grading		Only after succ. compl. of module(s)		
5	5 numerical grade				
Duratio	on	Module level	Other prerequisites		
1 semester graduate		graduate			
			•		

Contents

- 1. DNA-encoded library technology for small molecule screening.
- 2. Phage display and chemical modification of peptides in display libraries.
- 3. Medicinal Chemistry in the Pharmaceutical Industry, case studies presented by invited external speakers.
- 4. Entrepreneurship in the life sciences: start-ups, biotech, and private equity.
- 5. Protein-protein interactions as drug targets and modalities to inhibit them.
- 6. How not to perform the art of Medicinal Chemistry: Dirty Drugs, PAINS, frequent hitters, and impurities from compound synthesis as confounders
- 7. Therapeutic nucleic acid drugs
- 8. Multi-target drugs
- 9. Pharmacokinetic aspects in drug development
- 10Modern strategies in drug delivery

Intended learning outcomes

The students acquire basic knowledge of the terminology of medicinal chemistry, technologies for drug identification; exemplary biologics (oligonucleotides, peptides), properties of protein-protein-interaction inhibitors, basic knowledge of the industrial pharmaceutical research process, including entrepreneurship aspects, as well as of the compound optimization cycles and can confidently apply this knowledge in solving Medicinal Chemistry-related tasks.

By successfully completing this module, students will be able to,

- explain the processes of pharmaceutical research and applications in industry.
- understand the underlying principles for the action of biological drugs.
- understand different technologies for drug identification.
- understand pharmacokinetic challenges to drug development.
- understand modern technologies for drug delivery.
- describe different strategies for protein-protein interaction inhibition and to draw conclusions about possible consequences of protein-protein interaction inhibition from chemical structural features.
- to develop interdisciplinary solution strategies for practical problems at the interface between chemistry, pharmacology and biophysics for basic research and biomedical applications.

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

S (2)

Module taught in: German or English

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

- a) written examination (approx. 45 to 90 minutes) or
- b) oral examination of one candidate each (20 to 30 minutes)

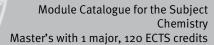
Language of assessment: German and/or English

Allocation of places

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Additional information

Master's with 1 major Chemistry (2026)		JMU Würzburg • generated 25-Nov-2025 • exam.	page 103 / 345
		reg. data record Master (120 ECTS) Chemie - 2026	





Workload
150 h
Teaching cycle
Referred to in LPO I (examination regulations for teaching-degree programmes)
-



Module title					Abbreviation
Special Topics in Medicinal Chemistry 08-MCMS-211-mo1					08-MCMS-211-m01
Module coordinator				Module offered by	
Person(s) responsible for the focus Medical Chemistry			dical Chemistry	Institute of Pharma	cy and Food Chemistry
ECTS	T i		npl. of module(s)		
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	its				
The mo	dule c	overs current and/or spec	cial topics in Medicin	al Chemistry.	
Intend	ed lear	ning outcomes			
acquire for vari	ed knov ous ex	wledge in the subject-spe perimental syntheses as	cific contexts, knows well as measuremen	the application are and analysis methor	 He/she is able to classify the as and can assess the relevance ods.
		number of weekly contact hours, l	anguage — if other than Ger	rman)	
S (2) +					
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)					
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English					
Allocation of places					
Additional information					
Workload					
150 h					
Teachi	ng cycl	e			

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



Module title					Abbreviation
Mass-Spectrometry and Proteomics					08-MBC-MSP-161-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 Mo		Module level	Other prerequisites		
1 semester		graduate			
Conten	Contents				

This module comprises a lecture, a seminar and a lab course. The lecture discusses the fundamental principles of the mass spectrometry of biomolecules. Topics to be covered in the lecture include ESI and MALDI ionisation techniques as well as the operating principles of TOF, Orbitrap and other mass analysers. The lecture also provides an introduction to CID and ETD fragmentation techniques, peptide and protein separation methods as well as the analysis of mass spectrometric data (protein databases, FDR, GO terms, etc.). It gives an overview of quantitative proteomics with a special focus on different stable isotope quantification methods (e.g. SILAC, N15 labelling, iTRAQ) and provides an insight into the mass spectrometric analysis of post-translational modifications. The seminar covers the fundamental principles of the analysis of mass spectrometric data. It introduces students to different software packages and gives them the opportunity to independently develop solutions to a range of problems. In the lab course, students will use affinity purification to isolate a protein complex from yeast. They will then use 1D-SDS-PAGE to separate that complex and will proteolytically cleave it in the gel. Afterwards, students will use nano-LC-MS/MS to analyse the peptides thus obtained and will conduct a data analysis to identify specific interaction partners and post-translational modifications.

Intended learning outcomes

Students have learned the theoretical foundations of mass spectrometry protein and proteomic analysis. They have learned how to use proteomic data analysis software tools. Students have become proficient in the affinity purification of protein complexes and have learned the steps involved in the preparation of samples for mass spectrometry protein analysis, e.g. SDS-PAGE and in-gel digestion. They have gained an insight into how to operate a nanoHPLC-coupled mass spectrometer.

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

V(2) + S(1) + P(2)

Module taught in: German or English

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

- a) written examination (approx. 45 to 90 minutes) or
- b) log (20 to 30 pages) or
- c) oral examination of one candidate each (20 to 30 minutes) or
- d) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate) or
- e) presentation (20 to 40 minutes)

Language of assessment: German and/or English Assessment offered: Once a year, winter semester

Allocation of places

67 places.

Additional information

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Workload

150 h

Teaching cycle

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Master's with 1 major Chemistry (2026)	JMU Würzburg • generated 25-Nov-2025 • exam.	page 106 / 345
	reg. data record Master (120 ECTS) Chemie - 2026	



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



Module title Abbreviation					Abbreviation	
Pharmaceutical/Medicinal Chemistry 2 08-MCM2b-161-mo1				08-MCM2b-161-m01		
Module coordinator				Module offered by		
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)			armaceutical Che-	Institute of Pharmacy and Food Chemistry		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
structu in the r	re-activ nodule	vity relationships; molecu	ılar effect mechanisn thesis; biotransforma	ns; pharmacological	gies for active agent discovery; principles of the drugs discussed tics of individual drugs; history of	
Intende	ed lear	ning outcomes				
Studen	ts have	e developed a knowledge	of pharmaceutical/r	nedicinal chemistry.		
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
V (3)						
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)						
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English						
Allocation of places						
Additional information						
Workload						
150 h						
Teaching cycle						
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		



Module title Abbro					Abbreviation	
Clinica	l-analy	tical Chemistry			08-PH-KAC-152-m01	
Module	e coord	linator		Module offered by		
		ture "Klinisch-analytisch l Chemistry)	e Chemie" (Clinical	Institute of Pharma	cy and Food Chemistry	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
This mo	odule d	discusses advanced topic	s in clinical analytica	al chemistry.		
Intende	ed lear	ning outcomes				
Studen	ts hav	e developed an advanced	knowledge of molec	cular biology.		
Course	S (type, i	number of weekly contact hours,	language — if other than Ge	rman)		
V (3)						
		sessment (type, scope, langua ble for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether	
written	exami	nation (approx. 120 minu	ites)			
Allocat	ion of	places				
-						
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						



Supramolecular Chemistry

(25 ECTS credits)



Compulsory Courses

(10 ECTS credits)



Module	e title				Abbreviation	
Supran	nolecul	ar Chemistry (Basics)			08-SCM1-161-m01	
Module	e coord	inator		Module offered	by	
lecture sics)"	r of the	seminar "Supramole	cular Chemistry (Ba-	Institute of Orga	anic Chemistry	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisite	Other prerequisites		
1 seme	ster	graduate				
Conten	its					
actions nation	betwe polyme	en molecules, molecu	ılar recognition by rece id crystals, self-asseml	ptors, complexes,	ecular chemistry. It focuses on inter- supramolecular polymers, coordi- dia, synthetic ion channels and mo-	
Intend	ed lear	ning 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 (3)						
Module taught in: German or English						

 $\textbf{Method of assessment} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination of fered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination of fered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language}) \ (\textbf{type}, \textbf{language})$ module is creditable for bonus)

a) written examination (approx. 90 minutes) or

b) oral examination of one candidate each (approx. 20 minutes)

Language of assessment: German and/or English

Allocation of places

Additional information

Workload

150 h

Teaching cycle



Module title					Abbreviation		
Supramolecular Chemistry (Practical Course)					08-SCM2-242-m01		
Modul	e coord	inator		Module offered by			
lecture sics)"	er of the	seminar "Supramolecul	ar Chemistry (Ba-	Institute of Organic	Chemistry		
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)			
5	(not)	successfully completed					
Durati	on	Module level	Other prerequisites				
1 seme	ester	graduate					
Conte	nts						
mistry.	. They w		host-guest complexe		ents in supramolecular che- nd nanoparticles and use advan-		
Intend	ed lear	ning outcomes					
		able to perform synthese hem. They are able to pro			roscopic methods to analyse and hem microscopically.		
Course	es (type, i	number of weekly contact hours,	language — if other than Ge	rman)			
P (6) Modul	e taugh	t in: German or English					
		sessment (type, scope, langua ble for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether		
pages	each) a	chtestate (pre and post- ind assessment of practions issessment: German and	cal performance (2 to		minutes each, log approx. 5 to 10 ions)		
Alloca	tion of	places					
Additional information							
Workload							
150 h							
Teaching cycle							
	<u>.</u>						



Compulsory Electives

(15 ECTS credits)



Modul	Module title				Abbreviation	
Bioorg	anic Ch	nemistry			08-SCM3-152-m01	
Modul	e coord	linator		Module offered by	l.	
lecturer of lecture "Bioorganische Chemie Chemistry)			mie" (Bioorganic	Institute of Organic	Chemistry	
ECTS	Meth	od of grading	Only after succ. compl. of module(s)			
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites	5		
1 seme	ester	graduate				
Conter	nts		•			
spectro	Bioorganic chemistry unites the central questions of organic chemistry, biochemistry, medicinal chemistry and spectroscopy with a focus on biomolecules. At the core of bioorganic chemistry is the synthesis and purposeful manipulation of biomolecules, such as nucleic acids, peptides, proteins, carbohydrates and lipids. This includes the framework of structure-function relationships and the fundamental understanding of biological mechanisms,					

Key concepts covered in the course are nucleic acid chemistry, peptide chemistry, carbohydrate chemistry, bioorthogonal reactions, molecular diversity, solid-phase synthesis, molecular recognition and interactions (ligand-receptor interactions, signal transduction)

to enable applications towards biomaterials, biosensing, bioimaging, clinical diagnostics and therapeutics.

Intended learning outcomes

The students will have a molecular understanding of the structure and reactivity of biomolecules. The students obtain knowledge of modern synthetic methods in bioorganic chemistry and can explain principles of molecular interactions and recognition mechanisms. They can describe modern aspects of nucleic acids, proteins, carbohydrates and lipids.

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

S (3)

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

- a) written examination (approx. 45 to 90 minutes) or
- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Modul	Module title				Abbreviation		
Supra	molecu	lar Chemistry (Advanced	Lab)		08-SCM4-242-m01		
Modul	le coord	inator		Module offered by			
lecture sics)"	er of the	seminar "Supramolecul	ar Chemistry (Ba-	Institute of Organic	Chemistry		
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)			
5	(not)	successfully completed					
Durati	on	Module level	Other prerequisites	.			
1 seme	ester	graduate					
Conte	nts		•				
thods	in supra		udents will be expect		synthesis and analytical mework in the lab independently, do		
Intend	led lear	ning outcomes					
		able to use advanced syr eir findings. They are abl			olecular chemistry in the lab and gs.		
Course	es (type, ı	number of weekly contact hours,	language — if other than Ge	rman)			
P (6) Modul	le taugh	t in: German or English					
		sessment (type, scope, langua	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
		(approx. 20 minutes) Issessment: German and	or English				
Allocation of places							
							
Additional information							
Additional information on module duration: block taught lab course with approx. 20 working days.							
Workload							
150 h	150 h						

Teaching cycle

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



Module	title				Abbreviation		
Supramolecular Soft Matter					08-SCM5-242-m01		
Module	coord	inator		Module offered by			
lecture	r of the	seminar "Supramolecula	ar Soft Matter"	Institute of Organic	Chemistry		
ECTS	S Method of grading Only after succ. co		Only after succ. con	mpl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Contents							
the for	This module introduces students to the fundamentals of supramolecular soft materials. The main focus lies on the formation and characterization of liquid crystals (LC's) soft crystals, plastic crystals, LC-Elastomers and hybrid materials. Concepts such as nanosegregation for the structural control and stimuli responsive properties						

conductors will be discussed.

Intended learning outcomes

Students are able to understand the structural design of soft matter and the underlying formation principles. The students will be able to create new materials with tailored properties which are optimized for modern applications. In a practical part students learn to evaluate the quality of publications related to these topics.

will be strengthened and their impact for applications such as soft robotics, anisotropic semi conductors and ion

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

 $S(2) + \ddot{U}(1)$

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

- a) oral examination of one candidate each (20 to 30 minutes) or
- b) talk (approx. 30 minutes) or
- c) portfolio (approx. 30 hours total)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Modul	e title				Abbreviation		
Special Topics in Supramolecular Chemistry 08-S					08-SCMS-211-m01		
Modul	e coord	inator		Module offered by			
Person mistry	ı(s) resp	oonsible for the focus Su	pramolecular Che-	Institute of Organic	Chemistry		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duration	on	Module level	Other prerequisites				
1 seme	ester	graduate					
Conter	ıts						
The mo	odule co	overs current and/or spe	cial topics in Supram	olecular Chemistry.			
Intend	ed lear	ning outcomes					
fy the a	acquire		ct-specific contexts,	knows the application	mistry. He/she is able to classion areas and can assess the relemethods.		
Course	es (type, r	number of weekly contact hours,	anguage — if other than Ge	rman)			
S (2) +	Ü (1)						
		sessment (type, scope, langua le for bonus)	${\sf ge-if}$ other than German,	examination offered — if no	ot every semester, information on whether		
b) oral c) oral d) log e) pres	examir examin (approx sentatio	mination (approx. 90 to 1 nation of one candidate e ation in groups of up to 3 . 20 pages) or n (approx. 30 minutes) ssessment: German and	ach (20 to 30 minute 3 candidates (approx	•	didate) or		
Allocat	tion of p	olaces					
Additional information							
Worklo	Workload						
150 h	150 h						
Teachi	Teaching cycle						
							

 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes})}$



Module title					Abbreviation			
Physic	al Chen	nistry of Supramolecular	Assemblies		08-PCM5-161-m01			
Module	e coord	inator		Module offered by				
	r of the Strukt	seminar "Physikalische uren"	Chemie Supramole-	Institute of Physica	l and Theoretical Chemistry			
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)				
5	nume	rical grade						
Duratio	on	Module level	Other prerequisites					
1 seme	ster	graduate						
Conten	its							
		xamines the basic intera of aggregates as well as			he formation and physical-cheministry.			
Intend	ed lear	ning outcomes						
in the f dern ap	ield. Th oplicati	ney can describe the form ons of supramolecular ch	ation and physical-cl nemistry.	hemical properties o	trating a high degree of expertise of aggregates. They can name mo-			
		number of weekly contact hours, l	anguage — if other than Ger	man)				
S (2) + Module		t in: German or English						
Metho	d of ass		ge — if other than German, o	examination offered — if no	ot every semester, information on whether			
b) oral c) talk	examir (approx	mination (approx. 90 min nation of one candidate e k. 30 minutes) ssessment: German and	ach (approx. 20 minı	utes) or				
Allocat	ion of p	olaces						
Additional information								
Workload								
150 h								
Teachi	Teaching cycle							
	-							

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module	Module title Abbreviation						
Bioinor	ganic	Chemistry			08-ACM2-242-m01		
Module	coord	inator		Module offered by			
lecture	r of the	seminar "Bioinorganic C	hemistry"	Institute of Inorgan	ic Chemistry		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
	ds of BI				chemistry (BIC). It discusses the ns of BIC in the fields of diagnosis		
Intende	ed lear	ning outcomes					
		able to describe the princ us enzymes and describe			xplain the structure and effects medicine.		
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ge	rman)			
S (3) Module	taugh	t in: German or English					
		sessment (type, scope, langua le for bonus)	${\sf ge-if}$ other than German,	examination offered — if no	ot every semester, information on whether		
b) oral c) portf	examir olio (a	mination (approx. 45 to 9 nation of one candidate e oprox. 30 hours total) ssessment: German and,	ach (20 to 30 minute	s) or			
Allocat	ion of _l	olaces					
Additional information							
Worklo	Workload						
150 h							
Teachi	Teaching cycle						
							



Module title Abbreviation							
Basics and Applications of Quantum Chemistry					08-TCM2-161-m01		
Module	Module coordinator Module offered by						
lecture	r of lec	ture "Computationa	l Chemistry"	Institute of Physica	l and Theoretical Chemistry		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites	;			
1 seme	ster	graduate					
Conten	its	,	`				
This m	odule i	ntroduces students	to the fundamental princi	ples of computation	al chemistry.		
Intend	ed lear	ning outcomes					
		able to explain the t	heoretical principles of co	mputational chemis	try and to apply methods in com-		
Course	S (type,	number of weekly contact h	nours, language — if other than Ge	rman)			
S (2) +	Ü (2)						
		sessment (type, scope, ble for bonus)	language $-$ if other than German,	examination offered — if no	ot every semester, information on whether		
b) oral c) oral d) log (e) pres	examiı examir (approx entatic	nation of one candid			didate) or		
Allocat	ion of	places					
Additio	Additional information						
Workload							
150 h							
Teaching cycle							
		le					



Module	e title				Abbreviation	
Organic Functional Materials					08-0CM-FM-161-m01	
Module	e coord	linator		Module offered by		
lecture	r of the	e seminar "Organische Fu	ınktionsmaterialien"	Institute of Organic Chemistry		
ECTS	S Method of grading Only after succ. cor		Only after succ. con	mpl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	its					
sical ef	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-					

Intended learning outcomes

linear optics.

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 (3)

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

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

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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



Module title Abbreviation						
Nanoscale Materials 08-PCM3-161-m01						
Modul	e coord	inator		Module offered by		
lecture	r of the	seminar "Nanoskalige N	laterialien"	Institute of Physica	l and Theoretical Chemistry	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ıts					
		liscusses advanced topio naracterisation methods			ne structure, properties, fabricatirials.	
Intend	ed lear	ning outcomes				
		able to characterise nanc inoscale materials.	scale materials. They	are able to name a	nalytical methods and applicati-	
Course	S (type, r	number of weekly contact hours,	anguage — if other than Ger	rman)		
S (2) + Module		t in: German or English				
		sessment (type, scope, langua	ge — if other than German, o	examination offered — if no	ot every semester, information on whether	
b) oral c) talk Langua	examir (approx	mination (approx. 90 mir nation of one candidate e k. 30 minutes) ssessment: German and bonus	ach (approx. 20 minu	utes) or		
Allocat	tion of p	olaces				
Additional information						
Workload						
150 h						
Teaching cycle						



Module title Abbreviation							
Polymers II					03-FU-PM2-222-m01		
Modul	e coord	inator		Module offered by			
holder Dentis		Chair of Functional Mater	ials in Medicine and	Chair of Chemical T	echnology of Material Synthesis		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ester	graduate					
Conter	ıts						
Basics racteriz		as advanced knowledge	about contemporary	issues of polymer s	ynthesis, -modification and cha-		
Intend	ed learı	ning outcomes					
The stu	udent h	as advanced knowledge	of the synthesis, mod	dification and charac	cterization of polymers.		
Course	es (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)			
V (2) +	P (2)						
		sessment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether		
b) oral c) talk Langua Assess	examir (approx age of a	mination (approx. 90 min nation of one candidate e k. 30 minutes) ssessment: German and, ffered: Once a year, winto bonus	ach (20 to 30 minute /or English	s) or			
Allocat	tion of p	olaces					
Additio	onal inf	ormation					
Workload							
150 h							
Teachi	ng cycl	e					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						
2							



		//(X/A 1	J WE OW KADI)5 0, \. 7.	, .	
Module title					Abbreviation	
Moleci	ular Ma	terials (Lecture)			o8-FU-MoMaV-152-mo1	
Modul	e coord	inator		Module offered by		
	progra Matrier	ımme coordinator Funktio ials)	onswerkstoffe (Func-	Chair of Chemical T	echnology of Material Synthesis	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	undergraduate				
Conter	nts					
	cal bon thin filr		tions, supramolecula	ır chemistry, molecu	lar materials, colloids, nanopar-	
Intend	ed lear	ning outcomes				
themse feedba	elves w	ith a topic in the field, de	eliver a presentation o	on that topic, discuss	nave learned how to familiarise s it as well as to give and receive	
-	_	number of weekly contact hours,	language — if other than Ger	rman)		
V (3) +			_			
		sessment (type, scope, langua ble for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether	
tes) or 20 pag Langua	c) oral ges) or e	examination in groups of e) presentation (approx. essessment: German and	f up to 3 candidates (a 30 minutes)] as well a	approx. 15 minutes p	ne candidate each (20 to 30 minu- per candidate) or d) log (approx. ninutes), weighted 3:1	
Allocat	tion of	places				
	-					
Additio	onal inf	ormation				
Worklo	oad					
150 h						

Teaching cycle

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Theoretical Chemistry

(25 ECTS credits)

Compulsory Courses

(15 ECTS credits)



Module	e title				Abbreviation		
Basics and Applications of Quantum Chemistry 08-TCM2-161-mo1							
Module coordinator Module offered by							
lecture	r of lec	ture "Computationa	l Chemistry"	Institute of Physica	l and Theoretical Chemistry		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites	;			
1 seme	ster	graduate					
Conten	its	,	`				
This m	odule i	ntroduces students	to the fundamental princi	ples of computation	al chemistry.		
Intend	ed lear	ning outcomes					
		able to explain the t	heoretical principles of co	mputational chemis	try and to apply methods in com-		
Course	S (type,	number of weekly contact h	nours, language — if other than Ge	rman)			
S (2) +	Ü (2)						
		sessment (type, scope, ble for bonus)	language $-$ if other than German,	examination offered — if no	ot every semester, information on whether		
b) oral c) oral d) log (e) pres	examiı examir (approx entatic	nation of one candid			didate) or		
Allocat	ion of	places					
Additio	nal inf	ormation					
Worklo	ad						
150 h							
Teaching cycle							
		le					



Module title					Abbreviation
Numer	rical Me	thods and Programming			08-TCM3-161-m01
Modul	e coord	inator		Module offered by	
lecture mie"	er of lec	ture "Programmieren in T	heoretischer Che-	Institute of Physica	al and Theoretical Chemistry
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)	
5	nume	rical grade			
Durati	on	Module level	Other prerequisites	•	
1 seme	ester	graduate			
Conter	nts				
		provides an introduction that	to the fundamentals	of programming in tl	heoretical chemistry and discus-
Intend	ed lear	ning outcomes			
		able to explain and use on ame its application area		ng languages typica	lly used in theoretical chemistry
Course	es (type, r	number of weekly contact hours,	language — if other than Ge	rman)	
S (2) +	Ü (2)				
		sessment (type, scope, langua	age — if other than German,	examination offered — if n	ot every semester, information on whether
b) oral c) oral d) log e) pres	examir examin (approx sentatio	mination (approx. 90 to a nation of one candidate of nation in groups of up to g a. 20 pages) or on (approx. 30 minutes) assessment: German and	each (20 to 30 minute 3 candidates (approx		ndidate) or
Alloca	tion of	places			
Additio	onal inf	ormation			
Worklo	oad				
150 h					
Teachi	ing cycl	e			

 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes}})$



Modul	e title			Abbreviation		
Quant	Quantum Dynamics				08-TCM4-161-m01	
Modul	e coord	inator		Module offered by		
lecture	er of lec	ture "Quantendynamik"		Institute of Physica	l and Theoretical Chemistry	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts					
	Time-dependent Schrödinger equation, propagators, time-dependent perturbation theory, adiabatic theorem, diabatic and adiabatic states, non-adiabatic dynamics, mixed quantum-classical dynamics.					
Intend	ed lear	ning outcomes				
in mol	ecules. field of	Their insight into the me theoretical chemistry.	thods and the numer	ical realizations allo	nuclear and electronic dynamics w them to carry out applications	
		number of weekly contact hours,	language — if other than Ger	rman)		
S (2) +						
			age — if other than German,	examination offered — if no	ot every semester, information on whether	
b) oral c) oral d) log e) pres	a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English					
Alloca	tion of	places				
Additio	onal inf	ormation				
Worklo	oad					

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes})}$

Compulsory Electives

(10 ECTS credits)



Module title Abbreviation						
Selected Topics in Theoretical Chemistry 08-TCM1-161-mo1						
Module coordinator Module offered by						
lecturer	of lect	ture "Theoretische Chen	nie"	Institute of Physica	al and Theoretical Chemistry	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade	Ī			
Duratio	n	Module level	Other prerequisites	·		
1 semes	ter	graduate				
Content	:S		•			
This mo	dule ir	ntroduces students to th	ne fundamental princi	ples of theoretical ch	nemistry.	
Intende	d learı	ning outcomes				
		able to describe the mat amical approaches of th		al principles underly	ring the quantum chemical and	
		number of weekly contact hours		rman)		
S (2) + Ü						
		sessment (type, scope, langule for bonus)	age — if other than German,	examination offered — if n	ot every semester, information on whether	
b) oral e c) oral e d) log (a e) prese	examir examin examin epprox entatio	mination (approx. 90 to nation of one candidate ation in groups of up to . 20 pages) or n (approx. 30 minutes) ssessment: German and	each (20 to 30 minute 3 candidates (approx		didate) or	
Allocati	on of p	olaces				
Addition	nal inf	ormation				
Workloa	ad					
150 h						
Teachin	g cycl	e				
Teachin 	g cycl	e				



Module title					Abbreviation	
Theore	tical Cl	nemistry - Project course	quantum chemistry		08-TCAP1-161-m01	
Modul	e coord	inator		Module offered by	l	
head o	f the re	search group offering the	e module	Institute of Physica	l and Theoretical Chemistry	
ECTS	Metho	od of grading	Only after succ. con	ıpl. of module(s)		
5	(not)	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	its		•			
will be Intender Studer tum ch	on qua ed lear ets have emistry	ning outcomes	thods typically used	in theoretical chemi vant to the field of qu	sed in the discipline. The focus stry and, in particular, in quan- uantum chemistry.	
P (5)	(type, i	idiliber of weekly contact flours, i	aliguage — il other than der	iliali)		
Metho module i	s creditab	le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
		(approx. 30 minutes) ssessment: German and	or English			
Allocat	-		3			
Additio	nal inf	ormation				
Additio	nal inf	ormation on module dura	ition: block taught la	b course with approx	x. 20 working days.	
Worklo	Vorkload Vorkload					

150 h

Teaching cycle

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module	e title		Abbreviation			
Theore	tical CI	nemistry - Project course		08-TCAP2-161-m01		
Module coordinator Module offered by						
head o	f the re	search group offering the	e module	Institute of Physica	l and Theoretical Chemistry	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	(not)	successfully completed				
Duratio	n	Module level	Other prerequisites	Other prerequisites		
1 seme	ster	graduate				
Conten	ts		`			
the Inst	titute o				the research groups based at sed in the discipline. The focus	
Intende	ed lear	ning outcomes				
		e learned some of the me s. They are able to explair	., .		stry and, in particular, in quan- iantum dynamics.	
Course	S (type, r	number of weekly contact hours, I	anguage — if other than Ge	rman)		
P (5)						
		sessment (type, scope, langua	ge — if other than German,	examination offered — if no	t every semester, information on whether	

Allocation of places

presentation (approx. 30 minutes)

Language of assessment: German and/or English

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Additional information

Additional information on module duration: block taught lab course with approx. 20 working days.

Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title Abbreviation						
Special Topics in Theoretical Chemistry 08-TCMS-211-mo1						
Module coordinator Module offered by						
Person	(s) resp	oonsible for the focus The	eoretical Chemistry	Institute of Physica	l and Theoretical Chemistry	
ECTS	Meth	od of grading	Only after succ. con	ipl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	its		,			
The mo	dule c	overs current and/or spec	cial topics in Theoreti	cal Chemistry.		
Intend	ed lear	ning outcomes				
acquire	ed knov		cific contexts, knows	the application are	ry. He/she is able to classify the as and is proficient in the requi- coretical Chemistry.	
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)		
S (2) +	Ü (1)					
		sessment (type, scope, langua ble for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
b) oral c) oral d) log (e) pres	examir examin (approx entatio	mination (approx. 90 to 1 nation of one candidate e nation in groups of up to 3 nation in groups of up to 3 nation in groups of up to 3 nation in (approx. 30 minutes) nation in and serman and services are services as a service services are services and services are services as a services are services	ach (20 to 30 minute 3 candidates (approx		didate) or	
Allocat	ion of	olaces				
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	e				
	-					



Module title					Abbreviation
Modern Drug Research 1: Basics and Drug Design					08-MCM3-242-m01
Module coordinator				Module offered by	
lecturers of Pharmaceutical Chemistry			nistry	Institute of Pharmacy and Food Chemistry	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)	
5	nume	rical grade			
Duration Module level		Other prerequisite	Other prerequisites		
1 semester graduate					
Contor	nt c	-	·		

Contents

Fundamentals: Phases of drug development, principles of drug action, pharmacokinetics and biotransformation; strategies of drug discovery, drug targets, chemical space of drug discovery, protein-ligand interactions, structure-activity-relationships (SAR), bioisosterism, prodrug strategies.

Experimental methods: binding assays, enzymatic assays, biophysical methods, high-throughput-screening (HTS).

Theoretical methods and drug design: virtual screening, ligand-based methods, QSAR, pharmacophore models, structure-based drug design, docking, simulation methods, machine learning (AI).

Case studies (drug discovery, design and optimization)

Intended learning outcomes

The students master the fundamentals of drug development, the strategies of drug discovery and the applied theoretical and experimental methods. They can understand and critically question the essential content of current scientific publications in drug research. They are able to carry out a basic virtual screen and to evaluate its results.

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

 $S(2) + \ddot{U}(1)$

Module taught in: German or English

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) presentation (approx. 30 minutes) or
- b) written examination (approx. 45 to 90 minutes)

Language of assessment: German and/or English

Allocation of places

22 places.

- 16 places for students of the Master's degree programme Chemie (Chemistry): Places will be allocated according to the same number of subject semesters; students who have chosen Medizinische Chemie (Medicinal Chemistry) as their focus will be given preferential consideration.
- 6 places for students of the Master's degree programme Biochemie (Biochemistry): Places will be allocated according to the number of subject semesters; among applicants with the same number of subject semesters, places will be allocated by lot.
- 2 places for students of the Master's degree programme MINT-Lehramt PLUS: Places will be allocated according to the number of subject semesters; among applicants with the same number of subject semesters, places will be allocated by lot; a waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

Teaching cycle

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Compulsory Electives 2

(15 ECTS credits)



Subfield Additional qualifications Compulsory Electives Focuses

(5-10 ECTS credits)

In the sub-area "Zusätzliche Kompetenzen aus den Schwerpunkten" ("Additional Skills from the Focus Area"), students may use a module of their choice from the Focus area that they are not using in the area of mandatory electives 1.



Module title Abbreviation					Abbreviation
Advand	ed Ino	rganic Chemistry			08-ACM1-161-m01
Module	e coord	linator		Module offered by	
Manag	ing Dir	ector of the Institute of Ir	organic Chemistry	Institute of Inorgan	ic Chemistry
ECTS	Meth	od of grading	Only after succ. co	npl. of module(s)	
10	nume	rical grade			
Duratio	on	Module level	Other prerequisites	;	
2 seme	ester	graduate			
Conten	its				
special	l comp		elements (MGEs), bo		metal chemistry. It focuses on MGEs and MGE compounds, the
Intend	ed lear	ning outcomes			
the che	emical				roup elements. They can describ s chemical and physical aspects
Course	S (type, i	number of weekly contact hours,	language — if other than Ge	rman)	
S (3) +	S (3)				
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)					
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or					

- d) log (approx. 20 pages) or
- e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

300 h

Teaching cycle

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



Module title				Abbreviation
Inorganic Chemistry practical course for advanced				08-ACPM-161-m01
Module coordinator			Module offered by	
focus point coordinator "Inorganic Chemistry"			Institute of Inorganic Chemistry	
ECTS N	Method of grading	Only after succ. compl. of module(s)		
10 (not) successfully completed			
Duration Module level		Other prerequisites		
1 semest	er graduate			
Contents	;			

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.

tral analysis and crystallography. Students will be expected to conduct their work in the lab independently, write

 $\textbf{Courses} \ (\text{type, number of weekly contact hours, language} - \text{if other than German})$

a lab report documenting their findings and deliver a presentation.

P (24)

Module taught in: German or English

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 on practical course (approx. 20 pages) and talk (approx. 15 minutes) Language of assessment: German and/or English

Allocation of places

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Additional information

Additional information on module duration: block taught lab course with approx. 40 working days.

Workload

300 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title				Abbreviation		
Special Topics in Inorganic Chemistry 08-ACMS-211-m01					08-ACMS-211-m01	
Module coordinator Module of			Module offered by	ffered by		
Person	(s) resp	oonsible for the focus Inc	organic Chemistry	Institute of Inorganic Chemistry		
ECTS	Meth	thod of grading Only after succ. compl. of module(s)				
5	nume	rical grade				
Duration Module level Other prerequisites						
1 semester graduate						
Conten	its					
The mo	dule c	overs current and/or spe	cial topics in Inorgan	ic Chemistry.		
Intend	ed lear	ning outcomes				
The student has advanced knowledge of selected topics in Inorganic Chemistry. He/she is able to classify the acquired knowledge in the subject-specific contexts, knows the application areas and can assess the relevance for various experimental syntheses as well as measurement and analysis methods.						
Course	S (type, i	number of weekly contact hours,	language — if other than Ge	rman)		
S (2) +	Ü (1)					
		sessment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
b) oral c) oral d) log (e) pres	examir examir (approx entatio	mination (approx. 90 to 1 nation of one candidate e nation in groups of up to 3 c. 20 pages) or on (approx. 30 minutes) assessment: German and	each (20 to 30 minute 3 candidates (approx	•	didate) or	
Allocat	ion of	places				
Additional information						
Workload						
150 h						
Teachi	ng cycl	e				



Module title					Abbreviation		
Advanced Research Project Organic Chemistry 08-OCM-AKP1-161-mo1							
Module coordinator Modu				Module offered by	odule offered by		
head o	f the re	search group offering the	e module	Institute of Organic	Chemistry		
ECTS	Metho	od of grading	Only after succ. compl. of module(s)				
10	(not)	successfully completed					
Duratio	Duration Module level Other prerequisites						
1 seme	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.							
Intend	ed lear	ning 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.							
Course	S (type, r	number of weekly contact hours, I	anguage — if other than Ger	man)			
P (20) Modul	e taugh	t in: German or English					
		Sessment (type, scope, langualle for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
Log (approx. 15 to 20 pages) and talk (approx. 15 minutes) Language of assessment: German and/or English							
Allocat	tion of p	olaces					
Additional information							
Workload							
300 h							
Teaching cycle							
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)			



Module title					Abbreviation	
Special Topics in Organic Chemistry 08-0CMS-211-mo1					08-0CMS-211-m01	
Module coordinator				Module offered by		
Person	(s) resp	oonsible for the focus Org	anic Chemistry	Institute of Organic	Chemistry	
ECTS	Metho	od of grading	Only after succ. compl. of module(s)			
5	nume	rical grade				
Duratio	uration Module level Other prerequisites					
1 seme	1 semester graduate					
Contents						
The mo	odule co	overs current and/or spec	cial topics in Organic	Chemistry.		
Intend	ed lear	ning outcomes				
Course S (2) +	s experi s (type, r Ü (1)	mental syntheses as wel	l as measurement an anguage — if other than Gei	d analysis methods _{man)}	and can assess the relevance for . ot every semester, information on whether	
module i	s creditab	le for bonus)				
b) oral c) oral d) log (e) pres	examir examin (approx entatio	mination (approx. 90 to 1 nation of one candidate enation in groups of up to 3 . 20 pages) or n (approx. 30 minutes) ssessment: German and	ach (20 to 30 minute 3 candidates (approx	•	didate) or	
Allocation of places						
Additional information						
Workload						
150 h						
Teachi	Teaching cycle					



Module title					Abbreviation	
Laser Spectroscopy					08-PCM1a-161-m01	
Module coordinator				Module offered by	l .	
lecture copy)	r of ser	ninar "Laserspektro	skopie" (Laser Spectros-	Institute of Physica	l and Theoretical Chemistry	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites	•		
1 seme	ster	graduate				
Conten	ts					
		ntroduces students spectroscopy.	to the fundamental princi	ples of laser spectro	scopy. It discusses absorption	
Intend	ed lear	ning outcomes				
			omponents and operating to describe the principles		as well as the optical principles emission spectroscopy.	
Course	S (type, r	number of weekly contact h	nours, language — if other than Ge	rman)		
S (2) + Module	٠,	t in: German or Engl	ish			
		sessment (type, scope, ole for bonus)	language — if other than German,	examination offered — if no	ot every semester, information on whether	
b) oral	examir	mination (approx. 9 nation of one candid ssessment: Germar	ate each (approx. 20 mini	utes)		
Allocat	ion of p	olaces				
Additional information						
						
Workload						
150 h						
Teaching cycle						
						
Referre	ed to in	LPO I (examination regi	ulations for teaching-degree progra	ammes)		



Modul	Module title Abbreviation					
Advanced Physical Chemistry (Lab)					08-PCM1b-161-m01	
Module coordinator				Module offered by		
lecture copy)	r of ser	ninar "Laserspektroskopi	e" (Laser Spectros-	Institute of Physica	l and Theoretical Chemistry	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	(not)	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conter	its					
borato be exp	ry. Afte ected t		idents autonomously	conduct experimen	ds in physical chemistry in the lats in the laboratory. Students will	
		e developed a high level of to analyse the resulting r			ethods in physical chemistry.	
Course	S (type, r	number of weekly contact hours, I	anguage — if other than Ge	rman)		
P (4) Module	e taugh	t in: German or English				
		sessment (type, scope, langua ble for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations) Language of assessment: German and/or English						
Allocat	ion of	olaces				
Additional information						

Additional information

Additional information on module duration: block taught lab course with approx. 20 working days.

Workload

150 h

Teaching cycle

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



Module title					Abbreviation	
Physic	al Cher	mistry (Advanced Lab)			08-PCM6-161-m01	
Module	e coord	inator		Module offered by		
lecture	rs Phys	sikalische Chemie (Physic	al Chemistry)	Institute of Physica	l and Theoretical Chemistry	
ECTS	Metho	od of grading	Only after succ. co	mpl. of module(s)		
5	(not)	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
	_	rives students the opport of Physical Chemistry and			f the research groups based at lytical methods.	
Intende	ed lear	ning outcomes				
					relevant physical chemistry resequestions in physical chemistry.	
Course	S (type, r	number of weekly contact hours, l	anguage — if other than G	erman)		
P (4) Module taught in: German or English						
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)						

Allocation of places

presentation (approx. 20 minutes)

Language of assessment: German and/or English

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Additional information

Additional information on module duration: block taught lab course with approx. 20 working days.

Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title					Abbreviation	
Specia	l Topic	s in Physical Chemistry			08-PCMS-211-m01	
Module coordinator Mode			Module offered by	I.		
Person	ı(s) res _l	oonsible for the focus Ph	ysical Chemistry	Institute of Physica	al and Theoretical Chemistry	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites	;		
1 seme	ester	graduate				
Conter	ıts					
The mo	odule c	overs current and/or spe	cial topics in Physica	l Chemistry.		
Intend	ed lear	ning outcomes				
quired variou	knowle s exper	edge in the subject-spec imental measurement ar	ific contexts, knows that analysis methods.	ne application areas	He/she is able to classify the ac- and can assess the relevance for	
Course	S (type, i	number of weekly contact hours,	language — if other than Ge	rman)		
S (2) +	Ü (1)					
		sessment (type, scope, langu ole for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether	
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English						
Alloca	tion of	places				
Additional information						
Workload						
150 h						
Teachi	ng cycl	e				

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module	Module title Abbreviation					
Ultrafa	Ultrafast spectroscopy and quantum-control 08-PCM4-242-mo1					
Module	coord	inator		Module offered by	I.	
lecture	r of the	seminar "Nanoskalige N	laterialien"	Institute of Physica	al and Theoretical Chemistry	
ECTS	Meth	od of grading	Only after succ. con	ıpl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate	Prior completion of	modules 08-PCM1a	and o8-PCM1b recommended.	
Conten	ts					
		liscusses advanced topic ime-resolved laser spect			control. It focuses on ultrashort	
Intende	ed lear	ning outcomes				
plain th princip	e theo les and	ry of time-resolved laser I applications of quantun	spectroscopy and na n control.	me experimental me	naracterise them. They can exethods. They can describe the	
		number of weekly contact hours, I	anguage — if other than Ger	man)		
S (2) + Module		t in: German or English				
		sessment (type, scope, langua ble for bonus)	ge — if other than German, o	examination offered — if n	ot every semester, information on whether	
b) talk c) portf	(appro olio (a	nation of one candidate e x. 30 minutes) or pprox. 50 hours total) ssessment: German and		ites) or		
Allocat	ion of _l	places				
Additional information						
Workload						
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						



Module title					Abbreviation	
Molecular Biology					08-BC-MOL-222-m01	
Module coordinator				Module offered by		
holder of the Chair of Biochemistry			1	Chair of Biochemistry		
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)		
5	nume	erical grade				
Duratio	on	Module level	Other prerequisites	Other prerequisites		
1 semester undergraduate						
Contents						
Conte						

The module covers specific topics of molecular physiology and functional biochemistry in lectures and exercices.

Intended learning outcomes

After attending the module events, students have sound knowledge in molecular biology.

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

 $V(2) + \ddot{U}(1)$

Module taught in: German

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

- a) written examination (approx. 45 to 90 minutes) or
- b) log (10 to 20 pages) or
- c) oral examination of one candidate each (20 to 30 minutes) or
- d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or
- e) presentation (20 to 30 minutes) or
- f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

Teaching cycle: Once a year, summer semester

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title					Abbreviation
Molecular Biology laboratory course					08-BC-MOLP-172-m01
Module coordinator				Module offered by	
holder	holder of the Chair of Biochemistry			Chair of Biochemistry	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
10	nume	rical grade			
Durati	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)

P (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)

- a) written examination (approx. 45 to 90 minutes) or
- b) log (10 to 20 pages) or
- c) oral examination of one candidate each (20 to 30 minutes) or
- d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or
- e) presentation (20 to 30 minutes) or
- f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)

Language of assessment: German and/or English

Assessment offered: Once a year, winter semester

Allocation of places

Biochemie (Biochemistry) 24 places.

Selection process Biochemie (Biochemistry), Bachelor's (180 ECTS credits): Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

Chemie (Chemistry), Master's and MINT-Lehramt PLUS Master's: 6 places. Selection process: 1. Applications of Master's degree programme Chemie (Chemistry) (120 ECTS credits) will be considered first: Places will be allocated according to the number of subject semesters. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available. 2. In case that there are places left after procedure 1 is finished completely, theses places will be distributed among the students in the Master's degree programme MINT-Lehramt PLUS as follows: Places will be allocated according to the number of subject semesters. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

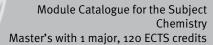
Additional information

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Workload

300 h

Master's with 1 major Chemistry (2026)	JMU Würzburg • generated 25-Nov-2025 • exam.	page 151 / 345
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Teaching cycle				
-				
Referred to in LPO I (examination regulations for teaching-degree programmes)				
				



Module title					Abbreviation	
Research Internship Biochemistry for Master Chemistry					08-BC-FPMC-242-m01	
Module coordinator				Module offered by		
focus point coordinator "Biochemistry"			1	Chair of Biochemistry		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
10	(not)	successfully completed	o8-BC-MOLP			
Duratio	Duration Module level		Other prerequisites			
1 semester graduate						
Contents						

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

Intended learning outcomes

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

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

P (10)

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

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

Allocation of places

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Additional information

Additional information on module duration: block taught lab course with approx. 40 working days.

Workload

300 h

Teaching cycle

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



Module title					Abbreviation			
Special Topics in Biochemistry					08-BCMS-211-m01			
Module coordinator				Module offered by	I.			
Person	(s) resp	oonsible for the focus Bio	chemistry	Chair of Biochemis	try			
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)				
5	nume	rical grade						
Duratio	on	Module level	Other prerequisites	1				
1 seme	ster	graduate						
Conter	ıts							
The mo	odule c	overs current and/or spe	cial topics in Biochen	nistry.				
Intend	ed lear	ning outcomes						
red kn	owledg		contexts, knows the a	application areas an	ne is able to classify the acquidd can assess the relevance for va-			
Course	S (type, ı	number of weekly contact hours,	language — if other than Ge	rman)				
S (2) +	Ü (1)							
		sessment (type, scope, langua ble for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether			
b) oral c) oral d) log (e) pres	examir examir (approx entatio	mination (approx. 90 to a nation of one candidate e nation in groups of up to g c. 20 pages) or on (approx. 30 minutes) assessment: German and	ach (20 to 30 minute 3 candidates (approx	•	didate) or			
Allocat	tion of	places						
Additional information								
Workload								
150 h								
Teachi	ng cycl	e						
			<u></u>					

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



Module title					Abbreviation	
Lab Co	urse M	aterial Science			08-FMM-MP-161-m01	
Modul	Module coordinator			Module offered by		
	rs spec Materi	ialisation subject Funktionals)	onsmaterialien (Fun-	Chair of Chemical T	echnology of Material Synthesis	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	(not)	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts					
Ten se	lected e	experiments in materials	science.			
Intend	ed lear	ning outcomes				
Studer	nts have	e developed an advanced	proficiency in the pe	erformance of experi	ments in materials science.	
Course	es (type, r	number of weekly contact hours,	anguage — if other than Ger	rman)		
P (8)						
		sessment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
pages	each) a	ichtestate (pre and post- ind assessment of practions issessment: German and	cal performance (2 to		minutes each, log approx. 5 to 10 ions)	
Allocat	tion of _I	olaces				
	,					
Additio	onal inf	ormation				
Workload						
150 h						
Teaching cycle						
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		



Modul	e title				Abbreviation	
Projec	t Work				08-FMM-PA-161-m01	
Modul	e coord	inator		Module offered by		
head c	of the re	search group offering the	e module	Chair of Chemical T	Technology of Material Synthesis	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	(not)	successfully completed				
Durati	on	Module level	Other prerequisites	i		
1 seme	ester	graduate				
Conte	nts					
		gives students the opport findings.	unity to explore a res	earch topic under th	ne guidance of a supervisor and to	
Intend	ed lear	ning outcomes				
Studer	nts have	e developed an advanced	proficiency in the pe	erformance of experi	ments in materials science.	
Course	es (type, r	number of weekly contact hours,	anguage — if other than Ge	rman)		
P (10)						
		sessment (type, scope, langua ble for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
		5 pages) and talk (appro				
Alloca	tion of	places				
Addition	onal inf	ormation				
Workload						
150 h						
Teaching cycle						
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	ımmes)		



Module title					Abbreviation	
Biopolymers					03-BIOPOL-222-m01	
Modul	e coord	inator		Module offered by		
holder of the Chair of Macromolecular Chemistry			cular Chemistry	Faculty of Medi	Faculty of Medicine	
ECTS	Meth	od of grading	Only after succ	. compl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequi	sites		
1 semester						
Conter	its					
_	•	• ,			roteins, nucleic acids, etc.) that per	

Organisms produce biologically active macromolecules (polysaccharides, proteins, nucleic acids, etc.) that perform (survival) important functions in structure, movement, recognition, metabolic and information storage. These naturally occurring polymers can also be isolated, chemically modified and commercialized for further applications. In addition, novel macromolecules can additionally be synthetically derived from bio-based feedstocks, which are increasingly used as sustainable and degradable biopolymers.

Intended learning outcomes

The student will acquire fundamental knowledge of naturally occurring macromolecules, their production, function, modification, and application in various biological contexts and everyday areas.

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

 $V(2) + \ddot{U}(1) + P(1)$

Module taught in: V, Ü: English

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 to 30 minutes) or
- c) talk (approx. 30 minutes)

Language of assessment: English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



		_			T	
Modul					Abbreviation	
Chemically and bio-inspired Nanotechnology for Material S				Synthesis	08-FU-NT-152-m01	
Modul	e coord	inator		Module offered by		
degree programme coordinator Funktionswerkstoffe (Functional Matrierials)			ionswerkstoffe (Func-	Chair of Chemical 1	Fechnology of Material Synthesis	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	undergraduate				
Conter	its					
ted ma	terials.				tion and applications of the crea- materials, introduction to bio-in-	
Intend	ed lear	ning outcomes				
Studer	ts have	e developed a sound kr	owledge of sol-gel che	emistry and biomine	ralisation.	
Course	S (type, r	number of weekly contact hours	s, language — if other than Ge	rman)		
V (4)						
		sessment (type, scope, lang ble for bonus)	uage — if other than German,	examination offered — if no	ot every semester, information on whether	
b) oral c) oral d) log (e) pres	a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English					
Allocat	ion of	places				
Additional information						
Workload						
150 h						
Teachi	ng cycl	e				

 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes})}$



Modul	e title	,	,	Abbreviation	
Solid state chemistry and inorganic materials					o8-ACM3-161-mo1
Module coordinator				Module offered by	J.
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			Only after succ. cor	npl. of module(s)	
5	nume	rical grade			
Durati	on	Module level	Other prerequisites		
1 seme	ester	graduate			
Conte	nts				
			n to solid-state chemis selected materials of so		e structure, chemical and physical
Intend	ed lear	ning outcomes			
				•	xplain methods for solid-state the corresponding solids.
Course	es (type, i	number of weekly contact hou	rs, language — if other than Ge	rman)	
S (3)					
		sessment (type, scope, lan ole for bonus)	guage — if other than German,	examination offered — if n	ot every semester, information on whether
b) oral c) oral d) log e) pres	examir examir (approx sentatio		e each (20 to 30 minute o 3 candidates (approx)		ididate) or
Alloca	tion of	olaces			
Additional information					
Worklo	oad				
150 h					
Teachi	ng cycl	е			
Referre	ed to in	LPO I (examination regulat	ions for teaching-degree progra	ammes)	



Module title	Abbreviation	
Material Science 1 (Basic introduction)		08-FU-MaWi1-212-m01

Module coordinator	Module offered by
holder of the Chair of Chemical Technology of Material Syn-	Chair of Chemical Technology of Material Synthesis
thesis	

ECTS	ECTS Method of grading		Only after succ. compl. of module(s)
5	numerical grade		-
Duratio	n	Module level	Other prerequisites
2 seme	ster	undergraduate	-

Contents

Part A Structure of materials

The students learn about the atomic structure of solid materials.

Part B Metallic Materials

The students learn about the structure of metallic materials as well as their mechanical properties including deformation and failure mechanism as well as the analysis of mechanical properties. In addition, the corrosion and corrosion protection of metallic materials is introduced.

Part C Numerical Methods

The students are introduced to numerical methods like finite element methods (FEM) and Monte-Carlo-Simulation.

Intended learning outcomes

The students know the structure of solids, thermodynamic properties like enthalpy and entropy, the laws of diffusion and lattice defects. They are familiar with deformation and corrosion mechanisms in metals. The students acquire knowledge about thermodynamic of solids. They understand phase transitions, alloys and phase separation of metals. The students can explain the deformation as well as hardening due to dislocations of metals. The students can apply FEM to simple problems and perform simulations based on the Monte-Carlo-method.

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

 $V(2) + \ddot{U}(1) + V(2)$

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

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

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$

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Module title					Abbreviation	
Materia	al Scier	nce 2 (The Material Grou	ps)		08-FU-MaWi2-152-m01	
Module	coord	inator		Module offered by	, I	
holder thesis	of the (Chair of Chemical Techno	ology of Material Syn-	Chair of Chemical Technology of Material Synthesis		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	undergraduate		-		
Conten	ts					
and pro loys. Co	perties eramics	s; thermo-mechanical tre	atment; Martensitic t structural ceramics; e	ransitions; ductility lectric and magnetic	nicrostructure, phase transitions and strength; form memory al- c properties of functional cera- e materials.	
Intende	ed learı	ning 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 (3) + Ü (1)						

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

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

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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



Module	e title				Abbreviation		
Nano4	Med				03-FU-DDEL-222-m01		
Module	e coord	inator		Module offered by			
holder Dentist		Chair of Functional Mater	ials in Medicine and	Chair of Chemical 1	Fechnology of Material Synthesis		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster						
Conten	its						
		and Conjugateion of acti sport, targeting and relea			ctionalization of the particle sy-		
Intend	ed lear	ning outcomes					
		and Conjugateion of acti sport, targeting and rele			ctionalization of the particle sy-		
Course	S (type, r	number of weekly contact hours,	language — if other than Ger	rman)			
V (1) +	Ü (1)						
		sessment (type, scope, langua le for bonus)	age — if other than German, o	examination offered — if no	ot every semester, information on whether		
report (approx	on tech x. 90 m		pages) and b) presen		oractical course / project report / ninutes) or written examination		
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Workload							
150 h							
Teaching cycle							
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						



Module	Module title Abbreviation					
Specia	l Topics	s in the Field of Functiona	ıl Materials		08-FMMS-211-m01	
Module	e coord	inator		Module offered by		
Person	(s) resp	onsible for the focus Fur	ctional Materials	Chair of Chemical T	echnology of Material Synthesis	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate	-			
Conten	its					
The mo	dule co	overs current and/or spec	cial topics in the field	of Functional Mater	ials.	
Intend	ed learı	ning outcomes				
the rele	evance	for various experimental	syntheses, device pr	eparations as well a	olication areas and can assess is measurement and analysis me-	
		number of weekly contact hours, l	anguage — if other than Gei	man)		
S (2) +						
		le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
b) oral c) oral d) log (e) pres	a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English					
Allocation of places						
Additional information						
Worklo	Workload					
150 h						

Teaching cycle

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



		11.34		83 %, < 7.7 "	aster's with 1 major, 120 ECIS credits	
Module	title		Abbreviation			
Organo	Organo- and Biocatalysis 08-HKM1-152-m01					
Module	coord	inator		Module offered b	у	
lecture	r of the	seminar "Organo- and	Biokatalyse"	Faculty of Chemis	stry and Pharmacy	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisite	s		
1 seme	ster	graduate				
Conten	ts		,			
process	ses. Or plicatio	ganocatalysis: enantio	selective implementat	ion, principles, gre	npounds and enzymes in catalytic en chemistry, substance classes pects, especially regarding organic	
Intende	ed lear	ning 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 (3)						
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)						

a) written examination (approx. 45 to 90 minutes) or

- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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



Module title					Abbreviation
Practical course "Homogeneous catalysis in Inorganic Che			sis in Inorganic Cher	mistry"	08-HKM3AC-161-m01
Module	e coord	inator		Module offered by	
		seminar "Spezielle Meta vendung in der Homoger	-	Institute of Inorgan	ic Chemistry
ECTS	Metho	od of grading	Only after succ. com	ipl. of module(s)	
5	(not)	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	its				
thods i	n homo stallog	ogeneous catalysis. The f	ocus will be on cataly expected to conduct the	st synthesis and ch	synthesis and analytical me- aracterisation, spectral analysis ndependently, write a lab report
Intend	ed learı	ning outcomes			
					eneous catalysis in the lab and to dings and deliver a presentation.
Course	S (type, r	number of weekly contact hours, I	anguage — if other than Ger	man)	
P (6) Module	e taugh	t in: German or English			
		sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	et every semester, information on whether
		tical course (approx. 10 p ssessment: German and		ox. 15 minutes)	
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teaching cycle					
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	
			<u> </u>		



Module title Abbreviation					Abbreviation
Practic	al cour	se "Homogeneous cataly	sis in Organic Chemi	istry"	08-HKM3OC-161-m01
Module	e coord	inator		Module offered by	•
		seminar "Spezielle Meta wendung in der Homoger		Institute of Organic	Chemistry
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
5	(not)	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	its				
thods i and cry	n homo /stallog	ogeneous catalysis. The f	ocus will be on cataly expected to conduct t	st synthesis and ch	synthesis and analytical mearacterisation, spectral analysis independently, write a lab report
Intend	ed lear	ning outcomes			
					eneous catalysis in the lab and to dings and deliver a presentation.
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)	
P (6) Module	e taugh	t in: German or English			
		sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether
	•	tical course (approx. 10 p ssessment: German and,	-	ox. 15 minutes)	
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Workload					
150 h					
Teaching cycle					
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	



Modul	e title				Abbreviation
Advanced organometallic chemistry and its application in homogeneous catalysis					08-HKM2-161-m01
Module coordinator Module offe					
		seminar "Spezielle Meta wendung in der Homoger		Institute of Inorgan	ic Chemistry
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	graduate			
Conter	ıts				
This m tions.	odule e	xamines elementary orga	anic compounds of tr	ansition metals with	homogeneous catalytic applica-
Intend	ed lear	ning outcomes			
		•		•	entary organic compounds. They neous catalysis reactions.
Course	es (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)	
S (3) Modul	e taugh	t in: German or English			
		sessment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	t every semester, information on whether
b) oral c) oral d) log (e) pres	examir examin (approx sentatio	mination (approx. 90 to 1 nation of one candidate e ation in groups of up to 3 . 20 pages) or n (approx. 30 minutes) ssessment: German and	ach (20 to 30 minute 3 candidates (approx.		didate) or
Allocat	tion of p	olaces			
Additio	onal inf	ormation			
Worklo	oad		•		
150 h					
Teachi	ng cycl	e			
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	immes)	



Module title					Abbreviation	
Moder	n Syntl	netic Methods			08-OCM-SYNT-161-m01	
Modul	e coord	inator		Module offered by		
lecture	r of the	seminar		Institute of Organic	Chemistry	
ECTS	Meth	od of grading	Only after succ. con	Only after succ. compl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts					
		liscusses modern stereo emistry and catalysis.	selective synthesis m	ethods. It focuses o	n selected total syntheses, orga-	
Intend	ed lear	ning 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)

 $S(2) + \ddot{U}(1)$

Module taught in: German or English

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

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

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Modul	le title				Abbreviation
Polymer Chemistry 1 (Lecture and Practical Course)				03-FU-PM1-152-m01	
Modul	le coord	inator		Module offered by	I.
holder Dentis		Chair of Functional Mater	ials in Medicine and	Faculty of Medicine	2
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Durati	on	Module level	Other prerequisites	i	
1 seme	ester	undergraduate			
Conte	nts				
radica	l polym		on of polymers and p		onic polymerisations, controlled el permeation chromatography,
Intend	led lear	ning outcomes			
The st	udents	acquire fundamentals of	polymer chemistry ar	nd the related metho	ods for their characterisation.
Course	es (type, r	number of weekly contact hours,	language — if other than Ger	rman)	
V (2) +	P (2)				
		sessment (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
each, Langu Assess	log app age of a	rox. 5 to 10 pages each) a ssessment: German and ffered: Once a year, sum	and assessment of pr /or English		ation talks approx. 15 minutes (2 to 4 random examinations)
Alloca	tion of p	olaces			
	,				
Additi	onal inf	ormation			
Workle	oad				
150 h					
Teachi	ing cycl	e			
Referr	ed to in	LPO I (examination regulation	s for teaching-degree progra	immes)	
				<u> </u>	



Module	e title				Abbreviation
Specia	l Topic	s in Homogeneous Cataly	/sis		08-HKMS-211-m01
Module	e coord	inator		Module offered by	
Person sis	(s) resp	oonsible for the focus Ho	mogeneous Cataly-	Institute of Inorgan	ic Chemistry
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	its				
The mo	dule co	overs current and/or spe	cial topics in Homoge	eneous Catalysis.	
Intend	ed lear	ning outcomes			
the acc	quired k		-specific contexts, kn	ows the application	ysis. He/she is able to classify areas and can assess the relemethods.
Course	S (type, r	number of weekly contact hours, I	anguage — if other than Ger	man)	
S (2) +	Ü (1)				
		sessment (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
b) oral c) oral d) log (e) pres	examir examin (approx entatio	mination (approx. 90 to 1 nation of one candidate e ation in groups of up to 3 . 20 pages) or n (approx. 30 minutes) ssessment: German and	ach (20 to 30 minute 3 candidates (approx		didate) or
Allocat	ion of p	olaces			
Additional information					
Worklo	ad				
150 h					
Teachi	ng cycl	e			

 $\textbf{Referred to in LPO I} \ \ (\text{exa} \underline{\text{mination regulations for teaching-degree programmes})}$



Module title					Abbreviation
Advanced transition metal chemistry					o8-HKM4-161-mo1
Modul	e coord	inator		Module offered by	
lecture	r of the	seminar "Spezielle Über	gangsmetallchemie"	Institute of Inorgan	ic Chemistry
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	its				
nation	chemis				of transition metals and coordi- l discusses recent developments
Intend	ed lear	ning outcomes			
		able to explain transition field. They can explain th			monstrating a high degree of ex- chemistry.
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
S (3)					
		sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether
b) oral c) oral d) log (e) pres	examir examin (approx entatio	mination (approx. 90 to 1 nation of one candidate e nation in groups of up to 3 . 20 pages) or n (approx. 30 minutes) ssessment: German and	ach (20 to 30 minute 3 candidates (approx.	•	didate) or
Allocat	ion of p	olaces			
Additio	onal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	e			
	-				

 $\textbf{Referred to in LPO I} \ \ (\text{exa} \underline{\text{mination regulations for teaching-degree programmes})}$



Modul	e title				Abbreviation
Statistical Mechanics and Reaction Dynamics					08-PCM2-161-m01
Modul	e coord	inator		Module offered by	L
lecture mics)	r of ser	ninar "Chemische Dynam	iik" (Chemical Dyna-	Institute of Physica	l and Theoretical Chemistry
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duration	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conter	its				
clude t	he fund		atistical thermodynar		namics. Topics to be covered in- state theory, uni- and bimolecular
Intend	ed lear	ning outcomes			
		e become familiar with se re able to apply the fund			d reaction dynamics. They have ynamics.
Course	S (type, r	number of weekly contact hours,	anguage — if other than Ger	man)	
S (2) + Modul		t in: German or English			
		sessment (type, scope, langua	ge — if other than German,	examination offered — if no	ot every semester, information on whether
b) oral c) talk	examir (approx	mination (approx. 90 mir nation of one candidate e k. 30 minutes) ssessment: German and	ach (approx. 20 minu	utes) or	
Alloca	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	e			
			<u> </u>	<u> </u>	

 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes}})$



Module	title				Abbreviation
Practica	al cour	se medicinal chemistry			08-MCM1-161-m01
Module	coord	inator		Module offered by	
lecturer mistry)	rs Phari	mazeutische Chemie (Ph	armaceutical Che-	Institute of Pharma	cy and Food Chemistry
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
10	(not) s	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Content	ts				
Selecte	d meth	ods and topics in medic	inal chemistry (synth	esis, testing, analys	is, theory, pharmacokinetics).
Intende	d learr	ning outcomes			
Student	ts have	e developed a knowledge	of medicinal chemis	try and are able to a	pply it to practical experiments.
Courses	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ge	rman)	
P (10)		tin Common ou Fundinh			
		t in: German or English			
		le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
pages e pages)	each) a		cal assignments (2 to		minutes each, log approx. 5 to 10 ions) as well as report (30 to 50
Allocati			0.1		
Additio	nal info	ormation			
Worklo	ad				
300 h					
Teachin	ng cycle	e			
Doforro	d to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	



Module title					Abbreviation	
Clinical-analytical Chemistry					08-PH-KAC-152-m01	
Module	e coord	linator		Module offered by		
		ture "Klinisch-analytisch l Chemistry)	e Chemie" (Clinical	Institute of Pharma	cy and Food Chemistry	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
This mo	odule d	discusses advanced topic	s in clinical analytica	al chemistry.		
Intende	ed lear	ning outcomes				
Studen	ts hav	e developed an advanced	knowledge of molec	cular biology.		
Course	S (type, i	number of weekly contact hours,	language — if other than Ge	rman)		
V (3)						
		sessment (type, scope, langua ble for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether	
written	exami	nation (approx. 120 minu	ites)			
Allocat	ion of	places				
-						
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teaching cycle						
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	ammes)		



Module	e title		Abbreviation			
Mass-S	Spectro	metry and Proteomics			08-MBC-MSP-161-m01	
Module coordinator				Module offered by		
holder	holder of the Chair of Biochemistry			Chair of Biochemistry		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	Duration Module level		Other prerequisites			
1 semester graduate						
Conten	Contents					

This module comprises a lecture, a seminar and a lab course. The lecture discusses the fundamental principles of the mass spectrometry of biomolecules. Topics to be covered in the lecture include ESI and MALDI ionisation techniques as well as the operating principles of TOF, Orbitrap and other mass analysers. The lecture also provides an introduction to CID and ETD fragmentation techniques, peptide and protein separation methods as well as the analysis of mass spectrometric data (protein databases, FDR, GO terms, etc.). It gives an overview of quantitative proteomics with a special focus on different stable isotope quantification methods (e.g. SILAC, N15 labelling, iTRAQ) and provides an insight into the mass spectrometric analysis of post-translational modifications. The seminar covers the fundamental principles of the analysis of mass spectrometric data. It introduces students to different software packages and gives them the opportunity to independently develop solutions to a range of problems. In the lab course, students will use affinity purification to isolate a protein complex from yeast. They will then use 1D-SDS-PAGE to separate that complex and will proteolytically cleave it in the gel. Afterwards, students will use nano-LC-MS/MS to analyse the peptides thus obtained and will conduct a data analysis to identify specific interaction partners and post-translational modifications.

Intended learning outcomes

Students have learned the theoretical foundations of mass spectrometry protein and proteomic analysis. They have learned how to use proteomic data analysis software tools. Students have become proficient in the affinity purification of protein complexes and have learned the steps involved in the preparation of samples for mass spectrometry protein analysis, e.g. SDS-PAGE and in-gel digestion. They have gained an insight into how to operate a nanoHPLC-coupled mass spectrometer.

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

V(2) + S(1) + P(2)

Module taught in: German or English

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

- a) written examination (approx. 45 to 90 minutes) or
- b) log (20 to 30 pages) or
- c) oral examination of one candidate each (20 to 30 minutes) or
- d) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate) or
- e) presentation (20 to 40 minutes)

Language of assessment: German and/or English Assessment offered: Once a year, winter semester

Allocation of places

67 places.

Additional information

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Workload

150 h

Teaching cycle

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	reg. data record Master (120 ECTS) Chemie - 2026	



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



Module title Modern Aspects of Biological Chemistry				Abbreviation	
					08-0CM-BIO-242-m01
Module coordinator				Module offered by	
lecturer of the seminar "Modern Aspects of Biological Chemistry"					
ECTS	Metho	Method of grading Only after succ. co		mpl. of module(s)	
5	numer	rical grade			
Duration		Module level	Other prerequisites		
1 semester		graduate			
Conten	its		•		
The course deals with advanced topics of biological chemistry that build on fundamental knowledge of organi					

The course deals with advanced topics of biological chemistry that build on fundamental knowledge of organic chemistry, bioorganic chemistry, biochemistry and molecular biology. Key concepts in the course cover the chemistry of the genetic code, and methods to analyse and interfere with gene expression and secondary metabolism. We will cover genetic code expansion, including unnatural base pairs and unnatural amino acids, including their chemical synthesis and enzymatic incorporation. We will also cover combinatorial synthesis methods and directed evolution and display technologies. This includes in vitro selection and in vitro evolution of functional nucleic acids (aptamers, ribozymes, deoxyribozymes), mRNA display, phage display, directed evolution of proteins/enzymes, antibodies, nanobodies, sequencing methods, DNA/RNA origami and nanotechnology, as well as combinatorial polyketide synthesis and non-ribosomal peptide synthesis.

Intended learning outcomes

The students will have a detailed understanding of modern concepts in functional nucleic acids and engineered proteins, including their synthesis and analysis. They will be able to discuss a wide variety of relevant methods and explain chemical relationships at the molecular level with biochemical/biotechnological questions and apply them to corresponding problems. The students will be able to critically examine information and new developments in the field of biological chemistry.

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

S (3)

Module taught in: German or English

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

- a) written examination (approx. 45 to 90 minutes) or
- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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



Module title				Abbreviation	
Modern Drug Research 2: Technologies - Targets - Modaliti				es	08-MCM4-242-m01
Module coordinator				Module offered by	
lecturers of Pharmaceutical Chemistry				Institute of Pharmacy and Food Chemistry	
ECTS	Method of grading		Only after succ. compl. of module(s)		
5	nume	rical grade			
Duration		Module level	Other prerequisites		
1 semester		graduate			

Contents

- 1. DNA-encoded library technology for small molecule screening.
- 2. Phage display and chemical modification of peptides in display libraries.
- 3. Medicinal Chemistry in the Pharmaceutical Industry, case studies presented by invited external speakers.
- 4. Entrepreneurship in the life sciences: start-ups, biotech, and private equity.
- 5. Protein-protein interactions as drug targets and modalities to inhibit them.
- 6. How not to perform the art of Medicinal Chemistry: Dirty Drugs, PAINS, frequent hitters, and impurities from compound synthesis as confounders
- 7. Therapeutic nucleic acid drugs
- 8. Multi-target drugs
- 9. Pharmacokinetic aspects in drug development
- 10Modern strategies in drug delivery

Intended learning outcomes

The students acquire basic knowledge of the terminology of medicinal chemistry, technologies for drug identification; exemplary biologics (oligonucleotides, peptides), properties of protein-protein-interaction inhibitors, basic knowledge of the industrial pharmaceutical research process, including entrepreneurship aspects, as well as of the compound optimization cycles and can confidently apply this knowledge in solving Medicinal Chemistry-related tasks.

By successfully completing this module, students will be able to,

- explain the processes of pharmaceutical research and applications in industry.
- understand the underlying principles for the action of biological drugs.
- understand different technologies for drug identification.
- understand pharmacokinetic challenges to drug development.
- understand modern technologies for drug delivery.
- describe different strategies for protein-protein interaction inhibition and to draw conclusions about possible consequences of protein-protein interaction inhibition from chemical structural features.
- to develop interdisciplinary solution strategies for practical problems at the interface between chemistry, pharmacology and biophysics for basic research and biomedical applications.

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

S (2)

Module taught in: German or English

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

- a) written examination (approx. 45 to 90 minutes) or
- b) oral examination of one candidate each (20 to 30 minutes)

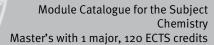
Language of assessment: German and/or English

Allocation of places

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Additional information

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	reg. data record Master (120 ECTS) Chemie - 2026	





Workload		
150 h		
Teaching cycle		
Referred to in LPO I (examination regulations for teaching-degree programmes)		



Module title Abbrevia					Abbreviation	
Pharmaceutical/Medicinal Chemistry 1					08-MCM2a-161-m01	
Module coordinator				Module offered by		
lecturers Pharmazeutische Chemie (Pharmaceutical Chemistry)			armaceutical Che-	Institute of Pharmacy and Food Chemistry		
ECTS	Metho	od of grading	Only after succ. compl. of module(s)			
5	nume	rical grade				
Duration Module level		Other prerequisites				
1 semester		graduate	-			
Conten	its					
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.						
Intend	ed lear	ning outcomes				
Students have developed a knowledge of pharmaceutical/medicinal chemistry.						
Courses (type, number of weekly contact hours, language — if other than German)						
V (3)						
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)						
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English						
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Workload						
150 h						
Teaching cycle						
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		



Module title					Abbreviation	
Pharmaceutical/Medicinal Chemistry 2			2		08-MCM2b-161-m01	
Modul	e coord	inator		Module offered by	l.	
lecture mistry)		mazeutische Chemie (Ph	armaceutical Che-	Institute of Pharma	cy and Food Chemistry	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts					
structu in the i	ıre-activ module	vity relationships; molecu	ılar effect mechanisn thesis; biotransforma	ns; pharmacological	gies for active agent discovery; principles of the drugs discussed tics of individual drugs; history of	
Intend	ed lear	ning outcomes				
Studer	ts have	e developed a knowledge	of pharmaceutical/r	nedicinal chemistry.		
Course	S (type, i	number of weekly contact hours, l	anguage — if other than Ger	rman)		
V (3)						
		sessment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
b) oral c) oral d) log (e) pres	examir examir (approx entatio	mination (approx. 90 to 1 nation of one candidate e nation in groups of up to 3 x. 20 pages) or on (approx. 30 minutes) assessment: German and	ach (20 to 30 minute candidates (approx	= -	didate) or	
Allocat	tion of	places				
Additio	onal inf	ormation				
Workload						
150 h						
Teaching cycle						
Referre	ed to in	LPO I (examination regulations	s for teaching-degree progra	mmes)		
(



Module title					Abbreviation	
Special Topics in Medicinal Chemistry 08-MCMS-211-mo1						
Modul	e coord	inator		Module offered by		
Person	(s) resp	oonsible for the focus Me	dical Chemistry	Institute of Pharma	cy and Food Chemistry	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conter	its		,			
The mo	dule co	overs current and/or spec	cial topics in Medicin	al Chemistry.		
Intend	ed lear	ning outcomes				
for vari	ous ex	wledge in the subject-spe perimental syntheses as number of weekly contact hours, l	well as measurement	and analysis metho	as and can assess the relevance ods.	
S (2) +	Ü (1)					
		sessment (type, scope, langua ole for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether	
b) oralc) orald) log (e) pres	examir examin (approx entatio	mination (approx. 90 to 1 nation of one candidate elation in groups of up to 3 and 20 pages) or in (approx. 30 minutes) assessment: German and	ach (20 to 30 minute 3 candidates (approx.		didate) or	
Allocat	ion of p	places				
Additional information						
Workload						
150 h						
Teaching cycle						



	_		C N L ON ABIVI	0.5 g,	, .		
Modul	Module title				Abbreviation		
Suprar	molecu	lar Chemistry (Basics)			08-SCM1-161-m01		
Modul	e coord	inator		Module offered by			
lecture sics)"	er of the	seminar "Supramolecu	ar Chemistry (Ba-	Institute of Organic	Chemistry		
ECTS	Meth	od of grading	Only after succ. cor	mpl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites	5			
1 seme	ester	graduate					
Conter	ıts						
actions nation dern a	s betwe polyme pplicati	en molecules, molecula ers and networks, liquid ons of supramolecular c	r recognition by recep crystals, self-assemb	otors, complexes, su	llar chemistry. It focuses on inter- pramolecular polymers, coordi- i, synthetic ion channels and mo-		
		ning outcomes					
field as describ	s well a be the s	s to describe the format	ion, structure and pol 's in aqueous media a	ymers of coordinations well as to identify	nigh degree of expertise in the on compounds. They are able to the characteristics of synthetic		
Course	es (type, i	number of weekly contact hours,	language — if other than Ge	rman)			
S (3) Modul	e taugh	t in: German or English					
		sessment (type, scope, langu ble for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether		
b) oral	examir	mination (approx. 90 mi nation of one candidate ussessment: German and	each (approx. 20 min	utes)			
Allocat	tion of	places					
Additio	onal inf	ormation					
Worklo	oad						
150 h	150 h						

Teaching cycle

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title					Abbreviation	
Supramolecular Chemistry (Practical Course)					08-SCM2-242-m01	
Module	coord	inator		Module offered by	•	
lecturer sics)"	of the	seminar "Supramolecul	ar Chemistry (Ba-	Institute of Organic	: Chemistry	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	(not) s	successfully completed				
Duratio	n	Module level	Other prerequisites	;		
1 semes	ster	graduate				
Content	ts		•			
mistry.	They w		host-guest complexe		ents in supramolecular che- nd nanoparticles and use advan-	
Intende	d learr	ning outcomes				
		ble to perform synthese nem. They are able to pro			roscopic methods to analyse and hem microscopically.	
Courses	5 (type, n	umber of weekly contact hours,	language — if other than Ge	rman)		
P (6) Module	taugh	t in: German or English				
		essment (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
pages e	ach) a	chtestate (pre and post- nd assessment of practions ssessment: German and	cal performance (2 to		minutes each, log approx. 5 to 10 ions)	
Allocati	on of p	laces				
Additio	nal info	ormation				
Workload						
150 h						
Teachin	g cycle	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						



Module title Abbreviation						
Bioinor	ganic	Chemistry			08-ACM2-242-m01	
Module	coord	inator		Module offered by		
lecture	r of the	seminar "Bioinorganic C	hemistry"	Institute of Inorgan	ic Chemistry	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
	ds of BI				chemistry (BIC). It discusses the ns of BIC in the fields of diagnosis	
Intende	ed lear	ning outcomes				
		able to describe the princ us enzymes and describe			xplain the structure and effects medicine.	
Course	S (type, r	number of weekly contact hours, I	anguage — if other than Ger	rman)		
S (3) Module	taugh	t in: German or English				
		sessment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
b) oral c) portf	examir olio (a	mination (approx. 45 to 9 nation of one candidate e pprox. 30 hours total) ssessment: German and	ach (20 to 30 minute	s) or		
Allocat	ion of _I	places				
Additional information						
Worklo	Workload					
150 h						
Teachir	ng cycl	e				



Module	Module title				Abbreviation	
Bioorg	anic Ch	nemistry			08-SCM3-152-m01	
Module coordinator				Module offered by		
lecturer of lecture "Bioorganische Chemie" (Bioorganic Chemistry)			Chemie" (Bioorganic	Institute of Organic Chemistry		
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisite	Other prerequisites		
1 semester graduate						
Contents						
Bioorganic chemistry unites the central questions of organic chemistry, biochemistry, medicinal chemistry and						

Bioorganic chemistry unites the central questions of organic chemistry, biochemistry, medicinal chemistry and spectroscopy with a focus on biomolecules. At the core of bioorganic chemistry is the synthesis and purposeful manipulation of biomolecules, such as nucleic acids, peptides, proteins, carbohydrates and lipids. This includes the framework of structure-function relationships and the fundamental understanding of biological mechanisms, to enable applications towards biomaterials, biosensing, bioimaging, clinical diagnostics and therapeutics.

Key concepts covered in the course are nucleic acid chemistry, peptide chemistry, carbohydrate chemistry, bioorthogonal reactions, molecular diversity, solid-phase synthesis, molecular recognition and interactions (ligand-receptor interactions, signal transduction)

Intended learning outcomes

The students will have a molecular understanding of the structure and reactivity of biomolecules. The students obtain knowledge of modern synthetic methods in bioorganic chemistry and can explain principles of molecular interactions and recognition mechanisms. They can describe modern aspects of nucleic acids, proteins, carbohydrates and lipids.

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

S (3)

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

- a) written examination (approx. 45 to 90 minutes) or
- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Modul	Module title				Abbreviation			
Suprar	Supramolecular Chemistry (Advanced Lab)				08-SCM4-242-m01			
Modul	e coord	inator		Module offered by	•			
lecture sics)"	er of the	seminar "Supramolecula	ar Chemistry (Ba-	Institute of Organic	Chemistry			
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)				
5	(not)	successfully completed						
Duratio	on	Module level	Other prerequisites					
1 seme	ester	graduate						
Conter	nts							
thods cumen	in supra	amolecular chemistry. Str indings and deliver a pre	udents will be expect		synthesis and analytical me- work in the lab independently, do-			
Intend	ed lear	ning outcomes						
		able to use advanced syn eir findings. They are abl			olecular chemistry in the lab and gs.			
Course	es (type, r	number of weekly contact hours,	anguage — if other than Ge	rman)				
P (6) Modul	e taugh	t in: German or English						
		sessment (type, scope, langua	${\sf ge-if}$ other than German,	examination offered — if no	ot every semester, information on whether			
		(approx. 20 minutes) ssessment: German and	or English					
Alloca	tion of	olaces						
Additio	Additional information							
Additio	Additional information on module duration: block taught lab course with approx. 20 working days.							
Worklo	oad							
150 h								

Teaching cycle



	_		J (NEXOVEN) C		ster 3 with 1 major, 120 EC13 credits		
Modul	e title				Abbreviation		
Moleci	ılar Ma	terials (Lecture)			08-FU-MoMaV-152-m01		
Modul	e coord	inator		Module offered by			
	progra Matrieri	mme coordinator Funktio als)	onswerkstoffe (Func-	Chair of Chemical T	Fechnology of Material Synthesis		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	undergraduate					
Conter	ıts						
	cal bon thin filn		tions, supramolecula	ır chemistry, molecu	llar materials, colloids, nanopar-		
Intend	ed learı	ning outcomes					
themse feedba	elves w	th a topic in the field, de	liver a presentation o	on that topic, discus	have learned how to familiarise s it as well as to give and receive		
		umber of weekly contact hours,	anguage — if other than Ger	rman)			
V (3) +							
		sessment (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
tes) or 20 pag Langua	[a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)] as well as talk (approx. 30 minutes), weighted 3:1 Language of assessment: German and/or English creditable for bonus						
Allocat	tion of p	olaces					
Additional information							
Workload							
150 h	150 h						
Teachi	Teaching cycle						

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module	e title				Abbreviation	
Nanoso	ale Ma	terials			08-PCM3-161-m01	
Module	coord	inator		Module offered by		
lecture	r of the	seminar "Nanoskalige M	aterialien"	Institute of Physica	l and Theoretical Chemistry	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
		liscusses advanced topic naracterisation methods a			ne structure, properties, fabricati- rials.	
Intende	ed learı	ning outcomes				
		able to characterise nano noscale materials.	scale materials. They	are able to name a	nalytical methods and applicati-	
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
S (2) + Module	` '	t in: German or English				
		sessment (type, scope, langua lle for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether	
b) oral c) talk (examir (approx ige of a	mination (approx. 90 min nation of one candidate e k. 30 minutes) ssessment: German and, bonus	ach (approx. 20 minu	utes) or		
Allocat	ion of p	olaces	_	_		
Additional information						
Workload						
150 h						
Teachi	Teaching cycle					



Module	e title				Abbreviation	
Organi	c Funct	ional Materials			08-OCM-FM-161-m01	
Module coordinator				Module offered by		
lecturer of the seminar "Organische Funktionsmaterialien"			nktionsmaterialien"	Institute of Organic Chemistry		
ECTS	Metho	od of grading	Only after succ. con	mpl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	its					
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-						

Intended learning outcomes

linear optics.

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 (3)

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

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

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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



Modul	e title				Abbreviation		
Physical Chemistry of Supramolecular Assemblies 08-PCM5-161-mg							
Modul	e coord	inator		Module offered by	,		
	r of the r Strukt	seminar "Physikalisch uren"	e Chemie Supramole-	Institute of Physica	l and Theoretical Chemistry		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	graduate					
Conter	ıts						
			ractions between mole as key applications of s		he formation and physical-chemi- nistry.		
Intend	ed lear	ning outcomes					
in the f dern a	field. Th pplicati	ney can describe the for ons of supramolecular	rmation and physical-c chemistry.	hemical properties o	trating a high degree of expertise of aggregates. They can name mo-		
		number of weekly contact hour	s, language — if other than Ge	rman)			
S (2) + Module	` '	t in: German or English					
		Sessment (type, scope, lang le for bonus)	guage — if other than German,	examination offered — if no	ot every semester, information on whether		
b) oral c) talk	examir (approx	mination (approx. 90 m nation of one candidate k. 30 minutes) ssessment: German ar	e each (approx. 20 minu	utes) or			
Allocat	tion of p	olaces					
Additional information							
Workload							
Worklo	150 h						
Worklo 150 h							

 $\textbf{Referred to in LPO I} \ \ (\text{exa} \underline{\text{mination regulations for teaching-degree programmes}})$



Modul	Module title Abbreviation						
Polym	ers II				03-FU-PM2-222-m01		
Modul	e coord	inator		Module offered by			
holder Dentis		Chair of Functional Mater	ials in Medicine and	Chair of Chemical T	echnology of Material Synthesis		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Durati	on	Module level	Other prerequisites				
1 seme	ester	graduate					
Conter	nts						
	as wel zation.	as advanced knowledge	about contemporary	issues of polymer s	ynthesis, -modification and cha-		
Intend	ed lear	ning outcomes					
The stu	udent h	as advanced knowledge	of the synthesis, mod	dification and charac	terization of polymers.		
Course	es (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)			
V (2) +	P (2)						
		sessment (type, scope, langua le for bonus)	ge — if other than German, (examination offered — if no	ot every semester, information on whether		
b) oral c) talk Langua Assess	examir (approx age of a	mination (approx. 90 min nation of one candidate e k. 30 minutes) ssessment: German and, ffered: Once a year, winto bonus	ach (20 to 30 minute /or English	s) or			
Alloca	tion of _l	olaces					
Additio	onal inf	ormation					
Worklo	Workload						
150 h							
Teaching cycle							
Referred to in LPO I (examination regulations for teaching-degree programmes)							



Module title Abbreviation					
		08-SCMS-211-m01			
	Module offered by				
Che-	Institute of Organic	Chemistry			
cc. con	npl. of module(s)				
uisites	i				
upram	olecular Chemistry.				
itexts,	knows the applicati	emistry. He/she is able to classion areas and can assess the relementations.			
than Ge	rman)				
German,	examination offered — if n	ot every semester, information on whether			
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English					
Allocation of places					
Additional information					
Workload					
150 h					
Teaching cycle					
	upram pics in atexts, measu than German, r	Institute of Organic cc. compl. of module(s) uisites upramolecular Chemistry. vics in Supramolecular Chemistry. vics in Supramolecular Chemistry. texts, knows the application measurement and analysis than German) German, examination offered — if nor minutes) or			

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title					Abbreviation
Supramolecular Soft Matter					08-SCM5-242-m01
Module	coord	inator		Module offered by	_
lecture	r of the	seminar "Supramolecul	ar Soft Matter"	Institute of Organ	ic Chemistry
ECTS	Meth	od of grading	Only after succ. c	ompl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisit	es	
1 seme	ster	graduate			
Conten	ts				
brid ma will be	aterials strengt	. Concepts such as nano	segregation for the	structural control an	c crystals, LC-Elastomers and hy- nd stimuli responsive properties nisotropic semi conductors and ion
Intende	ed lear	ning outcomes			
Students are able to understand the structural design of soft matter and the underlying formation principles. The students will be able to create new materials with tailored properties which are optimized for modern applications. In a practical part students learn to evaluate the quality of publications related to these topics.					
$oldsymbol{Courses}$ (type, number of weekly contact hours, language $-$ if other than German)					
$S(2) + \ddot{U}(1)$					
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)					
a) oral examination of one candidate each (20 to 30 minutes) or					

Language of assessment: German and/or English Allocation of places

b) talk (approx. 30 minutes) or c) portfolio (approx. 30 hours total)

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Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module	e title	,	Abbreviation			
Basics	and Ap	pplications of Quantum C		08-TCM2-161-m01		
Modul	e coord	inator		Module offered by	Į.	
lecture	r of lec	ture "Computational Che	mistry"	Institute of Physica	l and Theoretical Chemistry	
ECTS	Meth	od of grading	Only after succ. com	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conter	nts					
This m	odule i	ntroduces students to the	e fundamental princip	oles of computation	al chemistry.	
Intend	ed lear	ning outcomes				
		able to explain the theore	etical principles of co	mputational chemis	try and to apply methods in com-	
Course	S (type, i	number of weekly contact hours, l	anguage — if other than Ger	rman)		
S (2) +	Ü (2)					
		sessment (type, scope, langua ble for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether	
b) oral c) oral d) log (e) pres	a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English					
	tion of		<u> </u>			
Additio	onal inf	ormation				
Workload						
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						



Numerical Methods and Programming Module coordinator lecturer of lecture "Programmieren in Theoretischer Chemie"	08-TCM3-161-m01 Module offered by Institute of Physical and Theoretical Chemistry				
lecturer of lecture "Programmieren in Theoretischer Che-	<u> </u>				
<u> </u>	Institute of Physical and Theoretical Chemistry				
inic					
ECTS Method of grading Only after succ. c	ompl. of module(s)				
numerical grade					
Duration Module level Other prerequisit	es				
ı semester graduate					
Contents					
This module provides an introduction to the fundamental ses its application areas.	s of programming in theoretical chemistry and discus-				
Intended learning outcomes					
Students are able to explain and use one of the programr as well as to name its application areas.	ning languages typically used in theoretical chemistry				
Courses (type, number of weekly contact hours, language — if other than	German)				
S (2) + Ü (2)					
Method of assessment (type, scope, language — if other than Germa module is creditable for bonus)	n, examination offered $-$ if not every semester, information on whether				
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English					
Allocation of places					
Additional information					
Workload					
150 h					
Teaching cycle					

 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes}})$



Module title					Abbreviation	
Quantı	ım Dyn	amics		08-TCM4-161-m01		
Module coordinator				Module offered by		
lecture	r of lec	ture "Quantendynamik"		Institute of Physica	al and Theoretical Chemistry	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	its					
	•	ent Schrödinger equation adiabatic states, non-adi		•	ion theory, adiabatic theorem, al dynamics.	
Intend	ed lear	ning outcomes				
in the f	ield of (type, r	theoretical chemistry.			w them to carry out applications	
		sessment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if n	ot every semester, information on whether	
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English						
Allocat	ion of	places				
Additional information						
Workload						
150 h						
Teachi	ng cycl	e				

 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes}})$



Module title Abbreviation					
Selected Topics in Theoretical Chemistry 08-TCM1-161-m01					
Module coordinator					
f lecture "Theoretische Chemi	e"	Institute of Physica	l and Theoretical Chemistry		
lethod of grading	Only after succ. com	npl. of module(s)			
umerical grade					
Module level	Other prerequisites				
er graduate					
ule introduces students to the	e fundamental princip	oles of theoretical ch	nemistry.		
learning outcomes					
		al principles underly	ing the quantum chemical and		
ype, number of weekly contact hours, l	anguage — if other than Ger	rman)			
(2)					
f assessment (type, scope, langua editable for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether		
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes)					
Allocation of places					
Additional information					
Workload					
150 h					
Teaching cycle					
	Fordinator Flecture "Theoretische Chemister ethod of grading umerical grade Module level graduate graduate Ile introduces students to the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynamical approaches of the learning outcomes are able to describe the math dynami	Topics in Theoretical Chemistry Flecture "Theoretische Chemie" ethod of grading Jumerical grade Module level graduate Jule introduces students to the fundamental principal dearning outcomes are able to describe the mathematical and physical dynamical approaches of theoretical chemistry. Jule, number of weekly contact hours, language — if other than German, we ditable for bonus) examination (approx. 90 to 180 minutes) or amination of one candidate each (20 to 30 minute aumination in groups of up to 3 candidates (approx. prox. 20 pages) or action (approx. 30 minutes) of assessment: German and/or English of places I information	Flecture "Theoretische Chemie" Flecture "Theoretische Chemiet" Fle		

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title					Abbreviation
Modern Drug Research 1: Basics and Drug Design				08-MCM3-242-m01	
Module coordinator				Module offered by	
lecturers of Pharmaceutical Chemistry			nistry	Institute of Pharmacy and Food Chemistry	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)	
5	nume	rical grade			
Duration Module level Other prerequisite		S			
1 semester graduate					
Contonts					

Contents

Fundamentals: Phases of drug development, principles of drug action, pharmacokinetics and biotransformation; strategies of drug discovery, drug targets, chemical space of drug discovery, protein-ligand interactions, structure-activity-relationships (SAR), bioisosterism, prodrug strategies.

Experimental methods: binding assays, enzymatic assays, biophysical methods, high-throughput-screening (HTS).

Theoretical methods and drug design: virtual screening, ligand-based methods, QSAR, pharmacophore models, structure-based drug design, docking, simulation methods, machine learning (AI).

Case studies (drug discovery, design and optimization)

Intended learning outcomes

The students master the fundamentals of drug development, the strategies of drug discovery and the applied theoretical and experimental methods. They can understand and critically question the essential content of current scientifc publications in drug research. They are able to carry out a basic virtual screen and to evaluate its results.

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

 $S(2) + \ddot{U}(1)$

Module taught in: German or English

 $\textbf{Method of assessment} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language}) \ (\textbf{type}, \textbf{language}) \$ module is creditable for bonus)

- a) presentation (approx. 30 minutes) or
- b) written examination (approx. 45 to 90 minutes)

Language of assessment: German and/or English

Allocation of places

22 places.

- 16 places for students of the Master's degree programme Chemie (Chemistry): Places will be allocated according to the same number of subject semesters; students who have chosen Medizinische Chemie (Medicinal Chemistry) as their focus will be given preferential consideration.
- 6 places for students of the Master's degree programme Biochemie (Biochemistry): Places will be allocated according to the number of subject semesters; among applicants with the same number of subject semesters, places will be allocated by lot.
- 2 places for students of the Master's degree programme MINT-Lehramt PLUS: Places will be allocated according to the number of subject semesters; among applicants with the same number of subject semesters, places will be allocated by lot; a waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

Workload

150 h

Teaching cycle

Master's with 1 major Chemistry (2026)	JMU Würzburg • generated 25-Nov-2025 • exam.	page 199 / 345
	reg. data record Master (120 ECTS) Chemie - 2026	





Module title					Abbreviation
Special Topics in Theoretical Chemistry 08-TCMS-211-					
Module coordinator				Module offered by	-
Person	(s) resp	oonsible for the focus The	eoretical Chemistry	Institute of Physica	l and Theoretical Chemistry
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites	i	
1 seme	ster	graduate			
Conten	its				
The mo	dule c	overs current and/or spe	cial topics in Theoret	ical Chemistry.	
Intend	ed lear	ning outcomes			
acquire	ed knov		ecific contexts, knows	the application are	ry. He/she is able to classify the as and is proficient in the requi- coretical Chemistry.
Course	S (type, 1	number of weekly contact hours,	anguage — if other than Ge	rman)	
S (2) +	Ü (1)				
		sessment (type, scope, langua ble for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English					
Allocat	ion of	places			
Additional information					
Workload					
150 h					
Teachi	ng cycl	e			



Module title					Abbreviation	
Theoretical Chemistry - Project course quantum chemistry					08-TCAP1-161-m01	
Module coordinator Module			Module offered by			
head o	f the re	esearch group offering the	e module	Institute of Physica	l and Theoretical Chemistry	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	(not)	successfully completed				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts	,	,			
the Ins	titute o	•	, .		the research groups based at sed in the discipline. The focus	
Intende	ed lear	ning outcomes				
Students have learned some of the methods typically used in theoretical chemistry and, in particular, in quantum chemistry. They are able to explain issues that are relevant to the field of quantum chemistry.						
Courses (type, number of weekly contact hours, language — if other than German)						
P (5)						
		sessment (type, scope, langua	ge — if other than German,	examination offered — if no	et every semester, information on whether	

presentation (approx. 30 minutes)

Language of assessment: German and/or English

Allocation of places

Additional information

Additional information on module duration: block taught lab course with approx. 20 working days.

Workload

150 h

Teaching cycle

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title					Abbreviation
Theoretical Chemistry - Project course quantum dynamics			quantum dynamics		08-TCAP2-161-m01
Module	coord	linator		Module offered by	
head of	the re	esearch group offering the	e module	Institute of Physica	l and Theoretical Chemistry
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	(not)	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Contents					
the Inst	itute o				f the research groups based at sed in the discipline. The focus
Intende	d lear	ning outcomes			
		e learned some of the me s. They are able to explair			stry and, in particular, in quan- uantum dynamics.
Course	S (type, 1	number of weekly contact hours, I	anguage — if other than Ge	man)	
P (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)					
presentation (approx. 30 minutes) Language of assessment: German and/or English					

Allocation of places

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Additional information

Additional information on module duration: block taught lab course with approx. 20 working days.

Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes})}$



Subfield Other additional qualifications

(5-10 ECTS credits)



Module title Abbreviation					Abbreviation
Tutorin	g 1 (pr	actical course)			08-WRM1-161-m01
Module coordinator				Module offered by	
Dean o	f Studi	es Chemie (Chemistry)		Faculty of Chemistr	y and Pharmacy
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	(not)	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate	contract for this mo		ormed under a research assistant ust accompany a different course M1.
Conten	its				
		gives students the opport d Pharmacy and learn how			lecture offered by the Faculty of an appropriate manner.
Intend	ed lear	ning outcomes			
Studen needs.	its are	able to teach students in	earlier stages of thei	r degrees and tailor	their teaching to those students'
Course	S (type, 1	number of weekly contact hours,	language — if other than Ge	rman)	
T (3)					
		sessment (type, scope, langua ole for bonus)	${\sf rge}-{\sf if}$ other than German,	examination offered — if no	ot every semester, information on whether
	_	ities, (preparation of stat assessment: German and		ports, approx. 100 h	nours total)
Allocat	ion of	places			
Additional information					
Workload					
150 h					
Teaching cycle					
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	ımmes)	



Module	Module title Abbreviation					
Tutoring 2 (practical course) 08-WRM2-161-m01						
Module	e coord	linator		Module offered by		
Dean o	f Studi	es Chemie (Chemistry)		Faculty of Chemistr	ry and Pharmacy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	(not)	successfully completed				
Duratio	on	Module level	Other prerequisites	i		
1 semester graduate		contract for this mo		ormed under a research assistant ust accompany a different course M1.		
Conten	its					
		gives students the opport d Pharmacy and learn how			lecture offered by the Faculty of an appropriate manner.	
Intende	ed lear	ning outcomes				
Studen needs.	its are	able to teach students in	earlier stages of thei	r degrees and tailor	their teaching to those students'	
Course	S (type, 1	number of weekly contact hours,	language — if other than Ge	rman)		
T (3)						
		sessment (type, scope, langua ole for bonus)	${\sf rge}-{\sf if}$ other than German,	examination offered — if no	ot every semester, information on whether	
	_	ities, (preparation of stat		ports, approx. 100 h	nours total)	
Allocat	ion of	places				
Additio	nal inf	ormation				
Workload						
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						



Module title					Abbreviation
Foreign Studies (short)					08-APM1-161-m01
Modul	e coord	inator		Module offered by	
Erasmus programme coordinator Chemie (Cher			nie (Chemistry)	Faculty of Chemistry and Pharmacy	
ECTS	Metho	Method of grading Only after succ. co		npl. of module(s)	
5	(not)	ot) successfully completed			
Duration Module level		Other prerequisites	5		
1 semester graduate		May not be combine	ed with o8-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.

 $\textbf{Courses} \ (\text{type, number of weekly contact hours, language} - \text{if other than German})$

P (o)

Module taught in: German and/or English and potentially language of the respective country

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) report (10 to 20 pages) or
- b) talk (10 to 20 minutes)

Language of assessment: German and/or English and potentially language of the respective country

Allocation of places

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Additional information

Additional information on module duration: block placement abroad with a duration of no less than 20 working days.

Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title					Abbreviation	
Foreign Studies (long)					08-APM2-161-m01	
Modul	e coord	inator		Module offered by		
Erasmı	Erasmus programme coordinator Chemie (Chemis			Faculty of Chemistry and Pharmacy		
ECTS	Method of grading Only after succ. co			npl. of module(s)		
10	(not)	(not) successfully completed				
Duration Module level			Other prerequisites	s		
1 semester graduate		May not be combin	ed with o8-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.

 $\textbf{Courses} \ (\text{type, number of weekly contact hours, language} - \text{if other than German})$

P (o)

Module taught in: German and/or English and potentially language of the respective country

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) report (15 to 30 pages) or

b) talk (15 to 30 minutes)

Language of assessment: German and/or English and potentially language of the respective country

Allocation of places

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Additional information

Additional information on module duration: block placement abroad with a duration of no less than 40 working days.

Workload

300 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Modul	Module title Abbreviation						
Chemis	Chemistry-related competences outside of the Natural Sciences 08-CHPM1-161-mo1						
Module coordinator Module offered by							
Dean o	f Studi	es Chemie (Chemistry)		Faculty of Chemistr	y and Pharmacy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	(not)	successfully completed					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	graduate	Please consult with	course advisory ser	vice in advance.		
Conten	its						
other F	acultie		cluded in the acaden		elated courses that are offered by neir programmes. Students MUST		
Intend	ed lear	ning outcomes					
Studen	ts have	e developed the knowled	ge and skills taught i	n the courses attenc	led by them.		
Course	S (type, r	number of weekly contact hours,	anguage — if other than Ger	rman)			
		signed to module pecified by respective in	stitution				
		sessment (type, scope, langualle for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English							
Allocation of places							
Additional information							
Worklo	ad						

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes})}$



Module title					Abbreviation	
Chemis	stry-rel	ated competences within	5	08-CHPM2-161-m01		
Module	coord	inator		Module offered by		
Dean o	f Studi	es Chemie (Chemistry)		Faculty of Chemistr	y and Pharmacy	
ECTS	Meth	od of grading	Only after succ. con	ıpl. of module(s)		
5	(not)	successfully completed				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate	Please consult with	course advisory ser	vice in advance.	
Conten	ts					
consult Intende	t with t	s and are not explicitly in heir course advisors in ac ning outcomes e developed the knowled	dvance.	-	neir programmes. Students MUST	
Course	S (type, r	number of weekly contact hours,	anguage — if other than Ger	rman)		
		ssigned to module specified by respective in	stitution			
		sessment (type, scope, langua ble for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether	
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English						
	ige of a	issessment: German and	or English/			

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Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes})}$



Module	Module title Abbreviation						
Chemis	Chemistry-related competences outside of the Natural Sciences acquired ab- 08-CHPM3-161-m01						
road	road						
Module							
Dean o	f Studi	es Chemie (Chemistry)		Faculty of Chemistr	y and Pharmacy		
ECTS	Meth	od of grading	Only after succ. com	ıpl. of module(s)			
5	(not)	successfully completed					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate	Please consult with	course advisory ser	vice in advance.		
Conten	ts						
other Fa	acultie		cluded in the academ		elated courses that are offered by neir programmes. Students MUST		
Intende	ed lear	ning outcomes					
Studen	ts have	e developed the knowled	ge and skills taught i	n the courses attend	led by them.		
Course	S (type, r	number of weekly contact hours, I	anguage — if other than Ger	man)			
Course	(s) as s	signed to module specified by respective in t in: German and/or Engl		nguage of the respe	ective country		
		sessment (type, scope, langua ble for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether		
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English and potentially language of the respective country							
Allocat	ion of _I	places					
Additio	nal inf	ormation					
Workload							
150 h							
Teachi	ng cycl	e					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						



Module	e title		Abbreviation				
Chemis	stry-rel	ated competences within	08-CHPM4-161-m01				
Module	e coord	inator					
Dean o	f Studi	es Chemie (Chemistry)		Faculty of Chemistr	y and Pharmacy		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
5	(not)	successfully completed					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	undergraduate	Please consult with	course advisory serv	vice in advance.		
Conten	its						
This se	minar e	equips students with kno	wledge, skills and m	ethods for special ed	ducation professionals.		
Intend	ed learı	ning outcomes					
Knowle	edge, sl	kills and methods for spe	cial education profes	sionals.			
Course	S (type, r	number of weekly contact hours, I	anguage — if other than Ger	man)			
Course Module	No courses assigned to module Course(s) as specified by respective institution Module taught in: German and/or English and potentially language of the respective country Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether						
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English and potentially language of the respective country							
Allocat	ion of p	olaces					
Additio	nal inf	ormation	,				
Workload							
150 h							
Teaching cycle							
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						



Thesis

(30 ECTS credits)



Modul	Module title Abbreviation					
Master-Thesis Chemistry 08-MA-161-m01					08-MA-161-m01	
Modul	e coord	inator		Module offered by	J.	
degree	progra	mme coordinator Chemie	e (Chemistry)	Faculty of Chemistr	y and Pharmacy	
ECTS	Meth	od of grading	Only after succ. con	ıpl. of module(s)		
30	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate	Where applicable, s	pecific modules as s	specified by supervisor.	
Conter	nts					
		ives students the opport scientific methods they l			problem within a given time frame	
Intend	ed lear	ning outcomes				
		able to conduct research to present the results of t			the principles of good scientific	
Course	es (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
Νο cou	ırses as	signed to module				
		sessment (type, scope, langua ole for bonus)	ge — if other than German, (examination offered — if no	ot every semester, information on whether	
		is (approx. 60 to 80 page ssessment: German and,				
Alloca	tion of _l	olaces				
Additional information						
Time to complete: 6 months.						
Workload						
900 h						
Teaching cycle						



Compulsory Courses (double degree)

(35 ECTS credits)



Subfield Courses at partner university abroad

(5 ECTS credits)



Module title					Abbreviation	
Toxicology and legal studies				03-TR-152-m01		
Module coordinator			I	Module offered by		
lecture	lecturer of lecture "Toxikologie und Rechtskunde"			ı	Faculty of Medicine	
ECTS	Meth	od of grading	Only after succ	c. compl. of module(s)		
3	nume	rical grade				
Duratio	on	Module level	Other prerequis	sites		
1 semester undergraduate -						
Conten	Contents					

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

Intended learning outcomes

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

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

V(1) + V(1)

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

written examination (approx. 90 minutes)

Allocation of places

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Additional information

according to § 2 para. 2 sentence 2 APOLmCh in conjunction with No. II 2nd letter g) and i) and No. II 1st letter d) of annex 1 to the APOLmCh and No. 5 and 6 of annex 3 to the APOLmCh

Workload

90 h

Teaching cycle

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

§ 22 II Nr. 1 h)

§ 22 II Nr. 2 f)

§ 22 II Nr. 3 f)



Module	e title	·			Abbreviation
Advand	ed che	mical practical course			08-VPM-DA-161-m01
Module	e coord	inator		Module offered by	
head o	f the re	search group offering the	e module	Faculty of Chemistr	y and Pharmacy
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
2	(not)	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	its		•		
		ives students the opport ne in question.	unity to explore a res	earch topic and app	ly the methods commonly used
Intend	ed lear	ning outcomes			
	nts are a esentat		research topic and p	resent the results of	their work in a written report or
Course	S (type, r	number of weekly contact hours,	anguage — if other than Ger	rman)	
P (3)					
		sessment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether
		x. 3 pages) ssessment: German and	or English		
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
60 h			•		
Teachi	ng cycl	e			
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	ımmes)	



Subfield Courses at partner university abroad

(30 ECTS credits)



Module	e title	,			Abbreviation
Qualifications - Partner University 08-VPU-10					08-VPU-161-m01
Modul	e coord	inator		Module offered by	L
progra	mme co	ordinator of the exchang	ge programme	Faculty of Chemistr	y and Pharmacy
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
30	(not)	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate	Please consult with	course advisory sen	vice in advance.
Conten	its				
This m	odule d	iscusses topics from the	curriculum of the pa	rtner university abro	ad.
Intend	ed lear	ning outcomes			
Studer sity.	its have	e developed the knowled	ge and skills taught i	n the courses attend	led by them at the partner univer-
Course	S (type, r	number of weekly contact hours,	language — if other than Gei	man)	
		signed to module pecified by partner unive	ersity abroad		
		sessment (type, scope, langua	ge — if other than German,	examination offered — if no	ot every semester, information on whether
		as specified by partner u ssessment: German and		at partner university	v abroad
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
900 h					
Teachi	ng cycl	<u></u> е			
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	



Compulsory Electives (double degree)

(55 ECTS credits)

Students must take one focus with 25 ECTS credits as well as one focus with 30 ECTS credits (focuses 1 and 2 pursuant to Section 3 Subsection 2 FSB (subject-specific provisions) Annex DA), provisions on available combinations are set out in Section 3 Subsection 2 Sentence 8 FSB.



Inorganic Chemistry

(25 or 30 ECTS credits)



Compulsory Courses

(20 ECTS credits)



Modul	e title				Abbreviation
Advan	ced Ino	rganic Chemistry			08-ACM1-161-m01
Modul	e coord	inator		Module offered by	
Managing Director of the Institute of Inorganic Chemistry Institute of Inorganic Chemistry			ic Chemistry		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
10	nume	rical grade			
Duration	on	Module level	Other prerequisites		
2 seme	ester	graduate			
Conter	ıts				
specia	l compo		elements (MGEs), bo		metal chemistry. It focuses on MGEs and MGE compounds, the
Intend	ed lear	ning outcomes			
the ch	emical _l				roup elements. They can describe s chemical and physical aspects
Course	es (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)	
S (3) +	S (3)				
		sessment (type, scope, langua ble for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
b) oral c) oral d) log e) pres	examir examin (approx sentatio	mination (approx. 90 to 1 nation of one candidate e lation in groups of up to 3 lation in groups of up to 3 lation in groups of up to 3 lation in (approx. 30 minutes) lassessment: German and	ach (20 to 30 minute 3 candidates (approx		didate) or
Alloca	tion of	olaces			
	-1				
Additio	onal inf	ormation			
Worklo	oad				

.

300 h

Teaching cycle

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



Module title Abbreviation				Abbreviation	
Inorganic Chemistry practical course for advanced				08-ACPM-161-m01	
Modul	e coord	inator		Module offered by	l
focus p	oint co	ordinator "Inorganic Che	mistry"	Institute of Inorgan	ic Chemistry
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
10	(not)	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conter	ıts				
thods i tral and	in inorg alysis a	anic chemistry. The focus	s will be on working ι ents will be expected	inder inert atmosphe to conduct their wo	synthesis and analytical me- eres, purification methods, spec- rk in the lab independently, write
Intend	ed lear	ning 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.					
		number of weekly contact hours,			1

P (24)

Module taught in: German or English

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 on practical course (approx. 20 pages) and talk (approx. 15 minutes) Language of assessment: German and/or English

Allocation of places

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Additional information

Additional information on module duration: block taught lab course with approx. 40 working days.

Workload

300 h

Teaching cycle

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



Compulsory Electives

(5 or 10 ECTS credits)



Module	title	-			Abbreviation
Bioinor	ganic	Chemistry			08-ACM2-242-m01
Module	coord	inator		Module offered by	I.
lecture	r of the	seminar "Bioinorganic C	hemistry"	Institute of Inorgan	ic Chemistry
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
	ds of B				chemistry (BIC). It discusses the ns of BIC in the fields of diagnosis
Intende	ed lear	ning outcomes			
		able to describe the princ us enzymes and describe			explain the structure and effects medicine.
Course	S (type, i	number of weekly contact hours, I	anguage — if other than Ger	rman)	
S (3) Module	taugh	t in: German or English			
		sessment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
b) oral c) portf	examir olio (a	mination (approx. 45 to 9 nation of one candidate e pprox. 30 hours total) assessment: German and	ach (20 to 30 minute	s) or	
Allocat	ion of	places			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	e			
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	ımmes)	



Module	title	_			Abbreviation
Solid st	ate ch	emistry and inorganic m	aterials		08-ACM3-161-m01
Module	coord	inator		Module offered by	
		ninar "Festkörperchemie Solid State Chemistry and		Institute of Inorgan	ic Chemistry
ECTS Method of grading Only after succ. compl. of module(s)					
5	numei	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate			
Content	ts				
		rovides an introduction t			structure, chemical and physical
Intende	d learr	ning outcomes			
					xplain methods for solid-state the corresponding solids.
Courses	(type, n	umber of weekly contact hours, l	anguage — if other than Ger	rman)	
S (3)					
		sessment (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
b) oral e c) oral e d) log (a e) prese	examin examin approx entatio	mination (approx. 90 to 1 lation of one candidate e ation in groups of up to 3 . 20 pages) or n (approx. 30 minutes) ssessment: German and	ach (20 to 30 minute 3 candidates (approx		didate) or
Allocati	on of p	olaces			
Addition	nal info	ormation			
Workloa	ad				
150 h					
Teachin	g cycl	e			
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	immes)	



Module title					Abbreviation
Advano lysis	ced org	anometallic chemistry ar	08-HKM2-161-m01		
Module coordinator Module offered by					
		seminar "Spezielle Meta wendung in der Homoger		Institute of Inorgan	ic Chemistry
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	graduate			
Conter	ıts				
This m tions.	odule e	xamines elementary orga	anic compounds of tr	ansition metals with	homogeneous catalytic applica-
Intend	ed lear	ning outcomes			
		,		•	entary organic compounds. They neous catalysis reactions.
Course	es (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)	
S (3) Modul	e taugh	t in: German or English			
		sessment (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	t every semester, information on whether
b) oral c) oral d) log (e) pres	examir examin (approx sentatio	mination (approx. 90 to 1 nation of one candidate e nation in groups of up to 3 . 20 pages) or n (approx. 30 minutes) ssessment: German and	ach (20 to 30 minute 3 candidates (approx		didate) or
Allocat	tion of	olaces			
Additio	onal inf	ormation			
Worklo	oad				
150 h					
	ng cycl	e			
Referre	ed to in	LPO I (examination regulation:	s for teaching-degree progra	ımmes)	
	_	-			



Modul	Module title Abbreviation					
Basics	and Ap	oplications of Quantum C	hemistry		08-TCM2-161-m01	
Module coordinator Module offered				Module offered by		
lecture	r of lec	ture "Computational Che	mistry"	Institute of Physica	l and Theoretical Chemistry	
ECTS	Meth	od of grading	Only after succ. com	pl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ıts					
This m	odule i	ntroduces students to the	e fundamental princip	oles of computationa	al chemistry.	
Intend	ed lear	ning outcomes				
		able to explain the theore	etical principles of co	mputational chemist	try and to apply methods in com-	
Course	S (type, ı	number of weekly contact hours, l	anguage — if other than Ger	man)		
S (2) +	Ü (2)					
		sessment (type, scope, langua ble for bonus)	ge $-$ if other than German, ϵ	examination offered — if no	ot every semester, information on whether	
b) oral c) oral d) log (e) pres Langua	examir examir (approx entation age of a	mination (approx. 90 to 1 nation of one candidate e nation in groups of up to 3 a. 20 pages) or on (approx. 30 minutes) assessment: German and	ach (20 to 30 minute 3 candidates (approx.		didate) or	
Allocat	ion of	places				
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPO I (examination regulation:	s for teaching-degree progra	mmes)		



Organic Chemistry

(25 or 30 ECTS credits)



Compulsory Courses

(15 ECTS credits)



Module title Abbreviation					
Moderr	Synth	netic Methods			08-OCM-SYNT-161-m01
Module	coord	linator		Module offered by	
lecture	r of the	e seminar		Institute of Organic (Chemistry
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites	;	
1 seme	ster	graduate			
Conten	ts		•		
		discusses modern stered emistry and catalysis.	oselective synthesis m	ethods. It focuses on	selected total syntheses, orga-
Intende	ed lear	ning outcomes			
	ın expl	ain total syntheses. The		-	tereochemically analyse them. emistry and catalysis in synthe
Course	S (type, r	number of weekly contact hours	, language — if other than Ge	rman)	
S (2) + Module		t in: German or English			
		sessment (type, scope, langu	nage — if other than German,	examination offered — if not	every semester, information on whether

a) written examination (approx. 90 to 180 minutes) or

- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or
- d) log (approx. 20 pages) or
- e) presentation (approx. 30 minutes)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Modul	e title				Abbreviation
Advan	ed Res	earch Project Organic Cl	nemistry		08-OCM-AKP1-161-m01
Modul	e coord	inator		Module offered by	
head o	f the re	search group offering the	e module	Institute of Organic	Chemistry
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
10	(not)	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conter	its				
		rives students the opport f Organic Chemistry and			f the research groups based at ytical methods.
Intend	ed lear	ning outcomes			
		able to describe and use well as to describe theor		s and analytical met	thods typically used by the rese-
Course	S (type, r	number of weekly contact hours,	anguage — if other than Ge	rman)	
P (20) Module	e taugh	t in: German or English			
		sessment (type, scope, langua ole for bonus)	${\sf ge-if}$ other than German,	examination offered — if no	ot every semester, information on whether
		5 to 20 pages) and talk (ssessment: German and			
Allocat	ion of p	places			
Additio	nal inf	ormation	•		
Worklo	ad				
300 h					
Teachi	ng cycl	e			
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	ımmes)	
		-			

Compulsory Electives

(10 or 15 ECTS credits)



Module	e title		Abbreviation		
Moder	1 Aspec	ts of Biological Ch	emistry		08-0CM-BIO-242-m01
Module	e coordi	inator		Module offered by	
lecture mistry"		seminar "Modern A	spects of Biological Che-	Institute of Organio	Chemistry
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)	
5	numei	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semester graduate					
Conten	ts				
The cou	urse de	als with advanced t	opics of biological chemis	try that build on fun	damental knowledge of orga

The course deals with advanced topics of biological chemistry that build on fundamental knowledge of organic chemistry, bioorganic chemistry, biochemistry and molecular biology. Key concepts in the course cover the chemistry of the genetic code, and methods to analyse and interfere with gene expression and secondary metabolism. We will cover genetic code expansion, including unnatural base pairs and unnatural amino acids, including their chemical synthesis and enzymatic incorporation. We will also cover combinatorial synthesis methods and directed evolution and display technologies. This includes in vitro selection and in vitro evolution of functional nucleic acids (aptamers, ribozymes, deoxyribozymes), mRNA display, phage display, directed evolution of proteins/enzymes, antibodies, nanobodies, sequencing methods, DNA/RNA origami and nanotechnology, as well as combinatorial polyketide synthesis and non-ribosomal peptide synthesis.

Intended learning outcomes

The students will have a detailed understanding of modern concepts in functional nucleic acids and engineered proteins, including their synthesis and analysis. They will be able to discuss a wide variety of relevant methods and explain chemical relationships at the molecular level with biochemical/biotechnological questions and apply them to corresponding problems. The students will be able to critically examine information and new developments in the field of biological chemistry.

 $\textbf{Courses} \ (\textbf{type}, \, \textbf{number of weekly contact hours, language} - \textbf{if other than German})$

S (3)

Module taught in: German or English

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

- a) written examination (approx. 45 to 90 minutes) or
- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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



		1.11.2.11 =					
Module	e title				Abbreviation		
Organi	c Funct	ional Materials			08-OCM-FM-161-m01		
Module	coord	inator		Module offered by			
lecture	r of the	seminar "Organische Fu	nktionsmaterialien"	Institute of Organic	Chemistry		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
sical ef	fects ir nents s	organic molecular and p	oolymeric semicondu	ctors as well as their	is on fundamental (photo)phy- rapplication in (opto)electronic ganic solar cells as well as in non-		
Intende	ed lear	ning outcomes					
explain	the sy ich as f	nthesis of these semicon	ductor materials as v	vell as their applicat	nic semiconductors. He/She can ion in (opto)electronic compon- bhotovoltaics as well as in nonli-		
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)			
S (3)							
		sessment (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
b) oral c) oral d) log (e) pres	a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English						
Allocation of places							
Additio	nal inf	ormation					
Worklo	Workload						
150 h							
	., o,						

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$

Teaching cycle



Module title Abbreviation								
Organ	o- and E	Biocatalysis				08-HKM1-152-m01		
Modul	e coord	inator		I	Module offered by			
lecture	er of the	seminar "Organo- a	ınd Biokatalyse"	F	aculty of Chemisti	ry and Pharmacy		
ECTS	Metho	od of grading	Only after succ	. comp	ol. of module(s)			
5	nume	rical grade						
Durati	on	Module level	Other prerequi	sites				
1 seme	ester	graduate						
Conter	nts							
Studer scribe	ed lear nts are a the stru	acture and application	ons of enzymes in org			reas of application. They can deable to mechanistically describe		
		he effects of enzyme	nours, language — if other th	an Germ	an)			
S (3)	(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	iumber of weekly contact i	iours, turiguage in other th	an denn	u.i,			
Metho		sessment (type, scope, ole for bonus)	language — if other than Ger	rman, ex	amination offered — if n	ot every semester, information on whether		
a) written examination (approx. 45 to 90 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate) Language of assessment: German and/or English								
Allocation of places								

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes})}$



Module	title			Abbreviation				
Supran	nolecul	ar Chemistry (Basics)		08-SCM1-161-m01				
Module	coord	inator		Module offered by				
lecture sics)"	r of the	seminar "Supramolecul	ar Chemistry (Ba-	Institute of Organic	Chemistry			
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)				
5	nume	rical grade						
Duratio	n	Module level	Other prerequisites					
1 seme	ster	graduate						
Conten	ts							
actions nation	betwe polyme	en molecules, molecula	r recognition by recep crystals, self-assemb	tors, complexes, su	lar chemistry. It focuses on inter- pramolecular polymers, coordi- , synthetic ion channels and mo-			
Intend	ed lear	ning outcomes						
field as describ	well a	s to describe the formati	on, structure and pol s in aqueous media a	ymers of coordinations well as to identify	igh degree of expertise in the on compounds. They are able to the characteristics of synthetic			
Course	S (type, r	number of weekly contact hours,	language — if other than Ge	rman)				
S (3) Module	e taugh	t in: German or English						
		sessment (type, scope, langu ble for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether			
b) oral	a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (approx. 20 minutes) Language of assessment: German and/or English							
Allocation of places								
Additio	Additional information							
Worklo	Workload							

150 h

Teaching cycle

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module	e title			Abbreviation		
Bioorg	anic Ch	nemistry			08-SCM3-152-m01	
Module	e coord	linator		Module offered by		
lecturer of lecture "Bioorganische Chemie" (Bioorganic Chemistry)			Chemie" (Bioorganic	Institute of Organic	Chemistry	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites	5		
1 semester graduate						
Contents						
Bioorga	Bioorganic chemistry unites the central questions of organic chemistry, biochemistry, medicinal chemistry and					

Bioorganic chemistry unites the central questions of organic chemistry, biochemistry, medicinal chemistry and spectroscopy with a focus on biomolecules. At the core of bioorganic chemistry is the synthesis and purposeful manipulation of biomolecules, such as nucleic acids, peptides, proteins, carbohydrates and lipids. This includes the framework of structure-function relationships and the fundamental understanding of biological mechanisms, to enable applications towards biomaterials, biosensing, bioimaging, clinical diagnostics and therapeutics.

Key concepts covered in the course are nucleic acid chemistry, peptide chemistry, carbohydrate chemistry, bioorthogonal reactions, molecular diversity, solid-phase synthesis, molecular recognition and interactions (ligand-receptor interactions, signal transduction)

Intended learning outcomes

The students will have a molecular understanding of the structure and reactivity of biomolecules. The students obtain knowledge of modern synthetic methods in bioorganic chemistry and can explain principles of molecular interactions and recognition mechanisms. They can describe modern aspects of nucleic acids, proteins, carbohydrates and lipids.

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

S (3)

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

- a) written examination (approx. 45 to 90 minutes) or
- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Modul	e title		Abbreviation				
Basics	and Ap	oplications of Quantum	08-TCM2-161-m01				
Modul	e coord	linator	Module offered by				
lecture	r of lec	ture "Computational Cl	hemistry"	Institute of Physica	l and Theoretical Chemistry		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	·		
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites	i			
1 seme	ester	graduate					
Conter	nts						
This m	odule i	ntroduces students to	the fundamental princi	ples of computation	al chemistry.		
Intend	ed lear	ning outcomes					
		able to explain the theo emistry.	oretical principles of co	mputational chemis	try and to apply methods in com-		
Course	S (type,	number of weekly contact hou	rs, language — if other than Ge	rman)			
S (2) +	Ü (2)						
		sessment (type, scope, lang ble for bonus)	guage — if other than German,	examination offered — if no	ot every semester, information on whether		
b) oral c) oral d) log (e) pres	examii examir (approx entatic		e each (20 to 30 minute o 3 candidates (approx)		didate) or		
Allocat	tion of	places					
 A 1 1***	1. (. ,.					
Additio	Additional information						
150 h							
	Teaching cycle						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						
Referred to III Li O I (examination regulations for teaching-degree programmes)							



Physical Chemistry

(25 or 30 ECTS credits)



Compulsory Courses

(20 ECTS credits)



Modul	e title				Abbreviation		
Laser S	Spectro	scopy			08-PCM1a-161-m01		
Modul	e coord	inator		Module offered by			
lecture copy)	r of ser	ninar "Laserspektroskop	ie" (Laser Spectros-	Institute of Physica	l and Theoretical Chemistry		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites	i			
1 seme	ster	graduate					
Conter	its						
		ntroduces students to th spectroscopy.	e fundamental princi	ples of laser spectro	scopy. It discusses absorption		
Intend	ed lear	ning outcomes					
		able to explain the comp ology. They are able to d			as well as the optical principles emission spectroscopy.		
Course	S (type, r	number of weekly contact hours,	language — if other than Ge	rman)			
S (2) + Module		t in: German or English					
		Sessment (type, scope, langualle for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether		
b) oral	examir	mination (approx. 90 mination of one candidate of seessment: German and	each (approx. 20 mini	utes)			
Allocat	ion of p	olaces					
			_				
Additio	nal inf	ormation	_				
Worklo	Workload						
150 h	150 h						
Teachi	Teaching cycle						
							
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						



Modul	Module title Abbreviation						
Advan	ced Phy	sical Chemistry (Lab)		-	08-PCM1b-161-m01		
Modul	e coord	inator		Module offered by	L		
lecture copy)	er of ser	minar "Laserspektroskop	ie" (Laser Spectros-	Institute of Physica	l and Theoretical Chemistry		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
5	(not)	successfully completed					
Duratio	on	Module level	Other prerequisites				
1 seme	ester	graduate					
Conter	nts						
Intend Studer They a	ed lear nts have re able	o take tests and write lab ning outcomes e developed a high level to analyse the resulting r number of weekly contact hours,	of proficiency in mod measurements and w	ern experimental merite a lab report.	ethods in physical chemistry.		
P (4) Modul	e taugh	t in: German or English					
		sessment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
Vortestate/Nachtestate (pre and post-experiment examination talks approx. 15 minutes each, log approx. 5 to 10 pages each) and assessment of practical performance (2 to 4 random examinations) Language of assessment: German and/or English							
Allocation of places							
Additional information							
Additio	Additional information on module duration: block taught lab course with approx. 20 working days.						
Workload							

workle 150 h

Teaching cycle

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



Module	e title				Abbreviation			
Statist	ical Me	chanics and Reaction Dy	rnamics		08-PCM2-161-m01			
Module	e coord	inator		Module offered by	•			
lecture mics)	r of ser	ninar "Chemische Dynam	ik" (Chemical Dyna-	Institute of Physica	l and Theoretical Chemistry			
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)				
5	nume	rical grade						
Duratio	on	Module level	Other prerequisites					
1 seme	ster	graduate						
Conten	its							
clude t	he fund		atistical thermodynar		namics. Topics to be covered instate theory, uni- and bimolecular			
Intend	ed lear	ning outcomes						
		e become familiar with se re able to apply the fund			d reaction dynamics. They have			
Course	S (type, r	number of weekly contact hours, I	anguage — if other than Ger	man)				
S (2) + Module	• •	t in: German or English						
		sessment (type, scope, langua	ge — if other than German, o	examination offered — if no	ot every semester, information on whether			
b) oral c) talk	examir (approx	mination (approx. 90 mir nation of one candidate e k. 30 minutes) ssessment: German and	ach (approx. 20 minu	utes) or				
Allocat	ion of p	olaces	,					
Additional information								
Worklo	ad							
150 h	150 h							
	Teaching cycle							
	-							

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title					Abbreviation	
Physical Chemistry (Advanced Lab)					08-PCM6-161-m01	
Module	e coord	inator		Module offered by		
lecture	rs Phys	ikalische Chemie (Physic	cal Chemistry)	Institute of Physica	l and Theoretical Chemistry	
ECTS	Metho	od of grading	Only after succ. compl. of module(s)			
5	(not)	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	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.

 $\pmb{\textbf{Courses}} \text{ (type, number of weekly contact hours, language} - \text{if other than German)}$

P (4)

Module taught in: German or English

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 and/or English

Allocation of places

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Additional information

Additional information on module duration: block taught lab course with approx. 20 working days.

Workload

150 h

Teaching cycle

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



Compulsory Electives

(5 or 10 ECTS credits)



Module title Abbreviation							
Nanosc	ale Ma	terials			08-PCM3-161-m01		
Module	coord	inator		Module offered by			
lecture	of the	seminar "Nanoskalige M	aterialien"	Institute of Physica	l and Theoretical Chemistry		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
5	numei	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
		iscusses advanced topic aracterisation methods a			ne structure, properties, fabricatirials.		
Intende	d learr	ning outcomes					
		ble to characterise nano noscale materials.	scale materials. They	are able to name a	nalytical methods and applicati-		
Course	5 (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)			
S (2) + I Module	` '	t in: German or English					
		essment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether		
b) oral (c) talk (Langua	a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) talk (approx. 30 minutes) Language of assessment: German and/or English creditable for bonus						
Allocati	ion of p	laces					
Additional information							
Workload							
150 h	150 h						
Teaching cycle							

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



Module title Abbreviation											
Ultrafast spectroscopy and quantum-control 08-PCM4-242-mo1											
Module coordinator Module offered by					ered by						
lecture	r of the	seminar "Nanoskali	ge Materialien"	Institute of	Physical and Theoretical Chemistry						
ECTS	Meth	od of grading	Only after succ	. compl. of modul	e(s)						
5	nume	rical grade									
Duratio	on	Module level	Other prerequi	sites							
1 seme	ster	graduate	Prior completio	n of modules o8-	PCM1a and o8-PCM1b recommended.						
Conten	its		,								
			copics in ultrafast spe pectroscopy and coh		uantum control. It focuses on ultrashort						
Intend	ed lear	ning outcomes									
Course S (2) +	es (type, 1	d applications of quanumber of weekly contact hours	ours, language — if other th	an German)							
Metho	d of as			rman, examination offe	red — if not every semester, information on whether						
b) talk c) portf	(appro folio (a	nation of one candida x. 30 minutes) or pprox. 50 hours total assessment: German		minutes) or							
Allocat	ion of	places									
Additio	nal inf	ormation									
Workload											
150 h											
Teaching cycle											
reaciii	iig cyci	e									
	iig cycl	e									



Module	Module title Abbreviation						
Physica	Physical Chemistry of Supramolecular Assemblies 08-PCM5-161-mo1						
Module	coord	inator		Module offered by			
lecture kularer		seminar "Physikalische uren"	Chemie Supramole-	Institute of Physica	l and Theoretical Chemistry		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
		xamines the basic intera of aggregates as well as			he formation and physical-chemi- nistry.		
Intende	ed learı	ning outcomes					
in the f dern ap	ield. Th pplicati	ey can describe the form ons of supramolecular ch	ation and physical-c nemistry.	hemical properties o	trating a high degree of expertise of aggregates. They can name mo-		
		umber of weekly contact hours, I	anguage — if other than Ger	man)			
S (2) + Module	• •	t in: German or English					
		sessment (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
b) oral c) talk	examin (approx	mination (approx. 90 mir lation of one candidate e k. 30 minutes) ssessment: German and	ach (approx. 20 minu	utes) or			
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Workload							
150 h	150 h						
Teachi	ng cycl	e					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						



Module title Quantum Dynamics					Abbreviation
				08-TCM4-161-m01	
Module coordinator				Module offered by	
lecturer of lecture "Quantendynamik"				Institute of Physical and Theoretical Chemistry	
ECTS	Method of grading		Only after succ. compl. of module(s)		
5	nume	rical grade			
Duration Module level		Module level	Other prerequisites		
1 semester		graduate			
Conten	its				
		ent Schrödinger equatior adiabatic states, non-adi			ion theory, adiabatic theorem, al dynamics.
Intend	ed lear	ning outcomes			
in mole	ecules.		•	•	nuclear and electronic dynamics w them to carry out applications
Course	S (type, r	number of weekly contact hours,	language — if other than Ger	rman)	
S (2) +	Ü (2)				
Metho		sessment (type, scope, langua le for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether
module is		mination (approx. 90 to	180 minutes) or		

Allocation of places

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Additional information

Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes})}$



Module title Abbreviation							
Basics	and Ap	plications of Quantum C	hemistry		08-TCM2-161-m01		
Module	e coord	inator		Module offered by			
lecture	r of lec	ture "Computational Che	mistry"	Institute of Physica	l and Theoretical Chemistry		
ECTS	Metho	od of grading	Only after succ. compl. of module(s)				
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	its						
This m	odule ii	ntroduces students to the	fundamental princip	oles of computationa	al chemistry.		
Intend	ed lear	ning outcomes					
		able to explain the theore	tical principles of co	mputational chemist	try and to apply methods in com-		
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)			
S (2) +	Ü (2)						
		sessment (type, scope, langua le for bonus)	ge $-$ if other than German, ϵ	examination offered — if no	t every semester, information on whether		
b) oral c) oral d) log (e) pres	examir examin (approx entatio	mination (approx. 90 to 1 nation of one candidate e lation in groups of up to 3 . 20 pages) or n (approx. 30 minutes) ssessment: German and,	ach (20 to 30 minute 3 candidates (approx.		didate) or		
Allocat	ion of _J	olaces					
Additio	nal inf	ormation					
Worklo	ad						
150 h	-						
Teachi	Teaching cycle						
Referre	ed to in	LPO I (examination regulations	s for teaching-degree progra	mmes)			



Modul	o titlo				Abbreviation	
	Numerical Methods and Programming				08-TCM3-161-m01	
			•	1	00 1611/101 11101	
	e coord			Module offered by		
lecture mie"	r of lec	ture "Programmieren in 1	Theoretischer Che-	Institute of Physica	l and Theoretical Chemistry	
ECTS	Metho	od of grading	Only after succ. compl. of module(s)			
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites	i		
1 seme	ester	graduate				
Conter	ıts					
		rovides an introduction ation areas.	to the fundamentals	of programming in th	neoretical chemistry and discus-	
Intend	ed lear	ning outcomes				
		able to explain and use on the contract of the		ng languages typical	ly used in theoretical chemistry	
Course	es (type, r	number of weekly contact hours,	language — if other than Ge	rman)		
S (2) +	Ü (2)					
		sessment (type, scope, langualle for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether	
b) oral c) oral d) log (e) pres	examir examin (approx sentatio	mination (approx. 90 to nation of one candidate of ation in groups of up to . 20 pages) or n (approx. 30 minutes) ssessment: German and	each (20 to 30 minute 3 candidates (approx	•	didate) or	
Allocat	tion of p	olaces				
Additio	onal inf	ormation				
Worklo	oad					
150 h						
Teachi	ng cycl	e				



Module	title				Abbreviation
Theore	tical Ch	nemistry - Project course	quantum chemistry		08-TCAP1-161-m01
Module	coord	inator		Module offered by	I.
head o	f the re	search group offering the	module	Institute of Physica	l and Theoretical Chemistry
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)	
5	(not) s	successfully completed			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate		_	
Conten	ts				
Intende Studen	ed learr	ntum chemistry. ning outcomes e learned some of the me r. They are able to explair			stry and, in particular, in quan- uantum chemistry.
Course	S (type, n	umber of weekly contact hours, l	anguage — if other than Ge	rman)	
P (5)					
		sessment (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
		approx. 30 minutes) ssessment: German and	or English		
Allocat	ion of p	olaces			
Additio	nal info	ormation			
۷ ۲۲:۲۰	nalinf	armatian an madula dura	tion, block taught la	h course with annrox	v 20 working days

Additional information on module duration: block taught lab course with approx. 20 working days.

Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes})}$



Modul	o title				Abbreviation
	Theoretical Chemistry - Project course quantum dynamics				08-TCAP2-161-m01
			- quantum aynamics		00 10/11 2 101 11101
Modul	e coord	inator		Module offered by	
head o	f the re	search group offering the	e module	Institute of Physica	l and Theoretical Chemistry
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	(not)	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	graduate			
Conter	nts				
Intend Studer	ed lear	ntum dynamics. ning outcomes e learned some of the me s. They are able to explair			stry and, in particular, in quan- uantum dynamics.
Course	es (type, r	number of weekly contact hours,	language — if other than Ge	rman)	
P (5)					
		sessment (type, scope, langua ole for bonus)	nge — if other than German,	examination offered — if no	ot every semester, information on whether
		(approx. 30 minutes) ssessment: German and	/or English		
Allocat	tion of	places			
Additio	onal inf	ormation			
Additio	Additional information on module duration: block taught lab course with approx. 20 working days.				

Additional information on module duration: block taught lab course with approx. 20 working days.

Workload

150 h

Teaching cycle



Module title	Abbreviation
Material Science 1 (Basic introduction)	08-FU-MaWi1-212-m01
	·

Module coordinator	Module offered by
holder of the Chair of Chemical Technology of Material Syn-	Chair of Chemical Technology of Material Synthesis
thesis	

ECTS	Method of grading		Only after succ. compl. of module(s)
5	numerical grade		-
Duratio	n	Module level	Other prerequisites
2 seme	ster	undergraduate	-

Contents

Part A Structure of materials

The students learn about the atomic structure of solid materials.

Part B Metallic Materials

The students learn about the structure of metallic materials as well as their mechanical properties including deformation and failure mechanism as well as the analysis of mechanical properties. In addition, the corrosion and corrosion protection of metallic materials is introduced.

Part C Numerical Methods

The students are introduced to numerical methods like finite element methods (FEM) and Monte-Carlo-Simulation.

Intended learning outcomes

The students know the structure of solids, thermodynamic properties like enthalpy and entropy, the laws of diffusion and lattice defects. They are familiar with deformation and corrosion mechanisms in metals. The students acquire knowledge about thermodynamic of solids. They understand phase transitions, alloys and phase separation of metals. The students can explain the deformation as well as hardening due to dislocations of metals. The students can apply FEM to simple problems and perform simulations based on the Monte-Carlo-method.

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

 $V(2) + \ddot{U}(1) + V(2)$

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

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

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$

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Modul	e title				Abbreviation	
Lab Co	urse M	aterial Science			08-FMM-MP-161-m01	
Module coordinator Module offered by						
	rs spec Materi	ialisation subject Funktionals)	onsmaterialien (Fun-	Chair of Chemical T	echnology of Material Synthesis	
ECTS	Metho	od of grading	Only after succ. compl. of module(s)			
5	(not)	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts					
Ten se	lected e	experiments in materials	science.			
Intend	ed lear	ning outcomes				
Studer	nts have	e developed an advanced	proficiency in the pe	erformance of experi	ments in materials science.	
Course	es (type, r	number of weekly contact hours,	anguage — if other than Ger	rman)		
P (8)						
		sessment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
pages	each) a	ichtestate (pre and post- ind assessment of practions issessment: German and	cal performance (2 to		minutes each, log approx. 5 to 10 ions)	
Allocat	tion of _I	olaces				
	,					
Additio	onal inf	ormation				
Worklo	ad					
150 h						
Teachi	Teaching cycle					
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
						



Biochemistry

(25 or 30 ECTS credits)



Compulsory Courses

(15 ECTS credits)



Module	e title				Abbreviation
Molecular Biology					08-BC-MOL-222-m01
Modul	e coord	linator		Module offered by	I.
holder	of the	Chair of Biochemistry		Chair of Biochemis	try
ECTS	Meth	od of grading	Only after succ. compl. of module(s)		
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	its				
The module covers specific topics of molecular physiology and functional biochemistry in lectures and exercices.					
Intend	ed lear	ning outcomes			
After a	ttendin	g the module events, stu	ıdents have sound kn	owledge in molecula	ar biology.

 $\textbf{Courses} \ (\textbf{type}, \, \textbf{number of weekly contact hours, language} - \textbf{if other than German})$

 $V(2) + \ddot{U}(1)$

Module taught in: German

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

- a) written examination (approx. 45 to 90 minutes) or
- b) log (10 to 20 pages) or
- c) oral examination of one candidate each (20 to 30 minutes) or
- d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or
- e) presentation (20 to 30 minutes) or
- f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)

Language of assessment: German and/or English

Allocation of places

Additional information

Workload

150 h

Teaching cycle

Teaching cycle: Once a year, summer semester



Modul	e title				Abbreviation
Molec	Molecular Biology laboratory course				08-BC-MOLP-172-m01
Modul	e coord	linator		Module offered by	
holder	holder of the Chair of Biochemistry			Chair of Biochemistry	
ECTS	Meth	od of grading Only after succ. comp		mpl. of module(s)	
10	nume	rical grade			
Duration Module level (Other prerequisites	5		
1 semester undergraduate					
C 4					

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)

P (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)

- a) written examination (approx. 45 to 90 minutes) or
- b) log (10 to 20 pages) or
- c) oral examination of one candidate each (20 to 30 minutes) or
- d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or
- e) presentation (20 to 30 minutes) or
- f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)

Language of assessment: German and/or English

Assessment offered: Once a year, winter semester

Allocation of places

Biochemie (Biochemistry) 24 places.

Selection process Biochemie (Biochemistry), Bachelor's (180 ECTS credits): Should the number of applications exceed the number of available places, places will be allocated according to the following quotas: Quota 1 (two thirds of places): current average grade of successfully completed modules; among applicants with the same average grade, places will be allocated by lot. Quota 2 (one third of places): number of subject semesters of the respective applicant; among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated as they become available.

Chemie (Chemistry), Master's and MINT-Lehramt PLUS Master's: 6 places. Selection process: 1. Applications of Master's degree programme Chemie (Chemistry) (120 ECTS credits) will be considered first: Places will be allocated according to the number of subject semesters. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available. 2. In case that there are places left after procedure 1 is finished completely, theses places will be distributed among the students in the Master's degree programme MINT-Lehramt PLUS as follows: Places will be allocated according to the number of subject semesters. Among applicants with the same number of subject semesters, places will be allocated by lot. A waiting list will be maintained and places re-allocated by lot as they become available.

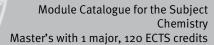
Additional information

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Workload

300 h

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

Compulsory Electives

(10 or 15 ECTS credits)



Module title					Abbreviation	
Research Internship Biochemistry for Master Chemistry					08-BC-FPMC-242-m01	
Module coordinator M				Module offered by		
focus	ooint co	ordinator "Biochemistry'	ı	Chair of Biochemistry		
ECTS	Meth	od of grading	Only after succ. compl. of module(s)			
10	(not)	successfully completed	o8-BC-MOLP			
Duratio	on	Module level	Other prerequisites			
1 semester graduate						
Conter	nts					
Thic la	h cours	o is based in a biochemi	stry and for molecula	r hiology recearch gr	oun at the University of Wiirz-	

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

Intended learning outcomes

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

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

P (10)

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

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

Allocation of places

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Additional information

Additional information on module duration: block taught lab course with approx. 40 working days.

Workload

300 h

Teaching cycle

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



Module	Module title Abbreviation						
Bioinor	Bioinorganic Chemistry 08-ACM2-242-mo1						
Module	coord	inator		Module offered by			
lecture	r of the	seminar "Bioinorganic C	hemistry"	Institute of Inorgan	ic Chemistry		
ECTS	Metho	od of grading	Only after succ. com	ıpl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
	ls of BI				chemistry (BIC). It discusses the ns of BIC in the fields of diagnosis		
Intende	ed lear	ning outcomes					
		able to describe the princ us enzymes and describe			xplain the structure and effects medicine.		
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)			
S (3) Module	taugh	t in: German or English					
		sessment (type, scope, langua le for bonus)	ge $-$ if other than German, ϵ	examination offered — if no	ot every semester, information on whether		
b) oral c) portf	examir olio (a _l	mination (approx. 45 to 9 nation of one candidate e oprox. 30 hours total) ssessment: German and,	ach (20 to 30 minute	s) or			
Allocat	ion of p	olaces					
Additional information							
-							
Workload							
150 h							
Teaching cycle							
Referre	d to in	LPO I (examination regulations	s for teaching-degree progra	mmes)			



		11.34		83 %, < 7.7 "	aster's with 1 major, 120 ECIS credits
Module	title				Abbreviation
Organo	o- and I	Biocatalysis			08-HKM1-152-m01
Module	coord	inator		Module offered b	у
lecture	r of the	seminar "Organo- and	Biokatalyse"	Faculty of Chemis	stry and Pharmacy
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisite	s	
1 seme	ster	graduate			
Conten	ts		,		
process	ses. Or plicatio	ganocatalysis: enantio	selective implementat	ion, principles, gre	npounds and enzymes in catalytic en chemistry, substance classes pects, especially regarding organic
Intende	ed lear	ning 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 (3)					
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)					

a) written examination (approx. 45 to 90 minutes) or

- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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



Modul	e title			Abbreviation		
Modern Aspects of Biological Chemistry					08-0CM-BIO-242-m01	
Modul	e coord	inator		Module offered by		
lecturer of the seminar "Modern Aspects of Biological Chemistry"			spects of Biological Che-	Institute of Organic Chemistry		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester graduate						
Contents						

The course deals with advanced topics of biological chemistry that build on fundamental knowledge of organic chemistry, bioorganic chemistry, biochemistry and molecular biology. Key concepts in the course cover the chemistry of the genetic code, and methods to analyse and interfere with gene expression and secondary metabolism. We will cover genetic code expansion, including unnatural base pairs and unnatural amino acids, including their chemical synthesis and enzymatic incorporation. We will also cover combinatorial synthesis methods and directed evolution and display technologies. This includes in vitro selection and in vitro evolution of functional nucleic acids (aptamers, ribozymes, deoxyribozymes), mRNA display, phage display, directed evolution of proteins/enzymes, antibodies, nanobodies, sequencing methods, DNA/RNA origami and nanotechnology, as well as combinatorial polyketide synthesis and non-ribosomal peptide synthesis.

Intended learning outcomes

The students will have a detailed understanding of modern concepts in functional nucleic acids and engineered proteins, including their synthesis and analysis. They will be able to discuss a wide variety of relevant methods and explain chemical relationships at the molecular level with biochemical/biotechnological questions and apply them to corresponding problems. The students will be able to critically examine information and new developments in the field of biological chemistry.

 $\textbf{Courses} \ (\text{type, number of weekly contact hours, language} - \text{if other than German})$

S (3)

Module taught in: German or English

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

- a) written examination (approx. 45 to 90 minutes) or
- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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



Module title					Abbreviation	
Modern Drug Research 1: Basics and Drug Design					08-MCM3-242-m01	
Module coordinator				Module offered by	,	
lecture	rs of Ph	narmaceutical Chem	nistry	Institute of Pharma	Institute of Pharmacy and Food Chemistry	
ECTS	Meth	od of grading	Only after succ. co	ompl. of module(s)		
5	nume	rical grade				
Duration Module level Other pro		Other prerequisit	es			
1 semester graduate						
Contor	nte	•	•			

Fundamentals: Phases of drug development, principles of drug action, pharmacokinetics and biotransformation; strategies of drug discovery, drug targets, chemical space of drug discovery, protein-ligand interactions, structure-activity-relationships (SAR), bioisosterism, prodrug strategies.

Experimental methods: binding assays, enzymatic assays, biophysical methods, high-throughput-screening (HTS).

Theoretical methods and drug design: virtual screening, ligand-based methods, QSAR, pharmacophore models, structure-based drug design, docking, simulation methods, machine learning (AI).

Case studies (drug discovery, design and optimization)

Intended learning outcomes

The students master the fundamentals of drug development, the strategies of drug discovery and the applied theoretical and experimental methods. They can understand and critically question the essential content of current scientifc publications in drug research. They are able to carry out a basic virtual screen and to evaluate its results.

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

 $S(2) + \ddot{U}(1)$

Module taught in: German or English

 $\textbf{Method of assessment} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language}) \ (\textbf{type}, \textbf{language}) \$ module is creditable for bonus)

- a) presentation (approx. 30 minutes) or
- b) written examination (approx. 45 to 90 minutes)

Language of assessment: German and/or English

Allocation of places

22 places.

- 16 places for students of the Master's degree programme Chemie (Chemistry): Places will be allocated according to the same number of subject semesters; students who have chosen Medizinische Chemie (Medicinal Chemistry) as their focus will be given preferential consideration.
- 6 places for students of the Master's degree programme Biochemie (Biochemistry): Places will be allocated according to the number of subject semesters; among applicants with the same number of subject semesters, places will be allocated by lot.
- 2 places for students of the Master's degree programme MINT-Lehramt PLUS: Places will be allocated according to the number of subject semesters; among applicants with the same number of subject semesters, places will be allocated by lot; a waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

Workload

150 h

Teaching cycle

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



Module	e title				Abbreviation	
Clinica	l-analy	tical Chemistry			08-PH-KAC-152-m01	
Module	e coord	linator		Module offered by		
		ture "Klinisch-analytisch l Chemistry)	e Chemie" (Clinical	Institute of Pharma	cy and Food Chemistry	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
This mo	odule d	discusses advanced topic	s in clinical analytica	al chemistry.		
Intende	ed lear	ning outcomes				
Studen	ts hav	e developed an advanced	knowledge of molec	cular biology.		
Course	S (type, i	number of weekly contact hours,	language — if other than Ge	rman)		
V (3)						
		sessment (type, scope, langua ble for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether	
written	exami	nation (approx. 120 minu	ites)			
Allocat	ion of	places				
-						
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						



Functional Materials

(25 or 30 ECTS credits)



Compulsory Courses

(20 ECTS credits)



Modul	e title			Abbreviation		
Lab Co	urse M	aterial Science			08-FMM-MP-161-m01	
Modul	e coord	inator		Module offered by		
	rs spec Materi	ialisation subject Funktionals)	onsmaterialien (Fun-	Chair of Chemical T	echnology of Material Synthesis	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	(not)	successfully completed				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts					
Ten se	lected e	experiments in materials	science.			
Intend	ed lear	ning outcomes				
Studer	nts have	e developed an advanced	proficiency in the pe	erformance of experi	ments in materials science.	
Course	es (type, r	number of weekly contact hours,	anguage — if other than Ger	rman)		
P (8)						
		sessment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
pages	each) a	ichtestate (pre and post- ind assessment of practions issessment: German and	cal performance (2 to		minutes each, log approx. 5 to 10 ions)	
Allocat	tion of _I	olaces				
	,					
Additio	onal inf	ormation				
Workload						
150 h						
Teaching cycle						
<u></u>						
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)		
						



Modul	e title	·		Abbreviation			
Project	t Work				08-FMM-PA-161-m01		
Modul	e coord	inator		Module offered by			
head o	f the re	search group offering the	module	Chair of Chemical T	echnology of Material Synthesis		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	(not)	successfully completed					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	graduate					
Conter	ıts		,				
	_	ives students the opport findings.	unity to explore a res	earch topic under th	e guidance of a supervisor and to		
Intend	ed learı	ning outcomes					
Studer	its have	e developed an advanced	proficiency in the pe	erformance of experi	ments in materials science.		
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)			
P (10)							
		sessment (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
		5 pages) and talk (appro ssessment: German and					
Allocat	tion of p	olaces					
Additio	onal inf	ormation					
Workload							
150 h							
Teaching cycle							
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	immes)			
	_						



Module	e title				Abbreviation	
Organi	c Funct	ional Materials			08-OCM-FM-161-m01	
Module	e coord	inator		Module offered I	by	
lecture	r of the	seminar "Organische Fu	nktionsmaterialien"	Institute of Orga	nic Chemistry	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
sical ef	fects ir nents s	n organic molecular and p	oolymeric semicondu	ctors as well as th	cus is on fundamental (photo)phy- neir application in (opto)electronic organic solar cells as well as in non-	
Intende	ed lear	ning 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 (3)						

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

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

Language of assessment: German and/or English

Allocation of places

Additional information

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Workload

150 h

Teaching cycle

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



Module title Abbreviation							
Polym	er Chen	nistry 1 (Lecture and Prac	tical Course)		03-FU-PM1-152-m01		
Modul	le coord	inator		Module offered by			
holde: Dentis		Chair of Functional Mater	ials in Medicine and	Faculty of Medicine	2		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Durati	on	Module level	Other prerequisites				
1 sem	ester	undergraduate					
Conte	nts						
radica	l polym		on of polymers and p		onic polymerisations, controlled el permeation chromatography,		
Intend	led lear	ning outcomes					
The st	udents	acquire fundamentals of	polymer chemistry ar	nd the related metho	ods for their characterisation.		
Cours	es (type, ı	number of weekly contact hours,	language — if other than Ger	rman)			
V (2) +	P (2)						
		sessment (type, scope, langua ole for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether		
each, Langu Asses	log app age of a	rox. 5 to 10 pages each) a ssessment: German and ffered: Once a year, sum	and assessment of pr /or English		ation talks approx. 15 minutes (2 to 4 random examinations)		
Alloca	tion of	places	,				
Additi	onal inf	ormation					
Workload							
150 h							
Teaching cycle							
Referr	ed to in	LPO I (examination regulation	s for teaching-degree progra	ımmes)			



Compulsory Electives

(5 or 10 ECTS credits)



Module title	Abbreviation	
Material Science 1 (Basic introduction)	08-FU-MaWi1-212-m01	

Module coordinator	Module offered by
holder of the Chair of Chemical Technology of Material Syn-	Chair of Chemical Technology of Material Synthesis
thesis	,

L				
	ECTS Method of grading		od of grading	Only after succ. compl. of module(s)
	5 numerical grade		rical grade	-
Ī	Duration Module level		Module level	Other prerequisites
	2 seme	ster	undergraduate	

Contents

Part A Structure of materials

The students learn about the atomic structure of solid materials.

Part B Metallic Materials

The students learn about the structure of metallic materials as well as their mechanical properties including deformation and failure mechanism as well as the analysis of mechanical properties. In addition, the corrosion and corrosion protection of metallic materials is introduced.

Part C Numerical Methods

The students are introduced to numerical methods like finite element methods (FEM) and Monte-Carlo-Simulation.

Intended learning outcomes

The students know the structure of solids, thermodynamic properties like enthalpy and entropy, the laws of diffusion and lattice defects. They are familiar with deformation and corrosion mechanisms in metals. The students acquire knowledge about thermodynamic of solids. They understand phase transitions, alloys and phase separation of metals. The students can explain the deformation as well as hardening due to dislocations of metals. The students can apply FEM to simple problems and perform simulations based on the Monte-Carlo-method.

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

 $V(2) + \ddot{U}(1) + V(2)$

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

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

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$

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	reg. data record Master (120 ECTS) Chemie - 2026	



Modul	e title				Abbreviation
Material Science 2 (The Material Groups)				08-FU-MaWi2-152-m01	
Module coordinator				Module offered by	
holder of the Chair of Chemical Technology of Material Sy		ology of Material Syn-	Chair of Chemical T	Fechnology of Material Synthesis	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	erical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	undergraduate			
Conter	nts		-		
mics; §	glass. P ed lear	Polymer materials: therm rning outcomes	oplasts, duromers, el	astomers. Composite	e properties of functional cera- e materials. main material groups and are able
		knowledge to research p			
Course	es (type,	number of weekly contact hours,	language — if other than Ge	rman)	
V (3) +	Ü (1)				
		sessment (type, scope, languble for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether
b) oral c) oral d) log e) pres	examii examir (approx sentatic	mination (approx. 90 to nation of one candidate on nation in groups of up to k. 20 pages) or on (approx. 30 minutes) assessment: German and	each (20 to 30 minute 3 candidates (approx		didate) or
Alloca	tion of	places			
Additio	onal inf	formation			

Workload

150 h

Teaching cycle



NA - d l - 4:41 -				Abbanistica
Module title				Abbreviation
Chemically and bio-inspired Nanotechnology for Material S			syntnesis	08-FU-NT-152-m01
Module coo	dinator		Module offered by	
degree prog tional Matrie	ramme coordinator Funkt erials)	ionswerkstoffe (Func-	Chair of Chemical 1	Fechnology of Material Synthesis
ECTS Met	hod of grading	Only after succ. con	npl. of module(s)	
5 num	erical grade			
Duration	Module level	Other prerequisites		
ı semester	undergraduate			
Contents				
ted material				tion and applications of the crea- materials, introduction to bio-in-
Intended lea	rning outcomes			
Students ha	ve developed a sound kn	owledge of sol-gel che	mistry and biomine	ralisation.
Courses (type	, number of weekly contact hours	, language — if other than Ger	rman)	
V (4)				
Method of a module is credit		uage — if other than German,	examination offered — if no	ot every semester, information on whether
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English				
Allocation o	f places			
Additional i	nformation			
Workload				
150 h				
Teaching cy	cle			



Module title					Abbreviation
Molecular Materials (Lecture)					08-FU-MoMaV-152-m01
Module coordinator				Module offered by	<u>'</u>
degree programme coordinator Funktionswerkstoffe (Functional Matrierials)		Chair of Chemical	Technology of Material Synthesis		
ECTS			npl. of module(s)		
5	nume	rical grade			
Durati	on	Module level	Other prerequisites	•	
1 seme	ester	undergraduate			
Conter	nts				
	cal bon thin filr		ctions, supramolecula	ar chemistry, molec	ular materials, colloids, nanopar-
Intend	ed lear	ning outcomes			
			e properties of moleci	ular materials. They	arious inter and intramolecular in- r have learned how to familiarise
thems feedba	elves w ack.	ith a topic in the field, d	e properties of moleco leliver a presentation of	ular materials. They on that topic, discu	
thems feedba	elves w ack. es (type, r		e properties of moleco leliver a presentation of	ular materials. They on that topic, discu	have learned how to familiarise
thems feedba Course V (3) + Metho	elves wack. es (type, r S (1) ed of ass	ith a topic in the field, d	e properties of molect leliver a presentation of , language — if other than Ge	ular materials. They on that topic, discu	have learned how to familiarise
thems feedba Course V (3) + Metho module i [a) writ tes) or 20 pag Langua	elves wack. es (type, r S (1) ed of ass is creditab tten exa c) oral ges) or e	number of weekly contact hours sessment (type, scope, languate for bonus) amination (approx. 90 to examination in groups of examination (approx. sessessment: German and	le properties of molecule liver a presentation of the live	ular materials. They on that topic, discu rman) examination offered — if ral examination of c approx. 15 minutes	not every semester, information on whether one candidate each (20 to 30 minuper candidate) or d) log (approx.
thems feedbar Course V (3) + Metho module in tes) or 20 page Langua credita	elves wack. es (type, r S (1) d of assistreditable tten exact c) oral ges) or eage of a	number of weekly contact hours sessment (type, scope, languate for bonus) amination (approx. 90 to examination in groups of presentation (approx. 90 to examination)	le properties of molecule liver a presentation of the live	ular materials. They on that topic, discu rman) examination offered — if ral examination of c approx. 15 minutes	not every semester, information on whether one candidate each (20 to 30 minuper candidate) or d) log (approx.
thems feedbar Course V (3) + Metho module in tes) or 20 page Langua credita	elves wack. es (type, r S (1) d of assisted the tenexate) c) or all ges) or a ges of a ges	number of weekly contact hours sessment (type, scope, languate for bonus) amination (approx. 90 to examination in groups of presentation (approx. 90 to examination)	le properties of molecule liver a presentation of the live	ular materials. They on that topic, discu rman) examination offered — if ral examination of c approx. 15 minutes	not every semester, information on whether one candidate each (20 to 30 minuper candidate) or d) log (approx.
thems feedback Course V (3) + Metho module in test or 20 page Langua credita Allocate	elves wack. es (type, r S (1) d of assisted the tenexate) or all ges) or all able for tion of p	number of weekly contact hours sessment (type, scope, languate for bonus) amination (approx. 90 to examination in groups of presentation (approx. 90 to examination)	le properties of molecule liver a presentation of the live	ular materials. They on that topic, discu rman) examination offered — if ral examination of c approx. 15 minutes	not every semester, information on whether one candidate each (20 to 30 minu per candidate) or d) log (approx.
thems feedback Course V (3) + Metho module in test or 20 page Langua credita Allocate	elves wack. es (type, r S (1) d of assisted the tenexate) c) or all ges) or a ges of a ges	number of weekly contact hours sessment (type, scope, languate for bonus) amination (approx. 90 to examination in groups of presentation (approx. ssessment: German and bonus)	le properties of molecule liver a presentation of the live	ular materials. They on that topic, discu rman) examination offered — if ral examination of c approx. 15 minutes	not every semester, information on whether one candidate each (20 to 30 minu per candidate) or d) log (approx.
thems feedback Course V (3) + Metho module in test or 20 page Langua credita Allocate	elves wack. es (type, r S (1) d of assis creditable tten exacc) oral ges) or eage of a able for tion of p	number of weekly contact hours sessment (type, scope, languate for bonus) amination (approx. 90 to examination in groups of presentation (approx. ssessment: German and bonus)	le properties of molecule liver a presentation of the live	ular materials. They on that topic, discu rman) examination offered — if ral examination of c approx. 15 minutes	not every semester, information on whether one candidate each (20 to 30 minu per candidate) or d) log (approx.
thems feedbar Course V (3) + Metho module is [a) writtes) or 20 pag Langua credita Allocata Addition Course feedbar Cour	elves wack. es (type, r S (1) d of assis creditable tten exacc) oral ges) or eage of a able for tion of p	number of weekly contact hours sessment (type, scope, languate for bonus) amination (approx. 90 to examination in groups of presentation (approx. ssessment: German and bonus)	le properties of molecule liver a presentation of the live	ular materials. They on that topic, discu rman) examination offered — if ral examination of c approx. 15 minutes	not every semester, information on whether one candidate each (20 to 30 minuper candidate) or d) log (approx.



Module	title			Abbreviation
Polymer	rs II			03-FU-PM2-222-m01
Module	coordinator		Module offered by	
holder of the Chair of Functional Materials in Medicine a Dentistry			Chair of Chemical T	echnology of Material Synthesis
ECTS	r F		npl. of module(s)	
5	numerical grade			
Duration	n Module level	Other prerequisites	i	
1 semes	ter graduate			
Content	s			
Basics a		edge about contemporary	issues of polymer sy	ynthesis, -modification and cha-
Intende	d learning outcomes			
The stuc	lent has advanced knowled	dge of the synthesis, mod	dification and charac	terization of polymers.
Courses	(type, number of weekly contact ho	ours, language — if other than Ger	rman)	
V (2) + P	(2)			
	of assessment (type, scope, lacreditable for bonus)	anguage — if other than German,	examination offered — if no	t every semester, information on whether
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) talk (approx. 30 minutes) Language of assessment: German and/or English Assessment offered: Once a year, winter semester creditable for bonus				
Allocation	on of places			
Additior	al information			
Workloa	d			
150 h				
Teaching cycle				
	I to in LPO I (examination regul			



Module	title				Abbreviation
Nano4l	Med				03-FU-DDEL-222-m01
Module coordinator				Module offered by	
holder of the Chair of Functional Materials in Medicine and Dentistry			aterials in Medicine and	Chair of Chemical	Technology of Material Synthesis
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites	i	
1 seme	ster				
Conten	ts				
			active substances into p release of active ingredie		ctionalization of the particle sy-
Intende	ed lear	ning outcomes			
			active substances into p release of active ingredie		ctionalization of the particle sy-
Course	S (type, r	number of weekly contact ho	ours, language — if other than Ge	rman)	
V (1) + I	Ü (1)				
		sessment (type, scope, la ble for bonus)	anguage — if other than German,	examination offered — if n	ot every semester, information on whether
report o	on tech x. 90 m		. 10 pages) and b) preser		oractical course / project report / ninutes) or written examination
Allocat	ion of _l	olaces			
	,				
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	е			
Referre	d to in	LPO I (examination regul	ations for teaching-degree progra	ammes)	



Modul	Module title				Abbreviation
Biopolymers					03-BIOPOL-222-m01
Module coordinator				Module offered by	I.
holder	of the	Chair of Macromolecular	Chemistry	Faculty of Medicine	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ester				
Conter	nts		•		
which	are inci	dition, novel macromoled reasingly used as sustain ning outcomes			rived from bio-based feedstocks,
The stu	ıdent w				olecules, their production, functi
Course	es (type, r	number of weekly contact hours,	language — if other than Ge	rman)	
	Ü (1) + e taugh	P (1) t in: V, Ü: English			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)					
b) oral	examir	mination (approx. 90 mir nation of one candidate e x. 30 minutes)		es) or	

c) talk (approx. 30 minutes)

Language of assessment: English

Allocation of places

Additional information

Workload

150 h

Teaching cycle

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



Module	title				Abbreviation	
Nanosc	ale Ma	iterials			08-PCM3-161-m01	
Module	coord	inator		Module offered by		
lecturer of the seminar "Nanoskalige Materialien"			Materialien"	Institute of Physica	al and Theoretical Chemistry	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
		liscusses advanced top			ne structure, properties, fabricatirials.	
Intende	ed lear	ning outcomes				
		able to characterise nar	noscale materials. They	are able to name a	nalytical methods and applicati-	
Course	S (type, r	number of weekly contact hours	s, language — if other than Ge	rman)		
S (2) + Module		t in: German or English				
		sessment (type, scope, lang ole for bonus)	uage — if other than German,	examination offered — if no	ot every semester, information on whether	
b) oral c) talk (examir (approx ge of a	mination (approx. 90 m nation of one candidate k. 30 minutes) ssessment: German an bonus	each (approx. 20 min	utes) or		
Allocat	ion of _I	places				
Additio	nal inf	ormation				
Workload						
150 h						
Teaching cycle						
Referre	d to in	LPO I (examination regulation	ons for teaching-degree progra	ımmes)		



O MEYOUR SINIC		ster 3 with 1 major, 120 LC13 credits		
Module title				
		08-SCM1-161-m01		
	Module offered by			
ar Chemistry (Ba-	Institute of Organic	: Chemistry		
Only after succ. con	npl. of module(s)			
Other prerequisites	i			
recognition by receptorystals, self-assemb	tors, complexes, su	pramolecular polymers, coordi-		
on, structure and pol [,] s in aqueous media a	ymers of coordinations well as to identify	on compounds. They are able to the characteristics of synthetic		
language — if other than Ge	rman)			
age — if other than German,	examination offered — if no	ot every semester, information on whether		
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (approx. 20 minutes) Language of assessment: German and/or English				
Allocation of places				
Additional information				
Workload				
	e fundamental principar recognition by receptorystals, self-assemble hemistry. In setween molecule on, structure and poles in aqueous media applications of suprallanguage — if other than Geman, and the second contact of	Only after succ. compl. of module(s) Other prerequisites e fundamental principles of supramolecular recognition by receptors, complexes, supercystals, self-assembly in aqueous media hemistry. In sheween molecules demonstrating a hon, structure and polymers of coordinations in aqueous media as well as to identify applications of supramolecular chemistry language — if other than German) The provided Herman (seman) The provided Herman (seman)		

150 h

Teaching cycle



Modul	e title				Abbreviation
Solid state chemistry and inorganic materials					08-ACM3-161-m01
Module coordinator				Module offered by	
lecturer of seminar "Festkörperchemie and Anorganische Materialien" (Solid State Chemistry and Inorganic Materials)				Institute of Inorganic Chemistry	
ECTS	ECTS Method of grading		Only after succ. con	ly after succ. compl. of module(s)	
5	numerical grade				
Duration		Module level	Other prerequisites	ther 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 (3)					
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)					
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English					
Allocation of places					
Additional information					
Workload					
150 h					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					



Module title Abbreviation					Abbreviation		
Basics and Applications of Quantum Chemistry 08-TCM2-16				08-TCM2-161-m01			
Module coordinator Module offered			Module offered by	,			
lecture	r of lect	ture "Computational Che	mistry"	Institute of Physica	l and Theoretical Chemistry		
ECTS	Metho	od of grading	Only after succ. com	ipl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
This m	odule ir	ntroduces students to the	fundamental princip	oles of computationa	al chemistry.		
Intend	ed lear	ning outcomes					
		able to explain the theore	tical principles of co	mputational chemist	try and to apply methods in com-		
Course	S (type, r	umber of weekly contact hours, l	anguage — if other than Ger	man)			
S (2) +	Ü (2)						
		sessment (type, scope, langua le for bonus)	ge — if other than German, ϵ	examination offered — if no	ot every semester, information on whether		
b) oral c) oral d) log (e) pres	examir examin approx entatio	mination (approx. 90 to 1 ation of one candidate e ation in groups of up to 3 . 20 pages) or n (approx. 30 minutes) ssessment: German and,	ach (20 to 30 minute 3 candidates (approx.		didate) or		
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	Workload						
150 h							
Teachi	ng cycl	e					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						

Homogeneous Catalysis

(25 or 30 ECTS credits)



Compulsory Courses

(20 ECTS credits)



moaul	title				Abbreviation	
Organo	o- and I	Biocatalysis			08-HKM1-152-m01	
Modul	coord	linator		Module offered	by	
lecture	r of the	e seminar "Organo- a	nd Biokatalyse"	Faculty of Chem	istry and Pharmacy	
ECTS	Meth	od of grading	Only after succ.	compl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisi	Other prerequisites		
1 seme	ster	graduate				
Conter	ts					
proces	ses. Or plication	ganocatalysis: enant	ioselective implemen	tation, principles, gr	ompounds and enzymes in catalytic reen chemistry, substance classes spects, especially regarding organic	
Intend	ed lear	ning 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.						
and an	Courses (type, number of weekly contact hours, language — if other than German)					
_	5 (type,					

a) written examination (approx. 45 to 90 minutes) or

- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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



Module	title	,	Abbreviation				
Advanced organometallic chemistry and its application in homogeneous cata-					08-HKM2-161-m01		
lysis	lysis						
Module	coord	inator		Module offered by			
		seminar "Spezielle Meta vendung in der Homogen		Institute of Inorgan	ic Chemistry		
ECTS		od of grading	Only after succ. con	nnl of module(s)			
5		rical grade		ipa or module(s)			
Duratio		Module level	Other prerequisites				
1 semes	ster	graduate					
Conten	ts						
This mo	odule e	xamines elementary orga	anic compounds of tr	ansition metals with	homogeneous catalytic applica-		
Intende	ed learr	ning outcomes					
1		•		•	nentary organic compounds. They neous catalysis reactions.		
Courses	S (type, n	umber of weekly contact hours, l	anguage — if other than Ger	man)	·		
S (3) Module	taugh	t in: German or English					
		eessment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	t every semester, information on whether		
b) oral of c) oral of d) log (a) e) preso	examin examin approx entatio	mination (approx. 90 to 1 ation of one candidate e ation in groups of up to 3 . 20 pages) or n (approx. 30 minutes) ssessment: German and,	ach (20 to 30 minute candidates (approx	= -	didate) or		
Allocati	ion of p	olaces					
Additio	nal info	ormation					
Worklo	Workload						
150 h	150 h						
Teachir	Teaching cycle						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						



Module title Abbreviation					
Practic	al cour	se "Homogeneous cataly	sis in Inorganic Cher	mistry"	08-HKM3AC-161-m01
Module	e coord	inator		Module offered by	
		seminar "Spezielle Meta wendung in der Homoger		Institute of Inorgan	ic Chemistry
ECTS	Metho	od of grading	Only after succ. com	npl. of module(s)	
5	(not)	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	its				
thods i and cry	n homo /stallog	ogeneous catalysis. The f	ocus will be on cataly expected to conduct t	st synthesis and ch	synthesis and analytical mearacterisation, spectral analysis independently, write a lab report
Intend	ed learı	ning outcomes			
					eneous catalysis in the lab and to dings and deliver a presentation.
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)	
P (6) Module	e taugh	t in: German or English			
Metho	d of ass		ge — if other than German, e	examination offered — if no	ot every semester, information on whether
	•	tical course (approx. 10 p ssessment: German and	-	ox. 15 minutes)	
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
	_				
Workload					
150 h					
Teaching cycle					
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	



Module title Abbreviation					
Practic	al cour	se "Homogeneous cataly	sis in Organic Chemi	istry"	08-HKM3OC-161-m01
Module	e coord	inator		Module offered by	
		seminar "Spezielle Meta wendung in der Homoger		Institute of Organic	Chemistry
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)	
5	(not)	successfully completed			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ıts		,		
thods i	in homo /stallog	geneous catalysis. The f	ocus will be on cataly expected to conduct t	st synthesis and ch	synthesis and analytical mearacterisation, spectral analysis independently, write a lab report
Intend	ed learı	ning outcomes			
					eneous catalysis in the lab and to dings and deliver a presentation.
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)	
P (6) Module	e taugh	t in: German or English			
		sessment (type, scope, langua le for bonus)	ge — if other than German, e	examination offered — if no	ot every semester, information on whether
		tical course (approx. 10 p ssessment: German and		ox. 15 minutes)	
Allocat	tion of p	olaces			
	_,				
Additio	onal inf	ormation			
Worklo	ad				
150 h	150 h				
Teaching cycle					
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	mmes)	



Compulsory Electives

(5 or 10 ECTS credits)



Madula	Module title Abbreviation						

Advanc	ed trai	sition metal chemistry			08-HKM4-161-m01		
Module	coord	inator		Module offered by			
lecture	r of the	seminar "Spezielle Über	gangsmetallchemie"	Institute of Inorgan	ic Chemistry		
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
5	nume	rical grade					
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts		,				
nation	chemis				of transition metals and coordi- discusses recent developments		
Intende	ed lear	ning outcomes					
		able to explain transition field. They can explain th			nonstrating a high degree of exchemistry.		
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)			
S (3)							
			ge — if other than German, e	examination offered — if no	ot every semester, information on whether		
b) oral c) oral d) log (e) pres	a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English						
Allocat	ion of p	olaces					
Additional information							
Workload							
150 h	150 h						
Teachi	Teaching cycle						

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title					Abbreviation	
Sustaiı	nability	in chemistry			08-HKM5-262-m01	
Module	e coord	inator		Module offered by	,	
				Faculty of Chemistr	y and Pharmacy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster					
Conten	ts		,			
Intend	ed lear	ning outcomes				
Course	S (type, ı	number of weekly contact hours,	language — if other than Ger	man)		
S (2) +	Ü (1)					
Module	e taugh	t in: English				
Metho	d of as	sessment (type, scope, langu	age — if other than German,	examination offered — if no	ot every semester, information on whether	
module is	creditab	ole for bonus)	_			
		mination (approx. 45 to	90 minutes) or			
		pprox. 40 hours total) ssessment: English				
Allocat						
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachi	Teaching cycle					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
		_				



Modul	e title				Abbreviation	
Statistical Mechanics and Reaction Dynamics					08-PCM2-161-m01	
AA - J1		· · · · · · · · · · · · · · · · · · ·		Mandada affanad baa		
	e coord		11 11 / 61 1 1 5	Module offered by		
lecture mics)	er of ser	ninar "Chemische Dynan	nik" (Chemical Dyna-	Institute of Physica	l and Theoretical Chemistry	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duration	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts					
clude t	the fund		atistical thermodynar		namics. Topics to be covered instate theory, uni- and bimolecular	
Intend	ed lear	ning outcomes				
		e become familiar with se re able to apply the fund			d reaction dynamics. They have ynamics.	
Course	es (type, r	number of weekly contact hours,	language — if other than Ge	man)		
S (2) +		t in: German or English				
			age — if other than German	evamination offered — if no	ot every semester, information on whether	
		le for bonus)	ige in other than definally	examination onered in he	stevery semester, information on whether	
b) oral c) talk	examir (approx	mination (approx. 90 mination of one candidate 6 (. 30 minutes) ssessment: German and	each (approx. 20 minu	utes) or		
Alloca	tion of p	olaces				
Additio	onal inf	ormation				
Worklo	oad					
150 h						
Teaching cycle						

 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes})}$



Module	e title				Abbreviation	
Moder	n Synth	netic Methods			08-OCM-SYNT-161-m01	
Module coordinator				Module offered by		
lecture	r of the	seminar		Institute of Organic	Chemistry	
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites	5		
1 seme	ster	graduate				
Conten	nts					
		liscusses modern steemistry and catalysis	•	nethods. It focuses o	n selected total syntheses, orga-	
Intend	ed lear	ning 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)						

 $S(2) + \ddot{U}(1)$

Module taught in: German or English

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

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

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title					Abbreviation	
Basics and Applications of Quantum Chemistry 08-TCM					08-TCM2-161-m01	
Module coordinator Module offered by					I.	
lecture	r of lec	ture "Computationa	l Chemistry"	Institute of Physica	l and Theoretical Chemistry	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites	;		
1 seme	ster	graduate				
Conten	its	,	`			
This m	odule i	ntroduces students	to the fundamental princi	ples of computation	al chemistry.	
Intend	ed lear	ning outcomes				
		able to explain the t	heoretical principles of co	mputational chemis	try and to apply methods in com-	
Course	S (type,	number of weekly contact h	nours, language — if other than Ge	rman)		
S (2) +	Ü (2)					
		sessment (type, scope, ble for bonus)	language $-$ if other than German,	examination offered — if no	ot every semester, information on whether	
b) oral c) oral d) log (e) pres	examiı examir (approx entatic	nation of one candid			didate) or	
Allocat	ion of	places				
Additio	nal inf	ormation				
Workload						
150 h	150 h					
Teaching cycle						
		le				



Module title					Abbreviation		
Polymer Chemistry 1 (Lecture and Practical Course)			tical Course)		03-FU-PM1-152-m01		
Modul	e coord	inator		Module offered by			
holder Dentis		Chair of Functional Mater	ials in Medicine and	Faculty of Medicine			
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Durati	on	Module level	Other prerequisites				
1 seme	ester	undergraduate					
Conte	ıts						
radica	l polym		on of polymers and p		onic polymerisations, controlled I permeation chromatography,		
Intend	ed lear	ning outcomes					
The stu	udents	acquire fundamentals of	polymer chemistry ar	nd the related metho	ods for their characterisation.		
Course	es (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)			
V (2) +	P (2)						
		sessment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether		
each, l Langua Assess	og app age of a	rox. 5 to 10 pages each) a ssessment: German and, ffered: Once a year, sum	and assessment of pr or English		ation talks approx. 15 minutes (2 to 4 random examinations)		
Alloca	tion of _I	olaces					
Addition	onal inf	ormation					
Workle	oad						
150 h	150 h						
Teachi	Teaching cycle						
Referre	ed to in	LPO I (examination regulations	s for teaching-degree progra	mmes)			



Medicinal Chemistry

(25 or 30 ECTS credits)



Compulsory Courses

(10 ECTS credits)



Module title			Abbreviation			
Practical course medicinal chemistry			08-MCM1-161-m01			
Module coordinator		Module offered by				
lecturers Pharmazeutische Chemie (Ph mistry)	armaceutical Che-	Institute of Pharma	cy and Food Chemistry			
ECTS Method of grading	Only after succ. con	npl. of module(s)				
10 (not) successfully completed						
Duration Module level	Other prerequisites					
1 semester graduate						
Contents						
Selected methods and topics in medici	nal chemistry (synth	esis, testing, analysi	is, theory, pharmacokinetics).			
Intended learning outcomes						
Students have developed a knowledge	of medicinal chemis	try and are able to a	pply it to practical experiments.			
Courses (type, number of weekly contact hours, l	anguage — if other than Ger	rman)				
P (10) Module taught in: German or English						
Method of assessment (type, scope, langua module is creditable for bonus)	ge — if other than German, (examination offered — if no	ot every semester, information on whether			
Vortestate/Nachtestate (pre and post-e pages each) and assessment of practic pages) Language of assessment: German and	al assignments (2 to					
Allocation of places						
Additional information						
Workload	Workload					
300 h						
Teaching cycle						
Referred to in LPO I (examination regulations for teaching-degree programmes)						



Compulsory Electives

(15 or 20 ECTS credits)



Module	Abbreviation Abbreviation				
Pharma	aceutic	al/Medicinal Chemistry	1		o8-MCM2a-161-mo1
Module coordinator				Module offered by	I.
lecture mistry)	rs Phar	mazeutische Chemie (Ph	armaceutical Che-	Institute of Pharma	ncy and Food Chemistry
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites	i	
1 seme	ster	graduate			
Conten	its				
structu in the r	re-activ	vity relationships; molect	ular effect mechanism thesis; biotransforma	ns; pharmacological	egies for active agent discovery; principles of the drugs discussed etics of individual drugs; history of
Intend	ed learı	ning outcomes			
Studen	its have	e developed a knowledge	of pharmaceutical/r	nedicinal chemistry.	
Course	S (type, r	number of weekly contact hours,	language — if other than Ge	rman)	
V (3)					
		sessment (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
b) oral c) oral d) log (e) pres	examir examin (approx entatio	mination (approx. 90 to a nation of one candidate of ation in groups of up to g . 20 pages) or n (approx. 30 minutes) ssessment: German and	ach (20 to 30 minute 3 candidates (approx		didate) or
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	e			
	-				
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	ımmes)	



Module	Module title Abbreviation				
Pharma	aceutic	al/Medicinal Chemistry 2	2		08-MCM2b-161-m01
Module	coord	inator		Module offered by	l.
lecture mistry)	rs Phar	mazeutische Chemie (Ph	armaceutical Che-	Institute of Pharma	cy and Food Chemistry
ECTS Method of grading Only after succ. compl. of module(s)					
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
structuing the n	re-activ nodule	vity relationships; molecu	ılar effect mechanisn thesis; biotransforma	ns; pharmacological	gies for active agent discovery; principles of the drugs discussed tics of individual drugs; history of
Intende	ed lear	ning outcomes			
Studen	ts have	e developed a knowledge	of pharmaceutical/r	nedicinal chemistry.	
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)	
V (3)					
		sessment (type, scope, langua ele for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
b) oral of oral oral oral oral oral oral oral oral	examir examin approx entatio	mination (approx. 90 to 1 nation of one candidate e nation in groups of up to 3 nation in groups of up to 3 nation and approx. 30 minutes) ssessment: German and	ach (20 to 30 minute candidates (approx		didate) or
Allocat	ion of p	olaces			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachir	ng cycl	e			
Referre	d to in	LPO I (examination regulations	for teaching-degree progra	mmes)	



Modul	e title		Abbreviation		
Moder	Modern Drug Research 1: Basics and Drug Design				08-MCM3-242-m01
Module coordinator				Module offered by	
lecture	ers of Ph	narmaceutical Chemistry		Institute of Pharmacy and Food Chemistry	
ECTS	Meth	od of grading	Only after succ. compl. of module(s)		
5 numerical grade					
Duratio	Duration Module level		Other prerequisites		
1 seme	1 semester graduate				
Contor	nt c				

Contents

Fundamentals: Phases of drug development, principles of drug action, pharmacokinetics and biotransformation; strategies of drug discovery, drug targets, chemical space of drug discovery, protein-ligand interactions, structure-activity-relationships (SAR), bioisosterism, prodrug strategies.

Experimental methods: binding assays, enzymatic assays, biophysical methods, high-throughput-screening (HTS).

Theoretical methods and drug design: virtual screening, ligand-based methods, QSAR, pharmacophore models, structure-based drug design, docking, simulation methods, machine learning (AI).

Case studies (drug discovery, design and optimization)

Intended learning outcomes

The students master the fundamentals of drug development, the strategies of drug discovery and the applied theoretical and experimental methods. They can understand and critically question the essential content of current scientifc publications in drug research. They are able to carry out a basic virtual screen and to evaluate its results.

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

 $S(2) + \ddot{U}(1)$

Module taught in: German or English

 $\textbf{Method of assessment} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language}) \ (\textbf{type}, \textbf{language}) \$ module is creditable for bonus)

- a) presentation (approx. 30 minutes) or
- b) written examination (approx. 45 to 90 minutes)

Language of assessment: German and/or English

Allocation of places

22 places.

- 16 places for students of the Master's degree programme Chemie (Chemistry): Places will be allocated according to the same number of subject semesters; students who have chosen Medizinische Chemie (Medicinal Chemistry) as their focus will be given preferential consideration.
- 6 places for students of the Master's degree programme Biochemie (Biochemistry): Places will be allocated according to the number of subject semesters; among applicants with the same number of subject semesters, places will be allocated by lot.
- 2 places for students of the Master's degree programme MINT-Lehramt PLUS: Places will be allocated according to the number of subject semesters; among applicants with the same number of subject semesters, places will be allocated by lot; a waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

Workload

150 h

Teaching cycle

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	reg. data record Master (120 ECTS) Chemie - 2026	



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



Modul	e title		Abbreviation			
Moder	Modern Drug Research 2: Technologies - Targets - Modaliti			les	08-MCM4-242-m01	
Module coordinator				Module offered by		
lecture	ers of Ph	narmaceutical Chemist	try	Institute of Pharmacy and Food Chemistry		
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)		
5	5 numerical grade					
Durati	Duration Module level		Other prerequisites			
1 seme	1 semester graduate					
<i>~</i> .						

Contents

- 1. DNA-encoded library technology for small molecule screening.
- 2. Phage display and chemical modification of peptides in display libraries.
- 3. Medicinal Chemistry in the Pharmaceutical Industry, case studies presented by invited external speakers.
- 4. Entrepreneurship in the life sciences: start-ups, biotech, and private equity.
- 5. Protein-protein interactions as drug targets and modalities to inhibit them.
- 6. How not to perform the art of Medicinal Chemistry: Dirty Drugs, PAINS, frequent hitters, and impurities from compound synthesis as confounders
- 7. Therapeutic nucleic acid drugs
- 8. Multi-target drugs
- 9. Pharmacokinetic aspects in drug development
- 10Modern strategies in drug delivery

Intended learning outcomes

The students acquire basic knowledge of the terminology of medicinal chemistry, technologies for drug identification; exemplary biologics (oligonucleotides, peptides), properties of protein-protein-interaction inhibitors, basic knowledge of the industrial pharmaceutical research process, including entrepreneurship aspects, as well as of the compound optimization cycles and can confidently apply this knowledge in solving Medicinal Chemistry-related tasks.

By successfully completing this module, students will be able to,

- explain the processes of pharmaceutical research and applications in industry.
- understand the underlying principles for the action of biological drugs.
- understand different technologies for drug identification.
- understand pharmacokinetic challenges to drug development.
- understand modern technologies for drug delivery.
- describe different strategies for protein-protein interaction inhibition and to draw conclusions about possible consequences of protein-protein interaction inhibition from chemical structural features.
- to develop interdisciplinary solution strategies for practical problems at the interface between chemistry, pharmacology and biophysics for basic research and biomedical applications.

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

S (2)

Module taught in: German or English

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

- a) written examination (approx. 45 to 90 minutes) or
- b) oral examination of one candidate each (20 to 30 minutes)

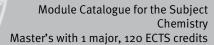
Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload
150 h
Teaching cycle
Referred to in LPO I (examination regulations for teaching-degree programmes)



Module	e title	,		Abbreviation		
Mass-Spectrometry and Proteomics					08-MBC-MSP-161-m01	
Module coordinator				Module offered by		
holder	of the	Chair of Biochemistry		Chair of Biochemistry		
ECTS	ECTS Method of grading		Only after succ. compl. of module(s)			
5	5 numerical grade					
Duratio	Duration Module level		Other prerequisites			
1 seme	1 semester graduate					
Conten	Contents					

This module comprises a lecture, a seminar and a lab course. The lecture discusses the fundamental principles of the mass spectrometry of biomolecules. Topics to be covered in the lecture include ESI and MALDI ionisation techniques as well as the operating principles of TOF, Orbitrap and other mass analysers. The lecture also provides an introduction to CID and ETD fragmentation techniques, peptide and protein separation methods as well as the analysis of mass spectrometric data (protein databases, FDR, GO terms, etc.). It gives an overview of quantitative proteomics with a special focus on different stable isotope quantification methods (e.g. SILAC, N15 labelling, iTRAQ) and provides an insight into the mass spectrometric analysis of post-translational modifications. The seminar covers the fundamental principles of the analysis of mass spectrometric data. It introduces students to different software packages and gives them the opportunity to independently develop solutions to a range of problems. In the lab course, students will use affinity purification to isolate a protein complex from yeast. They will then use 1D-SDS-PAGE to separate that complex and will proteolytically cleave it in the gel. Afterwards, students will use nano-LC-MS/MS to analyse the peptides thus obtained and will conduct a data analysis to identify specific interaction partners and post-translational modifications.

Intended learning outcomes

Students have learned the theoretical foundations of mass spectrometry protein and proteomic analysis. They have learned how to use proteomic data analysis software tools. Students have become proficient in the affinity purification of protein complexes and have learned the steps involved in the preparation of samples for mass spectrometry protein analysis, e.g. SDS-PAGE and in-gel digestion. They have gained an insight into how to operate a nanoHPLC-coupled mass spectrometer.

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

V(2) + S(1) + P(2)

Module taught in: German or English

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

- a) written examination (approx. 45 to 90 minutes) or
- b) log (20 to 30 pages) or
- c) oral examination of one candidate each (20 to 30 minutes) or
- d) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate) or
- e) presentation (20 to 40 minutes)

Language of assessment: German and/or English Assessment offered: Once a year, winter semester

Allocation of places

67 places.

Additional information

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Workload

150 h

Teaching cycle

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	reg. data record Master (120 ECTS) Chemie - 2026	



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



Module title					Abbreviation
Clinica	l-analy	tical Chemistry			08-PH-KAC-152-m01
Module	e coord	linator		Module offered by	
		ture "Klinisch-analytisch l Chemistry)	e Chemie" (Clinical	Institute of Pharma	cy and Food Chemistry
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
This mo	odule d	discusses advanced topic	s in clinical analytica	al chemistry.	
Intende	ed lear	ning outcomes			
Studen	ts hav	e developed an advanced	knowledge of molec	cular biology.	
Course	S (type, i	number of weekly contact hours,	language — if other than Ge	rman)	
V (3)					
		sessment (type, scope, langua ble for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether
written	exami	nation (approx. 120 minu	ites)		
Allocat	ion of	places			
-					
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachi	ng cycl	e			
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	ammes)	



Module title Abbreviation					
Moder	n Synth	netic Methods		08-OCM-SYNT-161-m01	
Modul	e coord	inator		Module offered by	
lecture	r of the	seminar		Institute of Organic Chemistry	
ECTS	Meth	od of grading	Only after succ. con	mpl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites	5	
1 seme	ester	graduate			
Conter	nts				
Studer They casis che Course S (2) +	ed lear ants are a an expl emistry. es (type, r	ain total syntheses. Th	ey can describe aspect	cal syntheses and to stereochemically analyse them. ts of organometallic chemistry and catalysis in synthe	
			,	examination offered — if not every semester, information on whether	
		le for bonus)			
	examir		e each (20 to 30 minute	es) or k. 15 minutes per candidate) or	

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Additional information

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Workload

150 h

Teaching cycle

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



Module title					Abbreviation	
Moderi	1 Aspec	ts of Biological Ch	emistry		08-0CM-BIO-242-m01	
Module coordinator				Module offered by		
lecturer of the seminar "Modern Aspects of E mistry"			Aspects of Biological Che-	Institute of Organic	Chemistry	
ECTS	Metho	d of grading	Only after succ. con	npl. of module(s)		
5	numer	rical grade				
Duration Module level Other pre		Other prerequisites	3			
1 semester graduate						
Conten	ts					

The course deals with advanced topics of biological chemistry that build on fundamental knowledge of organic chemistry, bioorganic chemistry, biochemistry and molecular biology. Key concepts in the course cover the chemistry of the genetic code, and methods to analyse and interfere with gene expression and secondary metabolism. We will cover genetic code expansion, including unnatural base pairs and unnatural amino acids, including their chemical synthesis and enzymatic incorporation. We will also cover combinatorial synthesis methods and directed evolution and display technologies. This includes in vitro selection and in vitro evolution of functional nucleic acids (aptamers, ribozymes, deoxyribozymes), mRNA display, phage display, directed evolution of proteins/enzymes, antibodies, nanobodies, sequencing methods, DNA/RNA origami and nanotechnology, as well as combinatorial polyketide synthesis and non-ribosomal peptide synthesis.

Intended learning outcomes

The students will have a detailed understanding of modern concepts in functional nucleic acids and engineered proteins, including their synthesis and analysis. They will be able to discuss a wide variety of relevant methods and explain chemical relationships at the molecular level with biochemical/biotechnological questions and apply them to corresponding problems. The students will be able to critically examine information and new developments in the field of biological chemistry.

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

S (3)

Module taught in: German or English

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

- a) written examination (approx. 45 to 90 minutes) or
- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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



Module title					Abbreviation	
Bioinorganic Chemistry 08-ACM2-242-mo1					08-ACM2-242-m01	
Module coordinator				Module offered by		
lecturer of the seminar "Bioinorganic Chemistry"			hemistry"	Institute of Inorgan	ic Chemistry	
ECTS	T T					
5	nume	rical grade				
<u> </u>		Other prerequisites				
1 seme	ster	graduate				
Conten	ts					
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.						
Intende	ed lear	ning 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.						
Course	S (type, i	number of weekly contact hours, l	anguage — if other than Gei	rman)		
S (3) Module	e taugh	t in: German or English				
		sessment (type, scope, langua ble for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
a) written examination (approx. 45 to 90 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) portfolio (approx. 30 hours total) Language of assessment: German and/or English						
Allocation of places						
Additional information						
Workload						
150 h						
Teaching cycle						

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title				Abbreviation	
Molecular Biology					08-BC-MOL-222-m01
Module coordinator				Module offered by	
holder of the Chair of Biochemistry				Chair of Biochemistry	
ECTS	Meth	Method of grading Only after succ. con		npl. of module(s)	
5	nume	rical grade			
Duration Module level		Module level	Other prerequisites		
1 semester		undergraduate			
Contents					
The module covers specific topics of molecular physiology and functional biochemistry in lectures and exercices.					
Intended learning outcomes					

After attending the module events, students have sound knowledge in molecular biology.

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

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Module taught in: German

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

- a) written examination (approx. 45 to 90 minutes) or
- b) log (10 to 20 pages) or
- c) oral examination of one candidate each (20 to 30 minutes) or
- d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or
- e) presentation (20 to 30 minutes) or
- f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

Teaching cycle: Once a year, summer semester

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title				Abbreviation	
Research Internship Biochemistry for Master Chemistry					08-BC-FPMC-242-m01
Modul	e coord	linator		Module offered by	
focus point coordinator "Biochemistry"			ı	Chair of Biochemistry	
ECTS	Meth	od of grading	Only after succ. con	ıpl. of module(s)	
10	(not)	successfully completed	o8-BC-MOLP		
Duration Module level		Module level	Other prerequisites		
1 semester		graduate			
Conter	nts				
Thic la	h cour	ea is based in a biashami	ctry and for molecula	r hiology rocoarch gr	oup at the University of Würz

This lab course is based in a biochemistry and/or molecular biology research group at the University of Würzburg. Please consult with the competent coordinator in advance regarding contents to be covered. The course

gives students the opportunity to actively engage with methods in biochemistry and/or molecular biology. Students will be expected to write a lab report documenting their experiments and findings.

Intended learning outcomes

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

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

P (10)

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

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

Allocation of places

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Additional information

Additional information on module duration: block taught lab course with approx. 40 working days.

Workload

300 h

Teaching cycle

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



Supramolecular Chemistry

(25 or 30 ECTS credits)

Compulsory Courses

(10 ECTS credits)



Module title					Abbreviation	
Supramolecular Chemistry (Basics)					08-SCM1-161-m01	
Module	e coord	inator		Module offered by		
lecturer of the seminar "Supramolecular Chemistry (Basics)"			ar Chemistry (Ba-	Institute of Organic Chemistry		
ECTS	TS Method of grading Only after succ. com		npl. of module(s)			
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites	5		
1 seme	ster	graduate				
Conten	ts					
nation 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 (3) Module taught in: German or English						
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 (approx. 20 minutes) Language of assessment: German and/or English						
Allocat	ion of p	olaces				

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Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title Supramolecular Chemistry (Practical Course)				Abbreviation		
					08-SCM2-242-m01	
Module coordinator				Module offered by	Į.	
lecturer of the seminar "Supramolecular Chemistry (sics)"			ar Chemistry (Ba-	Institute of Organic Chemistry		
ECTS	Meth	od of grading	Only after succ. compl. of module(s)			
5	(not)	successfully completed				
Durati	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conte	nts		-			
mistry	. They w		host-guest complexe		ents in supramolecular che- nd nanoparticles and use advan-	
Intend	ed lear	ning outcomes				
		able to perform synthese hem. They are able to pro			roscopic methods to analyse and hem microscopically.	
Course	es (type, r	number of weekly contact hours,	language — if other than Ge	erman)		
P (6) Modul	e taugh	t in: German or English				
		sessment (type, scope, langua le for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether	
pages	each) a	chtestate (pre and post- nd assessment of practions ssessment: German and	cal performance (2 to		minutes each, log approx. 5 to 10 ions)	
Allocation of places						
Additi	onal inf	ormation				
						
Workload						
150 h						
Teachi	ng cycl	e				
						

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



Compulsory Electives

(15 or 20 ECTS credits)



Module title Abbreviatio				Abbreviation		
Bioorganic Chemistry					08-SCM3-152-m01	
Modul	e coord	inator		Module offered by		
lecturer of lecture "Bioorganische Chemie" (Bioorganic Chemistry)			mie" (Bioorganic	Institute of Organic Chemistry		
ECTS	Meth	od of grading	Only after succ. compl. of module(s)			
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites	5		
1 seme	ster	graduate				
Conten	ıts		•			
Bioorganic chemistry unites the central questions of organic chemistry, biochemistry, medicinal chemistry and spectroscopy with a focus on biomolecules. At the core of bioorganic chemistry is the synthesis and purposeful manipulation of biomolecules, such as nucleic acids, peptides, proteins, carbohydrates and lipids. This includes the framework of structure-function relationships and the fundamental understanding of biological mechanisms, to enable applications towards biomaterials, biosensing, bioimaging, clinical diagnostics and therapeutics.						

Key concepts covered in the course are nucleic acid chemistry, peptide chemistry, carbohydrate chemistry, bioorthogonal reactions, molecular diversity, solid-phase synthesis, molecular recognition and interactions (ligand-receptor interactions, signal transduction)

Intended learning outcomes

The students will have a molecular understanding of the structure and reactivity of biomolecules. The students obtain knowledge of modern synthetic methods in bioorganic chemistry and can explain principles of molecular interactions and recognition mechanisms. They can describe modern aspects of nucleic acids, proteins, carbohydrates and lipids.

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

S (3)

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

- a) written examination (approx. 45 to 90 minutes) or
- b) oral examination of one candidate each (20 to 30 minutes) or
- c) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate)

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title Abbreviation						
		Abbreviation				
ular Chemistry (Advanced	Lab)		08-SCM4-242-m01			
dinator		Module offered by				
e seminar "Supramolecul	ar Chemistry (Ba-	Institute of Organic	: Chemistry			
nod of grading	Only after succ. cor	mpl. of module(s)				
successfully completed						
Module level	Other prerequisites	5				
graduate						
ramolecular chemistry. St	udents will be expec					
rning outcomes						
, number of weekly contact hours,	language — if other than Ge	erman)				
ht in: German or English						
	age — if other than German,	examination offered — if no	ot every semester, information on whether			
	/or English					
Allocation of places						
Additional information						
Additional information on module duration: block taught lab course with approx. 20 working days.						
Workload						
150 h						
	rdinator ne seminar "Supramolecular hod of grading) successfully completed Module level graduate gives students the opportoramolecular chemistry. Star findings and deliver a present findings. They are able to use advanced syncheir findings. They are ables, number of weekly contact hours, with in: German or English ssessment (type, scope, languar able for bonus) in (approx. 20 minutes) in assessment: German and if places Information	rdinator ne seminar "Supramolecular Chemistry (Ba- hod of grading Only after succ. con) successfully completed Module level graduate gives students the opportunity to enhance the oramolecular chemistry. Students will be expect findings and deliver a presentation. arning outcomes able to use advanced synthesis and analytical cheir findings. They are able to deliver a presentation, number of weekly contact hours, language — if other than Gental Capture (type, scope,	rdinator ne seminar "Supramolecular Chemistry (Ba- hod of grading Only after succ. compl. of module(s) successfully completed module level Other prerequisites graduate gives students the opportunity to enhance their skills in advanced bramolecular chemistry. Students will be expected to conduct their or findings and deliver a presentation. arning outcomes able to use advanced synthesis and analytical methods in suprame their findings. They are able to deliver a presentation on their finding, number of weekly contact hours, language — if other than German) set in: German or English ssessment (type, scope, language — if other than German, examination offered — if no able for bonus) alternation formation			

Teaching cycle

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



Module title					Abbreviation
Physical Chemistry of Supramolecular Assemblies					08-PCM5-161-m01
Module	e coord	inator		Module offered by	•
	r of the Strukti	seminar "Physikalisch uren"	e Chemie Supramole-	Institute of Physica	al and Theoretical Chemistry
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites	i	
1 seme	ster	graduate			
Conten	its				
		xamines the basic inte of aggregates as well a			he formation and physical-chemi- nistry.
Intende	ed learı	ning outcomes			
in the f dern ap	ield. Th	ey can describe the for ons of supramolecular	mation and physical-c chemistry.	hemical properties c	trating a high degree of expertise of aggregates. They can name mo-
		umber of weekly contact hours	s, language — if other than Ge	rman)	
S (2) + Module	` '	t in: German or English			
		sessment (type, scope, lang le for bonus)	uage — if other than German,	examination offered — if no	ot every semester, information on whether
b) oral c) talk (examin (approx	mination (approx. 90 m lation of one candidate k. 30 minutes) ssessment: German an	each (approx. 20 minu	utes) or	
Allocat	ion of p	olaces			
	_				
Additional information					
Workload					
150 h					
Teaching cycle					
					

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title Abbreviation						
Bioinorganic Chemistry					08-ACM2-242-m01	
Module	coord	inator		Module offered by		
lecture	r of the	seminar "Bioinorganic C	hemistry"	Institute of Inorgan	ic Chemistry	
ECTS	Meth	od of grading	Only after succ. com	npl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
	ds of BI			_	chemistry (BIC). It discusses the ns of BIC in the fields of diagnosis	
Intende	ed lear	ning outcomes				
		able to describe the princ us enzymes and describe	•		explain the structure and effects medicine.	
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	rman)		
S (3) Module	e taugh	t in: German or English				
		sessment (type, scope, langua ole for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether	
a) written examination (approx. 45 to 90 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) portfolio (approx. 30 hours total) Language of assessment: German and/or English						
Allocat	ion of _l	olaces				
Additional information						
Workload						
150 h						
Teaching cycle						
						

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title					Abbreviation		
Basics	and Ap	plications of Quantum C		08-TCM2-161-m01			
Module	Module coordinator			Module offered by			
lecture	r of lect	ture "Computational Che	mistry"	Institute of Physica	l and Theoretical Chemistry		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade	-				
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
This mo	dule ir	ntroduces students to the	e fundamental princip	oles of computationa	al chemistry.		
Intende	ed leari	ning outcomes					
		able to explain the theore	tical principles of co	mputational chemist	try and to apply methods in com-		
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)			
S (2) +	Ü (2)						
		sessment (type, scope, langua le for bonus)	ge — if other than German, o	examination offered — if no	t every semester, information on whether		
b) oral c) oral d) log (e) pres	a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English						
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	Workload						
150 h	150 h						
Teachi	Teaching cycle						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						
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Module title Abbreviat					Abbreviation	
Organi	c Funct	ional Materials			08-0CM-FM-161-m01	
Module	coord	inator		Module offered by		
lecture	r of the	seminar "Organische Fu	nktionsmaterialien"	Institute of Organic	Chemistry	
ECTS	Meth	od of grading	Only after succ. compl. of module(s)			
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites	es		
1 seme	ster	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 (3)

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

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

Language of assessment: German and/or English

Allocation of places

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Additional information

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Workload

150 h

Teaching cycle

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



Module title					Abbreviation		
Nanoscale Materials					08-PCM3-161-m01		
Modul	e coord	inator		Module offered by			
lecture	er of the	seminar "Nanoskalige N	laterialien"	Institute of Physica	l and Theoretical Chemistry		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Durati	on	Module level	Other prerequisites	i			
1 seme	ester	graduate					
Conte	nts		•				
		liscusses advanced topio naracterisation methods			e structure, properties, fabricatirials.		
Intend	ed lear	ning outcomes					
		able to characterise nanc noscale materials.	scale materials. They	are able to name ar	nalytical methods and applicati-		
Course	es (type, r	number of weekly contact hours,	language — if other than Ge	rman)			
S (2) + Modul	• •	t in: German or English					
		sessment (type, scope, langua	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
b) oral c) talk Langua	a) written examination (approx. 90 minutes) or b) oral examination of one candidate each (approx. 20 minutes) or c) talk (approx. 30 minutes) Language of assessment: German and/or English creditable for bonus						
Allocation of places							
Additio	Additional information						
Workload							

150 h

Teaching cycle

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



Theoretical Chemistry

(25 or 30 ECTS credits)



Compulsory Courses

(15 ECTS credits)



Module title Abbreviation							
Basics and Applications of Quantum Chemistry 08-TCM2-161-r					08-TCM2-161-m01		
Modul	e coord	inator		Module offered by			
lecture	r of lec	ture "Computational Che	mistry"	Institute of Physica	l and Theoretical Chemistry		
ECTS	Meth	od of grading	Only after succ. com	pl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	graduate					
Conter	ıts						
This m	odule i	ntroduces students to the	e fundamental princip	oles of computationa	al chemistry.		
Intend	ed lear	ning outcomes					
		able to explain the theore	etical principles of co	mputational chemist	try and to apply methods in com-		
Course	S (type, ı	number of weekly contact hours, l	anguage — if other than Ger	man)			
S (2) +	Ü (2)						
		sessment (type, scope, langua ble for bonus)	ge $-$ if other than German, ϵ	examination offered — if no	ot every semester, information on whether		
b) oral c) oral d) log (e) pres Langua	examir examir (approx entation age of a	mination (approx. 90 to 1 nation of one candidate e nation in groups of up to 3 a. 20 pages) or on (approx. 30 minutes) assessment: German and	ach (20 to 30 minute 3 candidates (approx.		didate) or		
Allocat	ion of	places					
Additio	nal inf	ormation					
Worklo	Workload						
150 h	150 h						
Teaching cycle							
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						
	to the state of th						



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Modul	e title				Abbreviation		
Numer	ical Me	thods and Programming			o8-TCM3-161-mo1		
Modul	e coord	inator		Module offered by			
lecture mie"	r of lec	ture "Programmieren in T	heoretischer Che-	Institute of Physica	l and Theoretical Chemistry		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites	i			
1 seme	ster	graduate					
Conter	nts						
		provides an introduction to ation areas.	o the fundamentals	of programming in th	neoretical chemistry and discus-		
Intend	ed lear	ning outcomes					
		able to explain and use o name its application area		ng languages typical	ly used in theoretical chemistry		
Course	S (type, r	number of weekly contact hours,	anguage — if other than Ge	rman)			
S (2) +	Ü (2)						
			${\sf ge-if}$ other than German,	examination offered — if no	ot every semester, information on whether		
b) oral c) oral d) log (e) pres	a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English						
Allocat	tion of	olaces					
Additio	Additional information						
Worklo	Workload						
150 h	150 h						
_	ng cycl	e	-				

 $\textbf{Referred to in LPO I} \ \ (\text{exa}\underline{\text{mination regulations for teaching-degree programmes}})$



Modul	e title				Abbreviation			
Quantı	ım Dyn	amics			08-TCM4-161-m01			
Modul	e coord	inator		Module offered by	-			
lecture	r of lect	ture "Quantendynamik"		Institute of Physica	al and Theoretical Chemistry			
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)				
5	nume	rical grade						
Duratio	on	Module level	Other prerequisites					
1 seme	ster	graduate						
Conter	its							
		ent Schrödinger equation Idiabatic states, non-adia			ion theory, adiabatic theorem, al dynamics.			
Intend	ed learı	ning outcomes						
in mole in the f	ecules.	Their insight into the met theoretical chemistry.	thods and the numer	ical realizations allo	nuclear and electronic dynamics w them to carry out applications			
		number of weekly contact hours, l	anguage — If other than Ger	man)				
S (2) +								
			ge — if other than German, o	examination offered — if no	ot every semester, information on whether			
a) written examination (approx. 90 to 180 minutes) or b) oral examination of one candidate each (20 to 30 minutes) or c) oral examination in groups of up to 3 candidates (approx. 15 minutes per candidate) or d) log (approx. 20 pages) or e) presentation (approx. 30 minutes) Language of assessment: German and/or English								
Allocation of places								
Additional information								
Worklo	Workload							
150 h			150 h					

Teaching cycle

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Compulsory Electives

(10 or 15 ECTS credits)



Module title Abbreviation					Abbreviation		
Selected Topics in Theoretical Chemistry 08-TCM					08-TCM1-161-m01		
Modul	e coord	inator		Module offered by			
lecture	r of lec	ture "Theoretische Chemi	e"	Institute of Physica	l and Theoretical Chemistry		
ECTS	Meth	od of grading	Only after succ. com	pl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ster	graduate					
Conter	its						
This m	odule i	ntroduces students to the	fundamental princip	oles of theoretical ch	emistry.		
Intend	ed lear	ning outcomes					
		able to describe the math amical approaches of the		al principles underly	ing the quantum chemical and		
Course	S (type, r	number of weekly contact hours, l	anguage — if other than Ger	man)			
S (2) +	Ü (2)						
		sessment (type, scope, langua ble for bonus)	ge $-$ if other than German, ϵ	examination offered — if no	ot every semester, information on whether		
b) oral c) oral d) log (e) pres Langua	examir examin approx entation age of a	mination (approx. 90 to 1 nation of one candidate e nation in groups of up to 3 a. 20 pages) or on (approx. 30 minutes) assessment: German and	ach (20 to 30 minute 3 candidates (approx.		didate) or		
Allocat	ion of	places					
Additio	Additional information						
							
Worklo	Workload						
150 h	150 h						
Teachi	Teaching cycle						
							
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)						



Modul	Module title Abbreviation						
Theore	etical Cl	hemistry - Project course	quantum chemistry		08-TCAP1-161-m01		
Modul	e coord	inator		Module offered by	•		
head o	of the re	search group offering the	e module	Institute of Physica	l and Theoretical Chemistry		
ECTS	Meth	od of grading	Only after succ. con	ıpl. of module(s)			
5	(not)	successfully completed					
Duratio	on	Module level	Other prerequisites				
1 seme	ester	graduate					
Conter	nts						
Intend Studer tum ch	on qua ed lear nts have nemistry	ning outcomes	thods typically used n issues that are relev	in theoretical chemi vant to the field of qu	sed in the discipline. The focus stry and, in particular, in quan- uantum chemistry.		
P (5)	(type, i		- I other than der	- Indity			
Metho		sessment (type, scope, langua ole for bonus)	ge — if other than German, o	examination offered — if no	ot every semester, information on whether		
	presentation (approx. 30 minutes) Language of assessment: German and/or English						
Allocation of places							
Additio	Additional information						
Additio	onal inf	ormation on module dura	ition: block taught la	b course with approx	x. 20 working days.		
14/ 11	Md-1 1						

Workload

150 h

Teaching cycle

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 $\label{lem:continuous} \textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title					Abbreviation	
Theoretical Chemistry - Project course quantum dynamics					08-TCAP2-161-m01	
Module coordinator				Module offered by		
head of the research group offering the module			e module	Institute of Physical and Theoretical Chemistry		
ECTS	TS Method of grading		Only after succ. compl. of module(s)			
5	(not)	successfully completed				
Duration Module level		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 quantum dynamics.						
Intended learning outcomes						
Students have learned some of the methods typically used in theoretical chemistry and, in particular, in quantum dynamics. They are able to explain issues that are relevant to the field of quantum dynamics.						
Courses (type, number of weekly contact hours, language — if other than German)						
P (5)						
		sessment (type, scope, langua	ge — if other than German,	examination offered — if r	not every semester, information on whether	

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

Language of assessment: German and/or English

Allocation of places

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Additional information

Additional information on module duration: block taught lab course with approx. 20 working days.

Workload

150 h

Teaching cycle

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Module title					Abbreviation
Modern Drug Research 1: Basics and Drug Design					08-MCM3-242-m01
Module coordinator				Module offered by	
lecturers of Pharmaceutical Chemistry			stry	Institute of Pharmacy and Food Chemistry	
ECTS	Meth	hod of grading Only after succ. co		npl. of module(s)	
5	nume	rical grade			
Duration Module level		Other prerequisite	Other prerequisites		
1 semester		graduate			
Contents					

Contents

Fundamentals: Phases of drug development, principles of drug action, pharmacokinetics and biotransformation; strategies of drug discovery, drug targets, chemical space of drug discovery, protein-ligand interactions, structure-activity-relationships (SAR), bioisosterism, prodrug strategies.

Experimental methods: binding assays, enzymatic assays, biophysical methods, high-throughput-screening (HTS).

Theoretical methods and drug design: virtual screening, ligand-based methods, QSAR, pharmacophore models, structure-based drug design, docking, simulation methods, machine learning (AI).

Case studies (drug discovery, design and optimization)

Intended learning outcomes

The students master the fundamentals of drug development, the strategies of drug discovery and the applied theoretical and experimental methods. They can understand and critically question the essential content of current scientific publications in drug research. They are able to carry out a basic virtual screen and to evaluate its results.

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

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Module taught in: German or English

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) presentation (approx. 30 minutes) or
- b) written examination (approx. 45 to 90 minutes)

Language of assessment: German and/or English

Allocation of places

22 places.

- 16 places for students of the Master's degree programme Chemie (Chemistry): Places will be allocated according to the same number of subject semesters; students who have chosen Medizinische Chemie (Medicinal Chemistry) as their focus will be given preferential consideration.
- 6 places for students of the Master's degree programme Biochemie (Biochemistry): Places will be allocated according to the number of subject semesters; among applicants with the same number of subject semesters, places will be allocated by lot.
- 2 places for students of the Master's degree programme MINT-Lehramt PLUS: Places will be allocated according to the number of subject semesters; among applicants with the same number of subject semesters, places will be allocated by lot; a waiting list will be maintained and places re-allocated by lot as they become available.

Additional information

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Workload

150 h

Teaching cycle

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	reg. data record Master (120 ECTS) Chemie - 2026	



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



Thesis

(30 ECTS credits)



Module title					Abbreviation
Master-Thesis Chemistry					08-MA-161-m01
Module coordinator				Module offered by	
degree programme coordinator Chemie			ie (Chemistry)	Faculty of Chemistry and Pharmacy	
ECTS	ECTS Method of grading		Only after succ. con	cc. compl. of module(s)	
30	nume	rical grade			
Duration		Module level	Other prerequisites		
1 semester		graduate	Where applicable, specific modules as specified by supervisor.		
Conte	nts				
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.					
Intend	ed lear	ning 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)					
Νο coι	ırses as	ssigned to module			
Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)					
Master's thesis (approx. 60 to 80 pages) Language of assessment: German and/or English					
Alloca	tion of	places			
Additional information					
Time to complete: 6 months.					
Workload					
900 h					
Teaching cycle					
					

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