

WÜRZBURG

Subdivided Module Catalogue for the Subject

Functional Materials

as a Master's with 1 major with the degree "Master of Science" (120 ECTS credits)

Examination regulations version: 2016 Responsible: Faculty of Medicine Responsible: Faculty of Chemistry and Pharmacy Responsible: Responsible: Faculty of Physics and Astronomy Responsible: University of Applied Sciences Würzburg- Schweinfurt (FHWS)

Learning Outcomes

German contents and learning outcome available but not translated yet.

Wissenschaftliche Befähigung

- Die Absolventinnen und Absolventen können ein breites und vertieftes interdisziplinäres Wissen aus den wichtigsten Disziplinen der Materialwissenschaften abrufen. Die Absolventinnen und Absolventen verstehen die mathematischen, theoretischen und experimentellen Grundlagen der Materialwissenschaften und können diese selbständig anwenden. Sie besitzen Abstraktionsvermögen, analytisches Denken, Problemlösungskompetenz und die Fähigkeit, komplexe Zusammenhänge zu strukturieren. Die Grundlagen hierfür werden in Vorlesungen und Übungen der Chemie, Mathematik und Physik vermittelt und mittels Klausuren überprüft.
- Die Absolventinnen und Absolventen können selbständig Experimente durchführen, analysieren und die erhaltenen Ergebnisse darstellen und bewerten. Vermittelt werden diese Fähigkeiten im Rahmen der Projektarbeiten. Die Überprüfung der Zielerreichung findet durch die Erstellung einer Projektarbeit und deren Präsentation mit anschließender Diskussion statt.
- Die Absolventinnen und Absolventen sind in der Lage, sich mit Hilfe von Fachliteratur in neue komplexe interdisziplinäre Aufgabengebiete selbständig einzuarbeiten, naturwissenschaftliche Methoden selbständig auf konkrete experimentelle oder theoretische Aufgabenstellungen anzuwenden, Lösungswege zu entwickeln und die Ergebnisse zu interpretieren und zu bewerten. Auch diese Fähigkeiten werden im Rahmen Projektarbeiten sowie der Masterarbeit entwickelt und durch die anschließende Bewertung der Arbeit überprüft. Die Absolventinnen und Absolventen können darüber hinaus ihr Wissen und ihre Erkenntnisse einem Fachpublikum gegenüber darstellen und vertreten, was durch das Abschlusskolloquium zur Masterarbeit überprüft wird.

Befähigung zur Aufnahme einer Erwerbstätigkeit

- Die Absolventinnen und Absolventen können mit wissenschaftlichen Methoden auch unbekannte Probleme aus unterschiedlichen fachlichen Perspektiven analysieren und bearbeiten. Der interdisziplinäre Aufbau des Studiengangs, der Elemente aus mathematisch-, ingenieurund naturwissenschaftlichen Fachbereichen vereint, fördert von Beginn an interdisziplinäres Lernen, Denken und Verstehen. Dies wird durch den Besuch von Lehrveranstaltungen der Physik, Mathematik und Chemie vermittelt und durch die erfolgreiche Absolvierung der Module bestätigt. Diese Problemlösungskompetenz können die Absolventinnen und Absolventen gewinnbringend in ihrer Berufspraxis einsetzen.
- Die Absolventinnen und Absolventen sind darüber hinaus in der Lage, theoretisches Wissen in der Praxis anzuwenden. Der Praxisbezug ist durch die eingangs genannten Kooperationspartner gegeben, sodass die Studierenden in Rahmen von Vorlesungen und Laborpraktika bereits im Bachelorstudium Kontakt zu praxisorientierten außeruniversitären Forschungseinrichtungen haben. Im Masterstudium können die Studierenden ihre Projektarbeiten in diesen Einrichtungen anfertigen, sodass ein direkter Praxisbezug der Forschung gegeben ist. Überprüft wird diese Fähigkeit durch Projektarbeiten und nicht zuletzt die Abschlussarbeit.
- Die Absolventinnen und Absolventen können unterschiedliche Aufgaben parallel und unter Zeitund Erfolgsdruck auch bei widrigen Rahmenbedingungen erfolgreich bearbeiten. Diese Fähigkeit wird durch die Prüfungsdichte am Ende der Vorlesungszeit erlernt und befähigt die Absolventinnen und Absolventen auch im stressigen Berufsalltag Aufgaben erfolgreich zu bearbeiten.
- Absolventinnen und Absolventen sind in der Lage, konstruktiv und zielorientiert in einem heterogenen Team zusammenzuarbeiten, unterschiedliche und abweichende Ansichten produktiv zur Zielerreichung zu nutzen und auftretende Konflikte zu lösen. Diese Teamfähigkeit und Konfliktkompetenz erlernen die Studierenden in der Zusammenarbeit in Arbeitskreisen während der Anfertigung der Projekt- und Abschlussarbeit.

Master's with 1 major Functional Materials (2016) JMU Würzburg • generated 19-Apr-2025 • exam ta record Master (120 ECTS) Funktionswerkstof	
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UNIVERSITÄT WÜRZBURG

Persönlichkeitsentwicklung

- Die Absolventinnen und Absolventen sind bereit und in der Lage, Verantwortung für ihr Handeln und für andere zu übernehmen. Die Absolventinnen und Absolventen 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 durch die Anfertigung der Projekt- und Abschlussarbeiten, deren Zielerreichung mit der Bewertung der Arbeit überprüft wird.
- Erst die durch Einübung und Ermutigung erlangte Fähigkeit zur 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 mittels Feedbacks durch Lehrende und Studierende zu ihrem Vortrag in Seminaren, die vermehrt im Masterstudium stattfinden.

Gesellschaftliches Engagement

• Die Absolventinnen und Absolventen haben ihr Wissen bezüglich wirtschaftlicher, gesellschaftlicher und naturwissenschaftlicher Fragestellungen erweitert und können begründet Position beziehen. Durch die Behandlung aktueller Forschungsthemen in den Lehrveranstaltungen werden Bezüge zu wirtschaftlichen und gesellschaftlichen Fragestellungen hergestellt. Darüber hinaus können die Absolventinnen und Absolventen gesellschaftliche, naturwissenschaftliche, kulturelle wie auch wirtschaftliche Entwicklungen kritisch reflektieren und deren Auswirkungen auf die Wirtschaft, Gesellschaft und die Umwelt erfassen. Im Rahmen der Projektarbeiten sowie der Masterarbeit befassen sich die Studierenden mit aktuellen gesellschaftlich und wirtschaftlich relevanten materialwissenschaftlichen Fragestellungen, deren Kenntnisse sowie die Fähigkeit begründet Position zu beziehen im Kolloquium überprüft werden.

Abbreviations used

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

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

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

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

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

Conventions

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

Notes

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

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

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

In accordance with

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

ASPO2015

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

04-Apr-2016 (2016-51) 05-Jul-2017 (2017-44) 26-Jul-2018 (2018-52) 30-Jul-2020 (2020-60)

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.

Master's with 1 major Functional Materials (2016)

The subject is divided into

Abbreviation	Module title	ECTS credits	Method of grading	page
Compulsory Courses (40 E	CTS credits)			
11-FU-MTE-161-m01	Mechanical and Thermal Material Properties	5	NUM	73
11-FU-MOE-161-m01	Opto-Electronic Material Properties	5	NUM	72
08-0C4-152-m01	Organic Chemistry 4	5	NUM	31
08-0CM-FM-161-m01	Organic Functional Materials	5	NUM	33
08-FU-PR1-161-m01	Research Project 1	10	NUM	26
08-FU-PR2-161-m01	Research Project 2	10	NUM	27
Compulsory Electives (50				<u> </u>
Subfield Focus Topic (30				
	b be selected, from which modules totaling 30 ECTS points are to	be includ	ed.	
Focus Topic A: Bio mate	rials (30 ECTS credits)			
03-BIOFAB-152-m01	Biofabrication	5	NUM	8
03-FU-TE-AT-161-m01	Tissue Engineering - Alternatives to Animal Testing	5	NUM	11
	Fundamentals of Physiology and Application of Surgical Im-		NUM	9
03-FU-IMP-161-m01	plants by Loss of Function	5		
03-TE-REG-161-m01	Tissue Engineering - Basics for Tissue Regeneration	5	NUM	1/
03-FU-TMW-161-m01	Carrier Materials and Devices for Therapeutic Compounds	5	NUM	12
03-FU-TRM-161-m01	Technologies to Support Regenerative Medicine	5	NUM	13
Focus Field B: Technica	l Materials (30 ECTS credits)			<u> </u>
	Structure and Properties of Modern Materials: Experiments vs.	_	NUM	
08-FU-MW-161-m01	Simulations	5		23
	Sensor and Actor Materials - Functional Ceramics and Magne-		NUM	30
08-FU-SAM-161-m01	tic Particles	5		
03-FU-PM2-161-m01	Polymers II	5	NUM	10
08-PCM3-161-m01	Nanoscale Materials	5	NUM	41
08-SCM1-161-m01	Supramolecular Chemistry (Basics)	5	NUM	46
08-PCM5-161-m01	Physical Chemistry of Supramolecular Assemblies	5	NUM	43
08-FU-PW1-161-m01	Polymer Materials 1: Technology of Polymer Modification	5	NUM	28
	Polymer Materials 2: Technology of Filler Modification for Poly-			-
08-FU-PW2-161-m01	mer Materials	5	NUM	29
11-NAN-152-m01	Nanoanalytics	6	NUM	84
11-OHL-161-m01	Organic Semiconductors	6	NUM	80
11-HNS-161-m01	Optical Properties of Semiconductor Nanostructures	6	NUM	78
11-ENT-152-m01	Principles of Energy Technologies	6	NUM	68
11-LIVI-152-11101				

Subfield General Compulsory Electives (20 ECTS credits)

The 20 ECTS points can only be taken from the following modules.

Alternatively, within these 20 ECTS credits, modules from the "Subfield Focus Topic A and/or B" can also be included, whereby the modules already taken in the selected "Subfield Focus Topic" and brought in there cannot be used again in the "Subfield General Compulsory Electives".

If none of the following modules are taken, the 20 ECTS credits are to be selected from modules in the subfield of one and/or both focus topics that have not yet been used within the 30 credits of the "Subfield Focus Topic". **Module Group Engineering Sciences**

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99-HIS-161-m01	Materials f stems	or High Voltage insulation and High Voltage Sy-	5	NUM	98
99-MST-161-m01	Modeling and Simulation for Technological Systems			NUM	99
Module Group Material	Sciences		I		
08-FU-NT-AA-152-m01	Chemical N	lanotechnology: Analytics and Applications	5	NUM	24
08-FU-EEW-152-m01	Electroche	mical Energy Storage and Conversion	5	NUM	19
08-FU-ANA-161-m01	Analytical	Methods - Examples from Practical Failure Analysis	5	NUM	18
08-FU-PART-161-m01	Chemical T	echnology of Inorganic Nano and Micro Particles	5	NUM	25
Module Group Physics					
11-BVG-152-m01	Coating Te	chnologies based on Vapour Deposition	5	NUM	65
11-SPD-152-m01	Physics of	Semiconductor Devices	6	NUM	92
11-HLF-152-m01	Semicondu	uctor Lasers and Photonics	6	NUM	74
11-QTH-161-m01	Quantum T	ransport	6	NUM	90
11-ZMB-152-m01	Methods o	f Non-Destructive Material Testing	4	NUM	96
11-LMT-152-m01	Laboratory	and Measurement Technology	6	NUM	82
11-BMT-161-m01	Biophysica	I Measurement Technology in Medical Science	6	NUM	61
11-HLPH-161-m01	Semicondu	uctor Physics	6	NUM	76
11-ZDR-152-m01	Principles	of Two- and Three-Dimensional Röntgen Imaging	6	NUM	94
11-PMM-161-m01	Physics of	Advanced Materials	6	NUM	88
11-LMB-152-m01	Laboratory	and Measurement Technology in Biophysics	6	NUM	80
11-CMS-161-m01	Computati	onal Materials Science (DFT)	8	NUM	66
11-FK2-161-m01	Solid State	Physics 2	8	NUM	70
11-BMS-152-m01	Imaging M	ethods at the Synchroton	6	NUM	59
11-BSV-161-m01	Image and	Signal Processing in Physics	6	NUM	63
Module Group Chemistr	ÿ				
08-SCM3-152-m01	Bioorganic	Chemistry	5	NUM	47
08-BC-MOLMC-161-	Molecular	Biology for Advanced Students	r -	NUM	17
m01	Molecular	biology for Auvanced Students	5	NOM	17
08-0CM-SYNT-161-mo	Modern Sy	nthetic Methods	5	NUM	35
08-PCM1a-161-m01	Laser Spec	troscopy	5	NUM	37
08-PCM2-161-m01	Statistical	Mechanics and Reaction Dynamics	5	NUM	39
08-PS3-152-m01	Applied Sp	ectroscopy 3	5	NUM	45
Module Group Theory o	f Chemistry	/ Numerics (Mathematics / Computer Science)			
08-TCM2-161-m01	Basics and	Applications of Quantum Chemistry	5	NUM	51
08-TCM3-161-m01	Numerical	Methods and Programming	5	NUM	53
08-TCM4-161-m01	Quantum [Dynamics	5	NUM	55
08-TCM1-161-m01	Selected T	opics in Theoretical Chemistry	5	NUM	49
10-I-PP-152-m01	Practical C	ourse in Programming	10	B/NB	57
10-M-MWR-152-m01	Modeling a	and Computational Science	8	NUM	58
Module Group Biology					
07-4S1MOLB-152-m01	Aspects of	Molecular Biotechnology	5	NUM	15
Module Group Focus To					
03-BIOFAB-152-m01	Biofabricat	rication		NUM	8
03-FU-TE-AT-161-m01	Tissue Eng	ineering - Alternatives to Animal Testing	5	NUM	11
03-FU-IMP-161-m01		tals of Physiology and Application of Surgical Im- .oss of Function	5	NUM	9
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03-TE-REG-161-m01	Tissue Engineering - Basics for Tissue Regeneration	5	NUM	14
03-FU-TMW-161-m01	03-FU-TMW-161-mo1 Carrier Materials and Devices for Therapeutic Compounds		NUM	12
03-FU-TRM-161-m01	Technologies to Support Regenerative Medicine	5	NUM	13
Module Group Focus To	pic B			
08-FU-MW-161-m01	Structure and Properties of Modern Materials: Experiments vs. Simulations	5	NUM	23
08-FU-SAM-161-m01	Sensor and Actor Materials - Functional Ceramics and Magne- tic Particles	5	NUM	30
03-FU-PM2-161-m01	Polymers II	5	NUM	10
08-PCM3-161-m01	Nanoscale Materials	5	NUM	41
08-SCM1-161-m01	Supramolecular Chemistry (Basics)	5	NUM	46
08-PCM5-161-m01	Physical Chemistry of Supramolecular Assemblies	5	NUM	43
08-FU-PW1-161-m01	Polymer Materials 1: Technology of Polymer Modification	5	NUM	28
08-FU-PW2-161-m01	Polymer Materials 2: Technology of Filler Modification for Poly- mer Materials	5	NUM	29
11-NAN-152-m01	Nanoanalytics	6	NUM	84
11-OHL-161-m01	Organic Semiconductors	6	NUM	86
11-HNS-161-m01	Optical Properties of Semiconductor Nanostructures	6	NUM	78
11-ENT-152-m01	Principles of Energy Technologies	6	NUM	68
Thesis (30 ECTS credits)			-	
08-FU-MT-161-m01	Master Thesis Functional Materials	25	NUM	22
08-FU-Koll-161-m01	Master Thesis Defense	5	NUM	21

Module title					Abbreviation		
Biofabr	Biofabrication 03-BIOFAB-152-mo1						
Module coordinator Module offered by							
	holder of the Chair of Functional Materials in Medicine and Faculty of Medicine Dentistry						
ECTS	Metho	od of grading	Only after succ. com	pl. of module(s)			
5		rical grade		•			
Duratio	n	Module level	Other prerequisites				
1 seme	ster	graduate					
Conten	ts						
and pra photon sinterin	actices, polym ng, melt	description of extracellu erisation, fused depositio	lar matrix, bioprintin on modelling, inorgai self-healing hydroge	g, continuous liquid nic powder printing, ls, polymers in 3D p	of medical device regulations interface polymerisation, two- stereolithography, selective laser rinting, introduction to rheology, rol.		
		ning outcomes					
ble in the printer ding of will acc	he cont works, scienti Juire th	ext of biofabrication. Thi with its strengths and we fic methodology for each	s includes how the p eaknesses. A holistic stage and the differe	olymers are process view of biofabricatio ent regulations gove	3D printing) technologies availa- ed and how each class of 3D on is taught, with an understan- rning medical devices. Students ting industry and the resulting		
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	n)		
V (2) + Module		t in: V, Ü: English					
		e ssment (type, scope, la on on whether module ca			tion offered — if not every seme-		
b) oral c) talk (examin 30 min	nination (approx. 90 min ation of one candidate e utes) ssessment: English					
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Worklo	ad						
150 h							
Teaching cycle							
-							
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Module	appea	irs in					
		ee (1 major) Biofabricatio	n (2015)				
Master's degree (1 major) Functional Materials (2016)							

Module title Abbreviation								
Fundan	Fundamentals of Physiology and Application of Surgical Implants by Loss of 03-FU-IMP-161-m01							
	Function							
Module	e coord	inator		Module offered by				
		Chair of Functional Mater	ials in Medicine and	Faculty of Medicine				
Dentist	T .							
ECTS		od of grading	Only after succ. con	ipl. of module(s)				
5		rical grade						
Duratio		Module level	Other prerequisites					
1 seme		graduate						
Conten	-							
structu	re and		hat lead to functional		tem, of the jaw including tooth of function. Materials and use of			
Intende	ed lear	ning outcomes						
		receive advanced knowle an lead to the use of med	• • • • •	•	owledge about pathological pro- t.			
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	an)			
V (3) +	P (1)	· · · · ·			·			
		sessment (type, scope, la ion on whether module ca			ition offered — if not every seme-			
(approx	x. 90 m	ractical course (approx. 1 inutes); weighted 1:1 ssessment: German and,		entation (approx. 30	minutes) or written examination			
Allocat	ion of j	olaces						
Additio	nal inf	ormation						
Worklo	ad							
150 h								
Teaching cycle								
Referred to in LPO I (examination regulations for teaching-degree programmes)								
Module	e appea	ars in						
		ee (1 major) Functional M	aterials (2016)					

Module title				Abbreviation		
Polyme	ers II				03-FU-PM2-161-mo:	1
Module	e coord	inator		Module offered by		
			orials in Modicino and	Faculty of Medicine		
	holder of the Chair of Functional Materials in Medicine and Faculty of Medicine Dentistry					
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					
plex po licatior	olymer an of the	architectures), biodegra	s, special polymers (blo adable polymers, polyp e.g as biomaterials, for	eptoides, natural po	olymers. We will disc	uss the app-
Intend	ed lear	ning outcomes				
differen als. Stu gain in: quence	nt syntł udents sight ir es / dis	netic routes with which can estimate if and how ito the field of technica	ledge in polymer manu the different molecules w fast a polymer degrac lly used polymers from esis of the various poly	s can be prepared fro les under given circu nature. Each section	om different starting umstances. Furtherm n also points to poss	materi- ore, they ible conse-
Course	s (type	, number of weekly con	itact hours, language –	- if other than Germa	ın)	
S (2) +	Ü (1)					
ster, in	formati	ion on whether module	language — if other the can be chosen to earn		tion offered — if not	every seme-
b) oral c) talk	examir (appro>	mination (approx. 90 m nation of one candidate k. 30 minutes) ssessment: German ar	e each (approx. 20 minu	ites) or		
Allocat	ion of _l	olaces				
	-					
Additio	onal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination re	gulations for teaching-	degree programmes)		
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Chemistry (2016)						
Master's degree (1 major) Enemistry (2016) Master's degree (1 major) Functional Materials (2016)						
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
	Master's degree (1 major) Chemistry (2018)					
			n MINT Teacher Educat			020)
Supple	menta	ry course MINT Teacher	Education PLUS, Elite	Network Bavaria (EN	B) (2020)	
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Module title Abbreviation					
Tissue	Engine	ering - Alternatives to Ar	nimal Testing		03-FU-TE-AT-161-m01
Modul	e coord	inator		Module offered by	<u> </u>
holder	ofthe	Chair of Regenerative Me	dicine	Faculty of Medicine	
ECTS		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				
		ue Engineering. Generation of implants (ATMPs) acco			oment of pre- clinical test models
Intend	ed lear	ning outcomes			
	-	basic knowledge to con mal experiments or as tr		•	the use therof as alternative test
Course	es (type	, number of weekly conta	ict hours, language –	- if other than Germa	ın)
V (2) +	Ü (2)				
		sessment (type, scope, la on on whether module c			tion offered — if not every seme-
(appro	x. 60 m			entation (approx. 30	minutes) or written examination
	tion of p				
Additi	onal inf	ormation			
Workle	oad				
150 h					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
		ee (1 major) Functional N	aterials (2016)		

Module title Abbreviation					
Carrier Materials and Devices for Therapeutic Compounds 03-FU-TMW-161-m01					03-FU-TMW-161-m01
Modul	e coord	inator		Module offered by	<u>I</u>
holder	ofthe	Chair of Regenerative Me	dicine	Faculty of Medicine	
ECTS		od of grading	Only after succ. con	· · ·	
5	nume	rical grade			
Durati	on	Module level	Other prerequisites		
1 seme	ester	graduate			
Conter	nts				
tation Furthe	of vario rmore, (us loading mechanisms	as well as the control ns and their clinical u	led release of drugs se are presented. St	rticular nanoparticles; presen- from the drug delivery system. udents gain a deeper insight into
Intend	ed lear	ning outcomes			
taught		roduction options are av			tems. In addition, they will be spected, so that they can deal
Course	es (type	, number of weekly conta	act hours, language –	- if other than Germa	an)
V (2) +	P (1)				
		s essment (type, scope, la ion on whether module c			tion offered — if not every seme-
(appro	x. 30 m			en examination (app	prox. 90 minutes) or presentation
	tion of	·	<u> </u>		
Additio	onal inf	ormation			
Worklo	ad				
150 h					
	ng cycl	e			
Referre	ed to in	LPOI (examination reg	lations for teaching-	degree programmes)	
Modul	e appea	ars in			
Master	's degr	ee (1 major) Functional N	Naterials (2016)		

Modul	Module title Abbreviation						
Techno	ologies	to Support Regenerative	Medicine		03-FU-TRM-161-m01		
Module coordinator Module offered by							
holder	of the (Chair of Regenerative Me	dicine	Faculty of Medicine			
ECTS	-	od of grading	Only after succ. con	,			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites				
1 seme	ester	undergraduate					
Conter	nts						
		ects for the generation of surfaces. Cell material iu		valents. Problems of	tissue/Implant interfaces. Nano-		
Intend	ed lear	ning outcomes					
		fundamental knowledge I the appropriate tissue q		/material interfaces,	with speciific tissue material in-		
Course	es (type	, number of weekly conta	ct hours, language –	- if other than Germa	ın)		
V (2) +	Ü (2)						
		essment (type, scope, la on on whether module ca			tion offered — if not every seme-		
(appro	x. 60 m			entation (approx. 30	minutes) or written examination		
_	tion of p						
Additio	onal inf	ormation					
Worklo							
150 h							
-	ng cycl	e					
Referred to in LPO I (examination regulations for teaching-degree programmes)							
Modul	Module appears in						
		ee (1 major) Functional M	aterials (2016)				

Module title Abbreviation					
Tissue E	ngineering - Basics for Tissue	Regeneration		03-TE-REG-161-m01	
Module	coordinator		Module offered by		
unknowr			Faculty of Medicine		
	Method of grading	Only after succ. con	,		
5 I	numerical grade				
Duration	Module level	Other prerequisites	5		
1 semest	er undergraduate				
Contents	5				
sue trans		cells for the genereat	ion of cartilage and	nes. Basics of matrix -based tis- bone tissue. Strategies for vascu-	
Intended	l learning outcomes				
stem cel				bloguous cells, the selection of used as diagnostics and for thera-	
Courses	(type, number of weekly conta	act hours, language –	- if other than Germa	an)	
V (2) + Ü	(2)				
	of assessment (type, scope, la ormation on whether module o			ation offered — if not every seme-	
(approx.	on practical course (approx. : 60 minutes) e of assessment: German and		entation (approx. 30	minutes) or written examination	
	on of places	<u>, c</u>			
Addition	al information				
Workloa	d				
150 h					
Teaching cycle					
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module	appears in				
Master's	degree (1 major) Functional N	Naterials (2016)			

Module					Abbreviation
Aspects of Molecular Biotechnology					07-4S1MOLB-152-m01
Module coordinator				Module offered by	
		Chair of Biotechnology ar	nd Biophysics	Faculty of Biology	
ECTS		od of grading	Only after succ. con	, .,	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
mes, p sor des	roducti sign, dı	ion of biomolecules, mole	ecular biology, recom	binant DNA technolo	nobilisation of cells and enzy- ogy, protein engineering, biosen tibodies, hybridoma technology,
		ning outcomes	-		
ges and Studen dently to inde	d disad its will review pende	dvantages. They will learn acquire a knowledge of fr relevant literature. In ado ntly acquaint themselves	to decide what meth undamental methods lition, they will becor with - relevant mech	od is most suitable in biotechnology th ne acquainted with - anisms.	logy and their respective advant for addressing a particular issue at will enable them to indepen- - or, where necessary, will be ab
		, number of weekly conta	ict hours, language –	· if other than Germa	an)
V (2) +	S (2)				
written credita	exami ble for				
Allocat		places			
Studen siderat ted to s nimum 60 ECT tik (Ma tentiall the nur there b form re ponent ve succ tial cor	I the nuts of the ion. She studen of one S credi thema ly to stumber o be, with egulation t that a cessful nsidera	the Bachelor's degree subj rould the module be used ts of the Bachelor's degree place in total) will be all its and to students of the tics), each with 180 ECTS udents of other 'importing f applications, the remain in one module component on for the courses of one re concerned will be alloce ly completed at least one tion.	ject Biologie (Biology I in other subjects, the se subject Biologie (B ocated to students of Bachelor's degree su credits, as part of the g' subjects). Should t ning places will be all nt, several courses wi module component. I cated in the same pro other module compo) with 180 ECTS cred ere will be two quot iology) with 180 ECT the Bachelor's degr bjects Computation application-oriente he number of places ocated to applicants th a restricted numb n this case, places of cedure. In this proce onent of the respecti	es will be allocated as follows: lits will be given preferential con as: 95% of places will be alloca- S credits and 5% of places (a mi ree subject Biologie (Biology) wit al Mathematics and Mathema- ed subject Biology (as well as po s available in one quota exceed s from the other quota. Should ber of places, there will be a uni- on all courses of a module com- edure, applicants who already have ve module will be given preferer
Selection mic achi ve achi in the s at the t average to their	on pro- hievem ieved a subject ime of e grade r total r	ents. For this purpose, and and their average grade of of Biologie (Biology) (exc application. This will be weighted according to the number of ECTS credits ac	es will primarily be all oplicants will be rank all assessments take cluding Chemie (Cher done as follows: First he number of ECTS cr chieved (quantitative	ocated according to ed according to the en during their studi nistry), Physik (Phys , applicants will be r edits (qualitative rar ranking). The applic	ble. the applicants' previous acade number of ECTS credits they ha- es or of all module components ics), Mathematik (Mathematics) ranked, firstly, according to their nking) and, secondly, according ants' position in a third ranking d according to this third ranking

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Among applicants with the same ranking, places will be allocated according to the qualitative ranking or otherwise by lot.

Selection process group 2 (5%): Places will be allocated according to the following quotas: Quota 1 (50 % of places): total number of ECTS credits already achieved in modules/module components of the Faculty of Biology; among applicants with the same number of ECTS credits achieved, places will be allocated by lot. Quota 2 (25 % 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. Quota 3 (25 % of places): lottery.

Should the module be used only in the Bachelor's degree subject Biologie (Biology) with 180 ECTS credits, places will be allocated according to the selection process of group 1.

Additional information

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Workload

150 h

Teaching cycle

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

Module appears in

Bachelor's degree (1 major) Biology (2015)
Bachelor's degree (1 major) Mathematics (2015)
Bachelor's degree (1 major) Nanostructure Technology (2015)
Bachelor's degree (1 major) Computational Mathematics (2015)
Master's degree (1 major) Functional Materials (2016)
Bachelor's degree (1 major) Biology (2017)
Bachelor's degree (1 major) Nanostructure Technology (2020)
Bachelor's degree (1 major) Biology (2021)
Bachelor's degree (1 major, 1 minor) Biology (Minor, 2021)
Bachelor's degree (1 major) Quantum Technology (2021)
Bachelor's degree (1 major) Biology (2022)
Master's degree (1 major) Functional Materials (2022)
exchange program Biosciences (2022)
Bachelor's degree (1 major) Mathematics (2023)
Master's degree (1 major) Functional Materials (2025)

Master's with 1 major Functional Materials (2016)

Module	e title				Abbreviation	
Molecular Biology for Advanced Students					08-BC-MOLMC-161-m01	
Module	e coord	inator		Module offered by	<u> </u>	
holder	of the (Chair of Biochemistry		Chair of Biochemis	try	
ECTS	1	od 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					
Compr tional l			this module discusse	s advanced topics i	n molecular physiology and func-	
Intend	ed lear	ning outcomes				
Studer	its have	e developed a sound kno	wledge of molecular	biology.		
Course	s (type	, number of weekly conta	act hours, language –	· if other than Germa	an)	
V (2) +		,				
Metho ster, in	d of ass formati	Sessment (type, scope, la ion on whether module c mination (approx. 90 to 1	an be chosen to earn		ation offered — if not every seme-	
d) log (e) pres	approx entatio ge of a	ation in groups of up to g . 20 pages) or n (approx. 30 minutes) ssessment: German and blaces			·	
Additio	onal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination regu	lations for teaching-	legree programmes)	
Modul	e appea	ars in				
		ee (1 major) Chemistry (2	2016)			
	-	ee (1 major) Functional N				
	-			ion PLUS, Elite Netw	ork Bavaria (ENB) (2016)	
		ry course MINT Teacher E		Network Bavaria (EN	IB) (2016)	
	-	ee (1 major) Chemistry (2				
				ion PLUS, Elite Netw	ork Bavaria (ENB) (2020)	
Supple	imentai		ducation DILLC FILL	Johnard David (CN		
Mactor	upplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) laster's degree (1 major) Functional Materials (2022)					

Module					Abbreviation	
Analytical Methods - Examples from Practical Failure Analy				sis	08-FU-ANA-161-m01	
Module	e coord	inator		Module offered by		
Dean o	f Studi	es Funktionswerkstoffe (F	unctional Materials)	Chair of Chemical T	echnology of Material Synthesis	
ECTS	1	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	ts					
and po	lymers		quainted to different	methods for the cha	amics, semiconductors, metals aracterization of the different ma-	
Intende	ed lear	ning outcomes				
The stu	Idents	gain fundamental knowle	dge in measuring me	thods in the physica	al / chemical laborratory.	
Course	s (type	, number of weekly conta	ct hours, language —	if other than Germa	an)	
V (2) +	P (2)					
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a 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 Assessment offered: Once a year, summer semester P: creditable for bonus						
Allocat						
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cvcl	e				
	is cycl					
Referre	d to in	LPO I (examination regu	lations for teaching.c	legree programmes)		
Module	anner	ars in				
		ee (1 major) Functional M	atorials (2016)			
	-	ee (1 major) Functional M ee (1 major) Functional M				
	-	ee (1 major) Functional M				
	-0-	. , , ,				

Electro	e title			Abbreviation		
Electrochemical Energy Storage and Conversion					08-FU-EEW-152-mo	1
Module	e coord	inator		Module offered by		
	_		logy of Material Sun-	· · ·	echnology of Materi	al Synthesis
holder of the Chair of Chemical Technology of Material Syn- thesis						at Synthesis
ECTS		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	ts					
um and cal dou	l nickel Ible lay	l application of: battery s metal hydride, sodium s er capacitors, redox-flow GaAs, organic and dye s	sulphur, sodium nick / batteries, fuel cell sy	el chloride, lithium io /stems (AFC, PEMFC,	on accumulators), el	ectrochemi-
Intende	ed lear	ning outcomes				
		e developed a knowledge to research problems.	e of electrochemical e	nergy storage and co	onversion and are at	ole to apply
		, number of weekly conta	act hours, language –	- if other than Germa	n)	
V (2) +		•				
Method	d of ass	sessment (type, scope, la on on whether module c			tion offered — if not	every seme
	ment o	ssessment: German and ffered: Once a year, sum blaces				
Additio	nal inf					
	mat mit	ormation				
		ormation	-			
 Worklo		ormation				
		ormation				
 Worklo 150 h Teachir	ad					
150 h	ad					
150 h Teachir 	ad ng cycl		llations for teaching-0	degree programmes)		
150 h Teachir 	ad ng cycl	e	lations for teaching-o	degree programmes)		
150 h Teachir Referre 	ad ng cycl ed to in	e LPO I (examination regu	ulations for teaching-o	degree programmes)		
150 h Teachir Referre Module	ad ng cycl ed to in e appea	e LPO I (examination regu				
150 h Teachir Referre Module Bachele Master	ad ng cycl ed to in e appea or's deg 's degr	e LPO I (examination regu I rs in gree (1 major) Nanostruc ee (1 major) Physics (201	ture Technology (201			
150 h Teachir Referre Module Bachele Master' Master	ad ng cycl ed to in e appea or's degr 's degr 's degr	e LPO I (examination regu I rs in gree (1 major) Nanostruc ee (1 major) Physics (201 ee (1 major) Nanostructu	ture Technology (201 .6) re Technology (2016)			
150 h Teachir Referre Module Bachelo Master' Master' Master	ad ng cycl ed to in e appea or's degre 's degre 's degre 's degre	e LPO I (examination regunstrian regunstri	ture Technology (201 .6) re Technology (2016) Naterials (2016)	5)		
150 h Teachin Referre Module Bachelo Master' Master' Master' Master'	ad ng cycl ed to in e appea or's degre 's degre 's degre 's degre 's degre	e LPO I (examination regunstrian gree (1 major) Nanostructee (1 major) Physics (201 ee (1 major) Nanostructu ee (1 major) Functional N ee (1 major) Nanostructu	ture Technology (201 .6) re Technology (2016) 1aterials (2016) re Technology (2020)	5)		
150 h Teachir Referre Bacheld Master' Master' Master' Master'	ad ng cycl ed to in e appea or's degr 's degr 's degr 's degr 's degr	e LPO I (examination regunstration regunstr	ture Technology (201 .6) re Technology (2016) 1aterials (2016) re Technology (2020) 20)	5)		
150 h Teachin Referre Bachelo Master' Master' Master' Master' Master' Master' Master'	ad ng cycl ed to in e appea or's degre 's degre 's degre 's degre 's degre 's degre 's degre	e LPO I (examination regunstration regunstr	ture Technology (201 .6) re Technology (2016) Aaterials (2016) re Technology (2020) 20) rnational (2020)	5)		
150 h Teachin Referre Module Bachelo Master' Master' Master' Master' Master' Master' Master'	ad ng cycl ed to in e appea or's degre 's degre 's degre 's degre 's degre 's degre 's degre 's degre	e LPO I (examination regunstration regunstra	ture Technology (201 .6) re Technology (2016) Aaterials (2016) re Technology (2020) 20) rnational (2020) gineering (2020)	5)		
150 h Teachin Referre Master' Master' Master' Master' Master' Master' Bachelo	ad ng cycl ed to in e appea or's degre 's degre 's degre 's degre 's degre 's degre 's degre 's degre	e LPO I (examination regunstration regunstr	ture Technology (201 .6) re Technology (2016) 1aterials (2016) re Technology (2020) 20) rnational (2020) gineering (2020) ture Technology (202	5)		



Master's degree (1 major) Quantum Technology (2021)

Modul	e title				Abbreviation	
Master	r Thesis	s Defense			08-FU-Koll-161-m01	
Modul	e coord	inator		Module offered by	<u> </u>	
chairpe fe	erson o	f examination committee	Funktionswerkstof-	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	o8-FU-MT			
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts					
Prasen	tation	and defense of the result	s of the Master-Thesi	S		
Intend	ed lear	ning outcomes				
The stu	udents	learn how to present and	defend a scientif pie	ce of work.		
Course	es (type	, number of weekly conta	act hours, language –	- if other than Germa	n)	
K (o)						
ster, in final co tes)	iformat olloquit	ion on whether module c	an be chosen to earn talk (approx. 30 min	a bonus)	tion offered — if not every seme- nt discussion (approx. 30 minu-	
	tion of	0	101 211511511			
Additio	onal inf	ormation				
Worklo	bad					
150 h						
-	ng cycl	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
				legree programmes)		
				legree programmes)		
 Modul	e appea					
 Modul Master	e appea r's degr	ars in	laterials (2016)			

Module	e title	·			Abbreviation
Master	Thesis	Functional Materials			08-FU-MT-161-m01
Module	e coord	inator		Module offered by	<u> </u>
	progra	mme coordinator Funktic	onswerkstoffe (Func-		echnology of Material Synthesis
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
25	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
		be expected to research a principles of good scienti		d topic in the techno	ology of functional materials, ad-
Intend	ed lear	ning outcomes			
		able to conduct research t the results of their work		dhering to the princi	ples of good scientific practice,
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	ın)
No cou	rses as	signed to module			
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-
		is (approx. 70 pages) ssessment: German and,	/or English		
Allocat	ion of _l	olaces			
	-				
Additio	onal inf	ormation			
Time to	comp	ete: 6 months.			
Worklo					
750 h					
Teachi	ng cycl	e			
	- /				
Referre	ed to in	LPOI (examination regu	lations for teaching-o	degree programmes)	
Module	e appea	ars in			
		ee (1 major) Functional M	aterials (2016)		
	-	ee (1 major) Functional M			
	-	ee (1 major) Functional M			

Church	e title				Abbreviation
שנועכנע	ire and	Properties of Modern N	laterials: Experiments	s vs. Simulations	08-FU-MW-161-m01
Module	e coord	inator		Module offered by	1
degree programme coordinator Funktionswerkstoffe (Func- tional Matrierials)					Technology of Material Synthesi
ECTS		od of grading	Only after succ. con	npl. of module(s)	
5	1	rical grade			
Duratio	I	Module level	Other prerequisites		
1 seme		graduate			
Conten		0			
	al prop	erties of metals and cera	amics: correlation of s	tructure/property re	elations through experiments an
Intend	ed lear	ning outcomes			
on. A s perties	pecial ·	focus is on the relation b	between the micro/na	noscopic structure o	ethods using numerical simulat of materials and the resulting pr
Course	s (type	, number of weekly cont	act hours, language –	– if other than Germ	an)
V (2) +	S (1)				
		sessment (type, scope, l ion on whether module o			ation offered — if not every sem
		nation of one candidate	eath (abbiox, 20 mm)		
Langua	age of a	ation in groups (groups ssessment: German and ffered: Once a year, win	of 2, approx. 30 minu I/or English	-	
Langua	age of a ment o	ssessment: German and ffered: Once a year, win	of 2, approx. 30 minu I/or English	-	
Langua Assess	age of a ment o	ssessment: German and ffered: Once a year, win	of 2, approx. 30 minu I/or English	-	
Langua Assess Allocat	age of a ment o ion of	ssessment: German and ffered: Once a year, win	of 2, approx. 30 minu I/or English	-	
Langua Assess Allocat 	age of a ment o ion of	ssessment: German and ffered: Once a year, win places	of 2, approx. 30 minu I/or English	-	
Langua Assess Allocat	age of a ment o ion of onal inf	ssessment: German and ffered: Once a year, win places	of 2, approx. 30 minu I/or English	-	
Langua Assess Allocat Additio Worklo	age of a ment o ion of onal inf	ssessment: German and ffered: Once a year, win places	of 2, approx. 30 minu I/or English	-	
Langua Assess Allocat Additio Worklo 150 h	age of a ment o ion of p onal inf	ssessment: German and ffered: Once a year, win places ormation	of 2, approx. 30 minu I/or English	-	
Langua Assess Allocat Additio Worklo	age of a ment o ion of p onal inf	ssessment: German and ffered: Once a year, win places ormation	of 2, approx. 30 minu I/or English	-	
Langua Assess Allocat Additio Worklo 150 h Teachin 	age of a ment o ion of onal inf pad	ssessment: German and ffered: Once a year, win places ormation	of 2, approx. 30 minu d/or English ter semester	ites total)	.)
Langua Assess Allocat Additio Worklo 150 h Teachin 	age of a ment o ion of onal inf pad	ssessment: German and ffered: Once a year, win places ormation	of 2, approx. 30 minu d/or English ter semester	ites total))
Langua Assess Allocat Additio 150 h Teachin Referre 	age of a ment o ion of p onal inf pad	ssessment: German and ffered: Once a year, win places ormation e LPOI (examination reg	of 2, approx. 30 minu d/or English ter semester	ites total)	
Langua Assess Allocat Additio Worklo 150 h Teachin Referre Module	age of a ment o ion of p onal inf pad ng cycl ed to in	ssessment: German and ffered: Once a year, win places ormation e LPOI (examination reg	of 2, approx. 30 minu d/or English ter semester ulations for teaching-	ites total))
Langua Assess Allocat Additio Worklo 150 h Teachin Referre Module	age of a ment o ion of p onal inf onal inf oad ad ed to in e appea 's degr	ssessment: German and ffered: Once a year, win places ormation e e LPO I (examination reg ars in ee (1 major) Physics (20	of 2, approx. 30 minu d/or English ter semester ulations for teaching- 16)	ites total) degree programmes	
Langua Assess Allocat Additio Worklo 150 h Teachin Referre Module Master Master	age of a ment o ion of p onal inf onal inf oad ed to in e appea 's degr 's degr	ssessment: German and ffered: Once a year, win places ormation e LPOI (examination reg	of 2, approx. 30 minu d/or English ter semester ulations for teaching- 16) ure Technology (2016)	ites total) degree programmes	
Langua Assess Allocat Additio 150 h Teachin Referre Module Master Master Master	age of a ment o ion of p onal inf pad ad ad ad ad ad ad ad ad ad ad ad ad a	ssessment: German and ffered: Once a year, win places ormation e LPOI (examination reg ars in ee (1 major) Physics (20 ee (1 major) Nanostructu	of 2, approx. 30 minu d/or English ter semester ulations for teaching- 16) ure Technology (2016) Materials (2016)	ites total) degree programmes	
Langua Assess Allocat Additio Worklo 150 h Teachin Referre Module Master Master Master Master	age of a ment o ion of p onal inf onal inf oad ad ad ad ad ad ad ad ad ad ad ad ad a	ssessment: German and ffered: Once a year, win places ormation e LPOI (examination reg ars in ee (1 major) Physics (20 ee (1 major) Nanostructu ee (1 major) Functional N	of 2, approx. 30 minu d/or English ter semester ulations for teaching- 16) ure Technology (2016) Materials (2016) ure Technology (2020)	ites total) degree programmes	;)
Langua Assess Allocat Additio Worklo 150 h Teachin Referre Moster Master Master Master Master Master Master	ed to in e appea 's degr 's degr 's degr 's degr	e e ars in e (1 major) Physics (20 e (1 major) Nanostructu e (1 major) Nanostructu e (1 major) Nanostructu e (1 major) Nanostructu e (1 major) Nanostructu	of 2, approx. 30 minu d/or English ter semester ulations for teaching- 16) ure Technology (2016) Materials (2016) ure Technology (2020) 20)	ites total) degree programmes	
Langua Assess Allocat Additio Worklo 150 h Teachin Referre Master Master Master Master Master Master Master Master	age of a ment o ion of p onal inf onal inf onali	ssessment: German and ffered: Once a year, win places ormation e LPO I (examination reg ars in ee (1 major) Physics (20 ee (1 major) Nanostructu ee (1 major) Nanostructu ee (1 major) Nanostructu ee (1 major) Physics (20)	of 2, approx. 30 minu d/or English ter semester ulations for teaching- 16) ure Technology (2016) Materials (2016) ure Technology (2020) 20) ernational (2020)	ites total) degree programmes	

Module	e title				Abbreviation
Chemical Nanotechnology: Analytics and Applications					08-FU-NT-AA-152-m01
Module coordinator				Module offered by	
degree tional <i>N</i>		mme coordinator Funktic 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	graduate			
Conten	Its				
		o the theory and applicat ethods, dynamic light sca			echnology. Thermoanalysis, industry and technology.
Intende	ed lear	ning outcomes			
Studen	nts have	e developed an advanced	knowledge of the ch	aracterisation and a	application of nanomaterials.
Course	s (type	, number of weekly conta	ct hours, language –	- if other than Germa	an)
V (4)					
		essment (type, scope, la on on whether module ca			ation offered — if not every seme-
e) pres	entatio age of a	. 20 pages) or n (approx. 30 minutes) ssessment: German and, blaces	/or English		
Additio	onal inf	ormation			
Worklo	ad		,		
150 h					
Teachi	ng cycl	e			
Referre	ed to in	LPOI (examination regu	lations for teaching-	degree programmes))
Module	e appea	urs in			
Master	's degr	gree (1 major) Nanostruct ee (1 major) Functional M	aterials (2016)	-	
		gree (1 major) Nanostruct gree (1 major) Quantum T	•, •	0)	
		ee (1 major) Functional M			
Master	's degr	ee (1 major) Functional M	aterials (2025)		

Modu	le title				Abbreviation		
Chem	ical Tec	hnology of Inorgani	c Nano and Micro Particles	S	08-FU-PART-161-m01		
Modu	le coord	linator		Module offered by			
	e progra Matrier		Inktionswerkstoffe (Func-	Chair of Chemical	Fechnology of Material Synthesis		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)			
5	nume	erical grade					
Durat	ion	Module level	Other prerequisites	i			
1 sem	ester	graduate					
Conte	ents						
synth	esis. Ch		all particles and structure-		damental methods of particle ps. Introduction of important par		
Intend	ded lear	ning outcomes					
Stude	ents gair	n advanced knowled	ge in nano- and micropart	icles.			
Cours	es (type	e, number of weekly	contact hours, language –	- if other than Germa	an)		
V (2) +	+ P (2)						
ster, i a) writ b) ora c) ora d) log e) pre Langu Asses	nformat tten exa il exami i exami (approx sentatio age of a ssment o	ion on whether mod mination (approx. 9 nation of one candid	ule can be chosen to earn o to 180 minutes) or late each (20 to 30 minute p to 3 candidates (approx res) a and/or English	a bonus) es) or	ation offered — if not every seme-		
Alloca	ation of	places					
Additi	ional in	formation					
Workload							
WORK							
150 h							
150 h	ing cyc	le					
150 h	ing cyc	le					
150 h Teach 			regulations for teaching-	degree programmes)		
150 h Teach 			regulations for teaching-	degree programmes)		
150 h Teach Referr		LPOI (examination	regulations for teaching-	degree programmes))		

Module title Abbreviation					Abbreviation
Resear	rch Proj	ect 1			08-FU-PR1-161-m01
Module coordinator Module offered by					
	e progra Matrier	mme coordinator Funktic als)	nswerkstoffe (Func-	Chair of Chemical T	echnology of Material Synthesis
ECTS		od of grading	Only after succ. con	pl. of module(s)	
10	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	graduate			
Conter	nts				
This m rials.	odule g	ives students the opport	unity to work indeper	ndently on experime	nts on a topic in functional mate-
Intend	ed lear	ning outcomes			
Studer		able to independently wo	rk on a defined topic	in functional materi	als and to present their findings
Course	es (type	, number of weekly conta	ct hours, language –	· if other than Germa	n)
R (10)		· · · · · · · · · · · · · · · · · · ·			
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-
•		. 25 pages) ssessment: German and,	or English		
Allocat	tion of _l	olaces			
Additio	onal inf	ormation			
			-		
Worklo	bad				
300 h					
-	ng cycl	e			
Referre	ed to in	LPOI (examination regu	lations for teaching.	legree programmes)	
Modul	e appea	ars in			
		ee (1 major) Functional M	aterials (2016)		
	-	ee (1 major) Functional M			
	-	ee (1 major) Functional M			
			<i></i>		

Module	e title				Abbreviation
Resear	rch Proj	ect 2			08-FU-PR2-161-m01
Module	e coord	inator		Module offered by	
degree tional I		mme coordinator Funktic	onswerkstoffe (Func-	Chair of Chemical T	echnology of Material Synthesis
ECTS	Meth	od of grading	Only after succ. com	npl. of module(s)	
10	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ester	graduate			
Conten	nts				
This m rials.	odule g	ives students the opport	unity to work indeper	ndently on experime	nts on a topic in functional mate-
Intend	ed lear	ning outcomes			
Studer in writt			rk on a defined topic	in functional materi	als and to present their findings
Course	es (type	, number of weekly conta	ct hours, language —	· if other than Germa	n)
R (10)					
		sessment (type, scope, la ion on whether module ca			tion offered — if not every seme-
		<. 25 pages) ssessment: German and	/or English		
Allocat	tion of _l	places			
Additio	onal inf	ormation			
Worklo	ad				
300 h					
Teachi	ng cvcl	e			
	0.99				
Referre	ed to in	LPOI (examination regu	lations for teaching-o	legree programmes)	
				- 0· p· - 3· «······00)	
Module	e annea	ars in			
		ee (1 major) Functional M	aterials (2016)		
	-	ee (1 major) Functional M			
	-	ee (1 major) Functional M			
		-			

Module	e title				Abbreviation
Polyme	er Mate	rials 1: Technology of Po	lymer Modification		08-FU-PW1-161-m01
Module coordinator				Module offered by	
	progra	mme coordinator Funktio	nswerkstoffe (Func-		echnology of Material Synthesis
ECTS		od of grading	Only after succ. com	pl. of module(s)	
5	1	rical grade		• • • •	
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
logies f	or the				; properties of polymers; techno- es for the characterisation of po-
Intende	ed lear	ning outcomes			
such as nufactu cessing	inject ired prog mach	ion moulding) and under oducts. They have becom ines and tools.	stand the different w e familiar with ways	ays of influencing th to calculate complex	chnologies, processing methods e properties of materials and ma- c flow conditions in polymer pro-
		, number of weekly conta	ct hours, language –	· if other than Germa	n)
V (2) +					
		sessment (type, scope, la on on whether module ca			tion offered — if not every seme-
b) oral c) oral (Langua Assess	examir examin ge of a ment o	mination (approx. 90 min nation of one candidate e ation in groups (groups c ssessment: German and, ffered: Once a year, winte or bonus	ach (approx. 20 minu of 2, approx. 30 minu ⁄or English	-	
Allocat	ion of J	olaces			
Additio	nal inf	ormation			
Worklo	ad				
150 h					
Teachiı	ng cycl	e			
Referre	d to in	LPOI (examination regu	lations for teaching-o	legree programmes)	
Module	e appea	ars in			
Master Master	's degr 's degr	ee (1 major) Functional M ee (1 major) Functional M ee (1 major) Biofabricatio	aterials (2022) n (2025)		
Master	's degr	ee (1 major) Functional M	aterials (2025)		

Module	e title				Abbreviation			
Polyme	er Mate	rials 2: Technology of Fi	ler Modification for F	Polymer Materials	08-FU-PW2-161-m01			
Module	e coord	inator		Module offered by	<u> </u>			
degree programme coordinator Funktionswerkstoffe (Func- tional Matrierials)								
ECTS	1	od of grading	Only after succ. con	pl. of module(s)				
5		rical grade		•				
			Other prerequisites	Other prerequisites				
1 semester graduate								
Conten	ts							
ons bet (e.g. el rheolog	tween f ectrica gy, mec	iller materials and polym behaviour, bactericidal hanical behaviour, colou	ers, determination of behaviour) and influe	f the special propert	er to modify polymers, interacti- ies of functionalised polymers tion on other properties (e.g.			
Intende	ed lear	ning outcomes						
ped an interac tionalis	aware tions b sed pol	ness of the possibilities a etween filler materials ar	and problems associand problems associand polymers. They known a start a start and the	ated with the modific ow how to determine behaviour) and unde	er materials. They have develo- cation of polymers as well as the e the special properties of func- rstand how other properties are urface).			
Course	s (type	, number of weekly conta	ict hours, language –	- if other than Germa	n)			
V (2) +	P (2)							
		sessment (type, scope, la ion on whether module c			tion offered — if not every seme			
b) oral c) oral Langua Assess	examir examin Ige of a ment o	mination (approx. 90 mir nation of one candidate e ation in groups (groups of ssessment: German and ffered: Once a year, sum or bonus	ach (approx. 20 minu of 2, approx. 30 minu /or English	-				
Allocat	ion of _l	olaces						
Additio	nal inf	ormation						
Worklo	ad							
150 h								
Teachi	ng cycl	e						
	-							
Referre	ed to in	LPOI (examination regu	lations for teaching-o	degree programmes)				
Module	e appea	ars in						
Master	's degr	ee (1 major) Functional N	aterials (2016)					
Master's degree (1 major) Functional Materials (2022)								
Master	's degr	ee (1 major) Functional N	laterials (2025)					

Modul	e title				Abbreviation		
Sensor and Actor Materials - Functional Ceramics and Mag				netic Particles	08-FU-SAM-161-m01		
Module coordinator				Module offered by	y		
degree tional <i>I</i>		mme coordinator Funktic	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	isites			
1 seme	ster	graduate					
Conten	ts						
					as piezoelectrics, shape memory blogical fluids, magnetofluids.		
Intend	ed lear	ning outcomes					
Studer	nts have	e developed fundamenta	l knowledge in the ar	ea of sensory and a	actuatory materials.		
Course	s (type	, number of weekly conta	ict hours, language –	- if other than Germ	nan)		
V (2) +							
		sessment (type, scope, la ion on whether module ca			nation offered — if not every seme		
	itable f	offered: Once a year, sum For bonus p laces					
Additio	onal inf	ormation					
Worklo	ad						
150 h							
Teachi	ng cycl	e					
Referre	ed to in	LPOI (examination regu	lations for teaching-o	legree programme	s)		
Modul							
	-	ee (1 major) Physics (201					
	-	ee (1 major) Nanostructur					
Master's degree (1 major) Functional Materials (2016) Master's degree (1 major) Nanostructure Technology (2020)							
	-	ee (1 major) Physics (202					
	-	ee (1 major) Physics Inter					
		ee (1 major) Quantum En					
	-	ee (1 major) Quantum Teo					
	-	ee (1 major) Quantum Eng					
waster	s aegr	ee (1 major) Physics Inter	national (2024)				

Module title					Abbreviation		
Organic Chemistry 4 08-0C4-152-m01							
Module coordinator				Module offered by			
holder	of the (Chair of Organic Chemist	rv II	Institute of Organic Chemistry			
ECTS		od of grading	Only after succ. con		,		
5	1	rical grade					
Duratio		Module level	Other prerequisites				
1 seme		undergraduate					
Conter			1				
	zardou	liscusses biologically im s substances, complicat					
Intend	ed lear	ning outcomes					
Students are able to name important heteroaromatics and to formulate their reactions and syntheses. They are able to characterise and categorise dyes. Students are able to describe the structure and selective synthesis of proteins. In addition, they are able to describe the structure of the DNA, carbohydrates, fats, terpenes and stero-ids.							
Course	s (type	, number of weekly cont	act hours, language –	- if other than Germa	n)		
V (2) +	Ü (2)						
		sessment (type, scope, laion on whether module of			tion offered — if not	every seme-	
 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					
Additio	onal inf	ormation	_				
Worklo			_				
	Dad						
150 h							
Teachi	ng cycl	e	_				
Referre	ed to in	LPOI (examination reg	ulations for teaching-o	degree programmes)			
§ 22 Nr. 1 h)							
-	§ 22 II Nr. 2 f)						
§ 62 Nr. 2							
Module appears in							
Bachelor's degree (1 major) Biochemistry (2015)							
First state examination for the teaching degree Grundschule Chemistry (2015)							
First state examination for the teaching degree Realschule Chemistry (2015)							
First state examination for the teaching degree Gymnasium Chemistry (2015)							
First state examination for the teaching degree Mittelschule Chemistry (2015)							
Master's degree (1 major) Functional Materials (2016)							
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)							
Bachelor's degree (1 major) Biochemistry (2017) Master's with 1 major Functional Materials (2016) JMU Würzburg • generated 19-Apr-2025 • exam. reg. da- page 31 / 99							
waster's w	nin 1 majo	r Furictional Materials (2016)	-	generated 19-Apr-2025 • exa r (120 ECTS) Funktionswerkst	-	page 31 / 99	

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) First state examination for the teaching degree Mittelschule Chemistry (2020 (Prüfungsordnungsversion 2015)) Bachelor's degree (1 major) Biochemistry (2022) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Module title					Abbreviation			
Organic Functional Materials 08-OCM-FM-161-m01								
Module coordinator			Module offered by					
		seminar "Organische F	unktionsmaterialien"					
ECTS	-	od of grading	Only after succ. con		,			
5	1	rical grade						
Durati	on	Module level	Other prerequisites					
1 seme	ester	graduate						
Conte	nts							
sical e compo	ffects ir	eals with specific topics organic molecular and uch as field effect trans	l polymeric semicondu	ctors as well as their	application in (opto)electronic		
Intend	ed lear	ning outcomes						
explai	n the sy uch as f	are able to explain fund nthesis of these semico ield effect transistors, o	onductor materials as v	vell as their applicat	ion in (opto)electror	ic compon-		
Course	es (type	, number of weekly con	tact hours, language –	- if other than Germa	n)			
S (3)								
 Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus) a) 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						
	_							
Additi	onal inf	ormation						
Workload								
150 h								
Teachi	ing cycl	е						
Referr	ed to in	LPOI (examination reg	gulations for teaching-	degree programmes)				
Module appears in								
Master's degree (1 major) Chemistry (2016)								
Master's degree (1 major) Functional Materials (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Chemistry (2018) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Functional Materials (2022)								
Master's v	vith 1 majo	Functional Materials (2016)		generated 19-Apr-2025 • exa r (120 ECTS) Funktionswerks		page 33 / 99		

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

Master's degree (1 major) Chemistry (2024)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Functional Materials (2025)

Module title					Abbreviation	
Modern Synthetic Methods					08-0CM-SYNT-161-1	m01
Madula and instan						-
Module coordinator lecturer of the seminar				Module offered by		
				Institute of Organic	Chemistry	
ECTS		od of grading	Only after succ. con	npl. of module(s)		
5		rical grade	-			
Duratio		Module level	Other prerequisites			
1 seme		graduate				
Conter						
		iscusses modern stere emistry and catalysis.	oselective synthesis m	ethods. It focuses of	n selected total synt	heses, orga-
Intend	ed lear	ning outcomes				
They ca	an expla	able to stereoselectivel ain total syntheses. The				
	emistry.					
		, number of weekly con	tact hours, language –	- if other than Germa	ın)	
S (2) + Modul		t in: German or English				
		essment (type, scope, on on whether module			ition offered — if not	every seme-
b) oral	examir	mination (approx. 90 to ation of one candidate ation in groups of up to	each (20 to 30 minute		didate) or	
		. 20 pages) or	5 5 canalaates (approx	. 15 minutes per can		
		n (approx. 30 minutes)				
Langua	age of a	ssessment: German an	id/or English			
Allocat	tion of p	olaces				
Additio	onal inf	ormation				
Worklo	ad					
150 h						
-	ng cycl	•				
Teacin	iig tyti	e				
Referred to in LPO I (examination regulations for teaching-degree programmes)						
Module appears in						
Master's degree (1 major) Chemistry (2016)						
Master's degree (1 major) Functional Materials (2016)						
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Chemistry (2018)						
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)						
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)						
Master's degree (1 major) Functional Materials (2022)						
Master's degree (1 major) Chemistry (2024)						
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)						
Master's w	ith 1 majo	r Functional Materials (2016)	-	• generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerks	-	page 35 / 99



Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Functional Materials (2025)

Module title Abbreviation						
Laser S	pectro	scopy			08-PCM1a-161-m01	
Module	e coord	inator		Module offered by		
lecture copy)	r of ser	ninar "Laserspektrosko	oie" (Laser Spectros-	Institute of Physical and Theoretical Chemistry		
ECTS	Metho	od of grading	Only after succ. con	pl. of module(s)		
5		rical grade		-		
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts		-			
	This module introduces students to the fundamental principles of laser spectroscopy. It discusses absorption and emission spectroscopy.					
Intende	ed lear	ning outcomes				
		able to explain the compology. They are able to o				
Course	s (type	, number of weekly con	tact hours, language –	- if other than Germa	n)	
S (2) + Module		t in: German or English				
Method	d of ass	sessment (type, scope, ion on whether module			tion offered — if not	every seme-
b) oral	examir	mination (approx. 90 m nation of one candidate ssessment: German an	each (approx. 20 minu	utes)		
Allocat	ion of _l	olaces				
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachir						
Teachin	ig cyci	e				
	• • •					
Referre	d to in	LPOI (examination reg	ulations for teaching-o	legree programmes)		
Module	e appea	ars in				
Master	's degr	ee (1 major) Chemistry (2016)			
	-	ee (1 major) Mathemati				
	-	ee (1 major) Computatio	-	6)		
Master's degree (1 major) Functional Materials (2016)						
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Master's degree (1 major) Chemistry (2018)						
	Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019)					
	-	hing degree Gymnasium	-	ion PLUS Flite Netwo	ork Bayaria (FNB) (2	020)
		ry course MINT Teacher				020)
		ee (1 major) Computatio			,,	
	-	ee (1 major) Functional		,		
		r Functional Materials (2016)		generated 19-Apr-2025 • exa	am reg da	D300 27 / 00
Master S WI	ai i majo	r runctional Materials (2010)	-	r (120 ECTS) Funktionswerkst	-	page 37 / 99

Master's degree (1 major) Mathematics (2022) Master's degree (1 major) Chemistry (2024) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Functional Materials (2025)

Module	e title				Abbreviation	
Statist	ical Me	chanics and Reaction D	ynamics		08-PCM2-161-m01	
Module	coord	inator		Module offered by	<u> </u>	
					l an d The section of Ch	
mics)		ninar "Chemische Dynan	·		l and Theoretical Ch	emistry
ECTS		od of grading	Only after succ. con	pl. of module(s)		
5	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
clude t	he func	iscusses selected topics lamental principles of st yell as charge and energ	atistical thermodynar			
		ning outcomes				
		e become familiar with s	elected topics in stati	stical mechanics and	d reaction dynamics.	. They have
		re able to apply the fund				,
Course	s (type	, number of weekly cont	act hours, language –	- if other than Germa	ın)	
S (2) +		•	·		•	
		t in: German or English				
		essment (type, scope, l on on whether module o			tion offered — if not	every seme-
b) oral c) talk (examin (approx	mination (approx. 90 mi ation of one candidate (. 30 minutes)	each (approx. 20 minu	utes) or		
		ssessment: German and	I/or English			
Allocat	ion of p	olaces				
Additio	nal inf	ormation				
Worklo	ad					
150 h						
Teachi	ng cvcl	9				
	<u> </u>	-				
Referre	d to in	LPOI (examination reg	lations for teaching	legree programmoc)		
Referre			alations for leaching-t			
Module						
	-	ee (1 major) Chemistry (2				
Master's degree (1 major) Mathematics (2016)						
Master's degree (1 major) Computational Mathematics (2016) Master's degree (1 major) Functional Materials (2016)						
Master's degree (1 major) Functional Materials (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Master's degree (1 major) Chemistry (2018)						
	-	ee (1 major) Computatio		9)		
	-	ee (1 major) Mathematic				
		ning degree Gymnasium				020)
Supple	mentar	y course MINT Teacher E	ducation PLUS, Elite I	Network Bavaria (EN	B) (2020)	
Master's wi	ith 1 maio	Functional Materials (2016)	JMU Würzburg●	generated 19-Apr-2025 • exa	am. reg. da-	page 39 / 99
			-	r (120 ECTS) Funktionswerks	-	

Master's degree (1 major) Functional Materials (2025)

Modul	Module title Abbreviation						
Nanoscale Materials 08-PCM3-161-m01							
Modul	e coord	inator		Module offered by	<u> </u>		
		seminar "Nanoskalige	Materialien"	Institute of Physical and Theoretical Chemistry			
ECTS	1	od of grading	Only after succ. con			ennotry	
5		rical grade					
Durati	on	Module level	Other prerequisites				
1 seme	ester	graduate					
Conte	nts						
	This module discusses advanced topics in nanoscale materials. It focuses on the structure, properties, fabricati- on, modern characterisation methods and application areas of nanoscale materials.						
Intend	ed lear	ning outcomes					
		able to characterise nan noscale materials.	oscale materials. They	<i>r</i> are able to name ar	nalytical methods an	ıd applicati-	
Course	es (type	, number of weekly cont	act hours, language –	- if other than Germa	ın)		
S (2) +							
Modul	e taugh	t in: German or English					
		Sessment (type, scope, on on whether module			tion offered — if not	every seme-	
a) writ	ten exai	mination (approx. 90 mi	inutes) or				
		ation of one candidate	each (approx. 20 mini	utes) or			
		(. 30 minutes)	d / ax English				
	age of a able for	ssessment: German and bonus	u/or English				
	tion of p						
Additi	onal inf	ormation					
Workle	oad						
150 h							
	ing cycl	e					
		-					
Referr	ed to in	LPOI (examination reg	ulations for teaching-	degree programmes)			
Modul	e appea	urs in					
		ee (1 major) Chemistry (2016)				
	-	ee (1 major) Mathematic					
	-	ee (1 major) Computatio		6)			
Master's degree (1 major) Functional Materials (2016)							
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)							
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)							
Master's degree (1 major) Chemistry (2018) Master's degree (1 major) Computational Mathematics (2019)							
	-	ee (1 major) Mathematic		9)			
	-	ning degree Gymnasium	-	ion PLUS, Elite Netw	ork Bavaria (ENB) (2	020)	
		y course MINT Teacher					
Bache	lor's de	gree (1 major) Quantum	Technology (2021)				
Master's v	vith 1 majo	r Functional Materials (2016)		generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerks		page 41 / 99	

Master's degree (1 major) Functional Materials (2025)

Module	e title				Abbreviation	
Physica	al Chem	istry of Supramolecula	r Assemblies		08-PCM5-161-m01	
Module	coordi	nator		Module offered by		
		seminar "Physikalische	Chamia Supramala	· · ·	l and Theoretical Ch	omicta
kularer	Struktu	ıren"	· 1			emistry
ECTS		d of grading	Only after succ. con	npl. of module(s)		
5	numer	ical grade				
Duratio	n	Module level	Other prerequisites	i		
1 seme	ster	graduate				
Conten	ts					
		xamines the basic inter of aggregates as well as				ysical-chemi
		ing outcomes	_ * • •	•	•	
in the f dern ap Course	ield. Th oplicatio s (type,	ble to explain the basic ey can describe the forr ons of supramolecular o number of weekly cont	nation and physical-c hemistry.	hemical properties o	f aggregates. They c	
S (2) + Module	• •	in: German or English				
		essment (type, scope, l on on whether module			tion offered — if not	every seme-
b) oral c) talk (Langua	examin (approx ge of as	nination (approx. 90 mi ation of one candidate . 30 minutes) ssessment: German and	each (approx. 20 mini	utes) or		
Allocat	ion of p	laces				
Additio	nal info	ormation	_			
Worklo	ad					
150 h						
Teachi	ng cycle	9				
	0.,	-				
Referre	d to in	LPOI (examination reg	ulations for teaching.	degree programmes)		
Referre						
	e appea					
	-	ee (1 major) Chemistry (
Master's degree (1 major) Mathematics (2016)						
Master's degree (1 major) Computational Mathematics (2016) Master's degree (1 major) Functional Materials (2016)						
Master's degree (1 major) Functional Materials (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Master's degree (1 major) Chemistry (2018)						
	-	ee (1 major) Computatio		.9)		
	-	ee (1 major) Mathematic		~		
Master	's teach	ing degree Gymnasium y course MINT Teacher I	MINT Teacher Educat			020)
Mactoria	th 1 main	Functional Materials (ass()	IAAI \A/::	generated to Apr ages	am rog da	
naster 5 WI	un i major	Functional Materials (2016)	-	• generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerkst	-	page 43 / 99

Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Functional Materials (2022) Master's degree (1 major) Mathematics (2022) Master's degree (1 major) Chemistry (2024) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Master's degree (1 major) Biofabrication (2025) Master's degree (1 major) Functional Materials (2025)

Module title				Abbreviation	
Applied	d Spect	roscopy 3			08-PS3-152-m01
Module	e coord	inator		Module offered by	
lecture	r of lect	ture "Praktische Spektros	kopie 3"	Institute of Physica	l and Theoretical Chemistry
ECTS	·	od of grading	Only after succ. com	pl. of module(s)	
5	nume	rical grade			
Duratio		Module level	Other prerequisites		
1 seme	ster	undergraduate			
Conten	ts				
This module gives students the opportunity to apply their theoretical knowledge of spectroscopic methods in practice and to interpret readings or graphs. We will record and analyse UV-VIS, fluorescence and vibration spectra and discuss modern mass spectrometry methods.					
Intende	ed learr	ning outcomes			
		able to work with differen discussions.	t spectrometers and	to interpret the resul	lting spectra. They are able to
Course	s (type,	, number of weekly conta	ct hours, language –	- if other than Germa	ın)
V (3)					
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a 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					
Worklo					
150 h					
Teachi	ng cycl	9			
	is cycl	5			
	dtain	IDOL (overside the second	lations for taashing	dograa programma)	
Referred to in LPO I (examination regulations for teaching-degree programmes)					
 Module annears in					
Module appears inBachelor's degree (1 major) Chemistry (2015)Bachelor's degree (1 major) Functional Materials (2015)Master's degree (1 major) Functional Materials (2016)Bachelor's degree (1 major) Chemistry (2017)Bachelor's degree (1 major) Functional Materials (2021)Bachelor's degree (1 major) Functional Materials (2025)					

Module title Abbreviation				Abbreviation	
-	Supramolecular Chemistry (Basics) 08-SCM1-161-m01				
Module	e coordi	inator		Module offered by	
lecture sics)"	r of the	seminar "Supramolecula	ar Chemistry (Ba-	Institute of Organic	Chemistry
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
5		rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	1 semester graduate				
Conten	ts				
actions nation	betwe polyme	en molecules, molecular	recognition by recep rystals, self-assembl	tors, complexes, sup	ar chemistry. It focuses on inter- pramolecular polymers, coordi- synthetic ion channels and mo-
Intende	ed learr	ning outcomes			
field as describ	well as	s to describe the formation	on, structure and poly s in aqueous media a	mers of coordinatio s well as to identify t	igh degree of expertise in the n compounds. They are able to the characteristics of synthetic
Course	s (type,	number of weekly conta	ct hours, language –	- if other than Germa	n)
S (3) Module	e taugh	t in: German or English			
		essment (type, scope, la on on whether module ca			tion offered — if not every seme-
b) oral	examin	nination (approx. 90 min ation of one candidate e ssessment: German and,	ach (approx. 20 minu	utes)	
Allocat	ion of p	olaces			
Additio	nal info	ormation			
Worklo	ad				
150 h					
Teachir	ng cycle	9			
	0 . 7	-			
Referre	d to in	LPO I (examination regu	lations for teaching-o	degree programmes)	
	Referred to in LPO I (examination regulations for teaching-degree programmes)				
Module	Module appears in				
		ee (1 major) Functional M	aterials (2016)		
	-	ee (1 major) Functional M			
	-	ee (1 major) Chemistry (2			
		ning degree Gymnasium I			
		y course MINT Teacher E		Network Bavaria (EN	B) (2025)
	-	ee (1 major) Biofabricatio ee (1 major) Functional M	-		
	Master's degree (1 major) Functional Materials (2025)				

Module title				Abbreviation	
Bioorganic Ch	-			08-SCM3-152-m01	
Module coord	inator		Module offered by		
lecturer of lect Chemistry)	ture "Bioorganische Ch	emie" (Bioorganic	Institute of Organic Chemistry		
	od of grading	Only after succ. con	npl. of module(s)		
5 nume	rical grade				
Duration	Module level	Other prerequisites			
1 semester	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 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)					
	ning 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, carbohy- drates and lipids.					
Courses (type	, number of weekly con	tact hours, language –	- if other than Germa	n)	
S (3)					
	essment (type, scope, on on whether module			tion offered — if not	every seme-
b) oral examir c) oral examin Language of a	mination (approx. 45 to nation of one candidate ation in groups of up to ssessment: German an	each (20 to 30 minute 3 candidates (15 to 30		late)	
Allocation of p	olaces				
Additional inf	ormation				
Workload					
150 h					
Teaching cycl	e				
Referred to in	LPOI (examination res	gulations for teaching-	degree programmes)		
Referred to in LPO I (examination regulations for teaching-degree programmes)					
Module appears in					
	ee (1 major) Biochemist	try (2015)			
-	ee (1 major) Chemistry (
-	ee (1 major) Functional				
	ning degree Gymnasiun ry course MINT Teacher				016)
	r Functional Materials (2016)	JMU Würzburg •	generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerkst	am. reg. da-	page 47 / 99

Master's degree (1 major) Biochemistry (2017) Master's degree (1 major) Chemistry (2018) Master's degree (1 major) Biochemistry (2019) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Functional Materials (2022) Master's degree (1 major) Chemistry (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Master's degree (1 major) Functional Materials (2025)

Module title					Abbreviation	
Select	Selected Topics in Theoretical Chemistry 08-TCM1-161-m01					
Madul	e coord	inator		Module offered by		
			•			
	1	ture "Theoretische Cher		Institute of Physica	l and Theoretical Ch	emistry
ECTS	1	od of grading	Only after succ. con	npl. of module(s)		
5	<u> </u>	rical grade				
Duratio		Module level	Other prerequisites			
1 seme		graduate				
	Contents					
This m	odule ir	ntroduces students to the	ne fundamental princi	ples of theoretical ch	emistry.	
Intend	ed learr	ning outcomes				
Studer	nts are a	able to describe the ma	thematical and physic	al principles underly	ing the quantum che	emical and
quantu	ım dyna	amical approaches of th	eoretical chemistry.			
Course	s (type,	, number of weekly con	tact hours, language –	- if other than Germa	n)	
S (2) +	Ü (2)					
		sessment (type, scope,	 language — if other th	an German, examina	tion offered — if not	everv seme-
		on on whether module				every serie
		mination (approx. 90 to				
		ation of one candidate		es) or		
,		ation in groups of up to	· ·	,	didate) or	
		. 20 pages) or				
		n (approx. 30 minutes)	.,			
Langua	age of a	ssessment: German an	d/or English			
Allocat	tion of p	olaces				
Additio	onal info	ormation				
Worklo	ad					
150 h						
	ng cycl	6				
	0.7	-				
Referre	ed to in	LPOI (examination reg	ulations for teaching-	degree programmes)		
Modul	e appea	ore in				
			(001()			
	-	ee (1 major) Chemistry (
	-	ee (1 major) Mathematio ee (1 major) Computatio		()		
	-			0)		
	Master's degree (1 major) Functional Materials (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)					016)
	Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)					
	Master's degree (1 major) Chemistry (2018)					
	-	ee (1 major) Computatio		9)		
	-	ee (1 major) Mathematic				
	-	ning degree Gymnasium	-	ion PLUS, Elite Netwo	ork Bavaria (ENB) (2	020)
		y course MINT Teacher				
		, ee (1 major) Computatio			-	
	-	ee (1 major) Functional				
Master's w	ith 1 major	Functional Materials (2016)	IMII Würzhurg	generated 19-Apr-2025 • exa	am, reg. da-	page 49 / 99
			-	er (120 ECTS) Funktionswerkst	-	P~3~ 47 / 99

Master's degree (1 major) Mathematics (2022) Master's degree (1 major) Chemistry (2024) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Functional Materials (2025)

Module	e title			Abbreviation		
Basics and Applications of Quantum Chemistry				08-TCM2-161-m01		
Module	e coordinator		Module offered by			
	r of lecture "Computational C	homistry"		l and Theoretical Ch	omistry	
ECTS	Method of grading	Only after succ. co			ennstry	
5	numerical grade					
Duratio		Other prerequisite	IC .			
1 seme			5			
Conten		l				
		the fundemental princ	inlag of computations	al ab amiatry		
	odule introduces students to	the fundamental princ	iples of computationa	at chemistry.		
	ed learning outcomes					
	nts are able to explain the the phal chemistry.	oretical principles of c	omputational chemist	try and to apply meth	nods in com-	
Course	s (type, number of weekly co	ntact hours, language	— if other than Germa	n)		
S (2) +	Ü (2)					
	d of assessment (type, scope formation on whether module			tion offered — if not	every seme-	
 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	onal information					
Worklo	ad					
150 h						
Teachi	ng cycle					
Referre	ed to in LPO I (examination re	egulations for teaching	-degree programmes)			
Module	e appears in					
	's degree (1 major) Chemistry	(2016)				
	's degree (1 major) Mathemat					
	's degree (1 major) Computat		16)			
	's degree (1 major) Functiona					
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
Master's degree (1 major) Chemistry (2018)						
Master's degree (1 major) Computational Mathematics (2019)						
	's degree (1 major) Mathemat		tion DILLC Flits Nature	ork Dougris (END) (-	o o o)	
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)						
	Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)					
Supple	-	Master's degree (1 major) Computational Mathematics (2022)				
Supple Master	-	ional Mathematics (20		Б) (2020)		
Supple Master Master	's degree (1 major) Computat	ional Mathematics (20 l Materials (2022)			page 51 / 99	

Master's degree (1 major) Mathematics (2022) Master's degree (1 major) Chemistry (2024) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Functional Materials (2025)

Module					Abbreviation	
Numeri	ical Meth	ods and Programmin	g		08-TCM3-161-m01	
Module	e coordin	ator		Module offered by		
		re "Programmieren in	Theoretischer Che-		l and Theoretical Ch	omictry
mie"						emistry
ECTS	ECTS Method of grading Only after succ. compl. of module(s)					
5	numerio	cal grade				
Duratio		Aodule level	Other prerequisites	i		
1 seme	ster g	graduate				
Conten	ts					
		ovides an introduction on areas.	n to the fundamentals	of programming in th	eoretical chemistry	and discus-
Intende	ed learni	ng outcomes				
		le to explain and use me its application are	one of the programmi eas.	ng languages typical	ly used in theoretica	l chemistry
Course	s (type, r	number of weekly con	tact hours, language –	- if other than Germa	n)	
S (2) +						
Method	d of asse		language — if other th can be chosen to earn		tion offered — if not	every seme-
c) oral e d) log (a e) prese	examinat (approx. 2 entation		each (20 to 30 minute 3 candidates (approx d/or English	-	didate) or	
Allocat	ion of pla	aces				
Additio	onal infor	mation				
Worklo	ad					
150 h						
	ng cycle					
Teacini	ig cycle					
Deferre	dtainl	DOL (avamination ra		dagraa programmac)		
Referre			gulations for teaching-	degree programmes)		
		•				
	e appears					
	-	e (1 major) Chemistry				
Master's degree (1 major) Mathematics (2016)						
Master's degree (1 major) Computational Mathematics (2016) Master's degree (1 major) Functional Materials (2016)						
Master's degree (1 major) Functional Materials (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)						
	Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)					
Master'	mentarv	course MINT Teacher	Education PLUS, Elite	Network Bavaria (EN	B) (2016)	010)
Master' Supple	•	course MINT Teacher e (1 major) Chemistry		Network Bavaria (EN	B) (2016)	010)
Master' Supple Master'	's degree	e (1 major) Chemistry			B) (2016)	010)
Master' Supple Master' Master'	's degree 's degree	e (1 major) Chemistry	(2018) onal Mathematics (201		B) (2016)	010)
Master' Supple Master' Master' Master' Master'	's degree 's degree 's degree 's teaching	e (1 major) Chemistry e (1 major) Computatio e (1 major) Mathemati ng degree Gymnasiun	(2018) onal Mathematics (201	.9) ion PLUS, Elite Netwo	ork Bavaria (ENB) (20	

Master's degree (1 major) Functional Materials (2025)

Modul	Module title Abbreviation						
Quanti	Quantum Dynamics 08-TCM4-161-mo1						
Modul	e coord	inator		Module offered by			
1		ture "Quantendynamik	1	-	f Physical and Theoretical Chemistry		
ECTS		od of grading	Only after succ. con			christiy	
5		rical grade					
Duratio	·	Module level	Other prerequisites				
1 seme		graduate					
Conter	nts	3					
	Time-dependent Schrödinger equation, propagators, time-dependent perturbation theory, adiabatic theorem, diabatic and adiabatic states, non-adiabatic dynamics, mixed quantum-classical dynamics.						
		ning outcomes		•	,		
		oossess knowledge ab	out the time-dependen	t description of the r	nuclear and electron	ic dynamics	
in mole	ecules.	Their insight into the m theoretical chemistry.					
Course	s (type	, number of weekly con	tact hours, language –	- if other than Germa	n)		
S (2) +	Ü (2)						
		essment (type, scope, on on whether module			tion offered — if not	every seme-	
a) writt	en exa	nination (approx. 90 to	180 minutes) or				
		ation of one candidate		s) or			
		ation in groups of up to	o 3 candidates (approx	. 15 minutes per can	didate) or		
		. 20 pages) or					
		n (approx. 30 minutes) ssessment: German ar					
Alloca	tion of p	Jaces					
Additio	onal inf	ormation					
Worklo	nad						
150 h							
	ng cycl	e					
Referre	ed to in	LPOI (examination reg	gulations for teaching-	degree programmes)			
Modul	e appea	ars in					
Master	's degr	ee (1 major) Chemistry	(2016)				
Master	's degr	ee (1 major) Mathemati	cs (2016)				
Master's degree (1 major) Computational Mathematics (2016)							
Master's degree (1 major) Functional Materials (2016)							
Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)							
Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)							
	-	ee (1 major) Chemistry		`			
	-	ee (1 major) Computati		9)			
	-	ee (1 major) Mathemati					
		ning degree Gymnasiur y course MINT Teacher				020)	
Master's w	vith 1 major	Functional Materials (2016)	-	9 generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerkst	-	page 55 / 99	

Master's degree (1 major) Functional Materials (2025)

Module title Abbreviation				Abbreviation	
	Practical Course in Programming 10-I-PP-152-m01				
Module	e coord	inator		Module offered by	
Dean o	f Studie	es Informatik (Computer S	Science)	Institute of Comput	er Science
ECTS		od of grading	Only after succ. com	pl. of module(s)	
10	(not) s	successfully completed			
Duratio	on	Module level	Other prerequisites		
		undergraduate			
Conten	Its				
The pro	ogramm	ning language Java. Indep	endent creation of sr	mall to middle-sized	, high-quality Java programs.
Intend	ed learı	ning outcomes			
The stu	udents a	are able to independently	v develop small to mi	ddle-sized, high-qua	ality Java programs.
Course	s (type	, number of weekly conta	ct hours, language –	· if other than Germa	n)
P (6)		, , , , , , , , , , , , , , , , , , , ,	, , , , , , , , , , , , , , , , , , , ,		,
	d of ass	essment (type, scope, la	nguage — if other tha	an German, examina	tion offered — if not every seme-
		on on whether module ca			,
written	examiı	nation (approx. 60 to 120	minutes).		
					tion may be replaced by an oral
			prox. 20 minutes) or	an oral examination	in groups of 2 candidates (ap-
		es per candidate).			
Allocat	tion of p	olaces			
Additio	onal info	ormation			
Worklo	ad				
300 h					
Teachi	ng cycl	е			
Teachi	ng cycle	e: every semester			
Referre	ed to in	LPOI (examination regu	lations for teaching-c	legree programmes)	
§ 49 I I	Vr. 1 c)				
§6911	Vr. 1 d)				
Module	e appea	ars in			
Bachel	or's de	gree (1 major) Computer S	Science (2015)		
		gree (1 major) Mathemati	-		
1	Bachelor's degree (1 major) Human-Computer Systems (2015)				
	Bachelor's degree (1 major) Computational Mathematics (2015) Bachelor's degree (1 major) Aerospace Computer Science (2015)				
			-	_	
		mination for the teaching			
		mination for the teaching ee (1 major) Functional M		computer science (2	2015)
1	-	gree (1 major) Functional M			
1		ee (1 major) Functional M			
1	-	ee (1 major) Functional M			
		,.,	····· · · · · · · · · · · · · · · · ·		

Module title					Abbreviation	
Modeling and Computational Science					10-M-MWR-152-m01	
Module coordinator				Module offered by		
Dean of Studies Mathematik (Mathematics)			atics)	Institute of Mathem	atics	
ECTS	1	od of grading	Only after succ. com			
8		rical grade				
Duratio		Module level	Other prerequisites			
1 seme		undergraduate				
Conten	ts					
scaling	; the mo ndame	odelling, asymptotic serie ntal methods for numerio	es, classical methods	for solving ordinary	rinciples of modelling, aspects of and partial differential equati- ns and the resulting systems of li-	
Intend	ed lear	ning outcomes				
		nasters the fundamental ng sciences on a comput		ls and techniques to	o simulate processes from natura	
Course	s (type	, number of weekly conta	act hours, language —	if other than Germa	n)	
V (4) + Module	• •	t in: German and/or Engl	ish			
Metho	d of ass	-	anguage — if other tha		tion offered — if not every seme-	
c) oral	examin age of a ble for		of 2, 10 to 15 minutes	-		
Additio	nalinf	ormation				
Auditio	niat IIII	UIIIIdUUI				
 Worklo	ad					
240 h						
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination regu	llations for teaching-c	legree programmes)		
Module appears in						
Bachelor's degree (1 major) Physics (2015) Bachelor's degree (1 major) Mathematical Physics (2015) Bachelor's degree (1 major) Computational Mathematics (2015) Bachelor's degree (1 major) Mathematical Physics (2016) Master's degree (1 major) Functional Materials (2016) Bachelor's degree (1 major) Physics (2020) Bachelor's degree (1 major) Mathematical Physics (2020)						
Bachel Bachel Master Bachel	or's de 's degr or's de	gree (1 major) Mathemati ee (1 major) Functional M gree (1 major) Physics (20	ical Physics (2016) laterials (2016) 020)	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		

Module title	Abbreviation						
Imaging Methods at the Synchroton		11-BMS-152-m01					
Module coordinator	Module	Module offered by					
Managing Director of the Institute of Applied Ph	sics Faculty	Faculty of Physics and Astronomy					
ECTS Method of grading Only aft	Only after succ. compl. of module(s)						
6 numerical grade							
Duration Module level Other p	erequisites						
1 semester undergraduate							
Contents							
Periodic and aperiodic signals. Fundamentals of and image processing. Discretisation of signals the convolution product. Tapering functions and energetic aspects. Statistical signals, image no transform.	/ sampling theorem interpolation of im	(Shannon). Homogeneous and linear filter, ages. The Parsival theorem, correlation and					
Intended learning outcomes							
The students know the principles of digital image applications of different image processing mether the state of the state							
Courses (type, number of weekly contact hours	language — if othe	r than German)					
V (3) + R (1) Module taught in: German or English							
Method of assessment (type, scope, language ster, information on whether module can be cho							
 c) oral examination in groups (groups of 2, appled) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method stead take the form of an oral examination of or of assessment is changed, the lecturer must infination date at the latest. Language of assessment: German and/or Englist Assessment offered: Once a year, summer semiconservation of the semiconse	of assessment, this e candidate each o orm students about h	may be changed and assessment may in- r an oral examination in groups. If the methoc					
Allocation of places	5101						
Additional information							
 Workload							
180 h							
	Teaching cycle						
Referred to in IPO I (examination regulations f	r teaching-degree r	rogrammes)					
Referred to in LPO I (examination regulations for teaching-degree programmes)							
 Module appears in							
Module appears in Bachelor's degree (1 major) Physics (2015) Bachelor's degree (1 major) Nanostructure Technology (2015) Master's degree (1 major) Functional Materials (2016) Bachelor's degree (1 major) Physics (2020)							
Master's with 1 major Functional Materials (2016)	JMU Würzburg • generated	19-Apr-2025 • exam. reg. da- page 59 / 99					

Bachelor's degree (1 major) Nanostructure Technology (2020) Bachelor's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Functional Materials (2022) exchange program Physics (2023) Master's degree (1 major) Functional Materials (2025)

Biophy	e title			Abbreviation		
Biophysical Measurement Technology in Medical Science					11-BMT-161-m01	
Module coordinator				Module offered by		
Manag	anaging Director of the Institute of Applied Physics			Faculty of Physics a	and Astronomy	
ECTS						
6		rical grade				
Duratio	on	Module level	Other prerequisite	s		
1 seme		graduate		-		
Conter	nts		- I			
topics sound	are con	ventional X-ray technic R-tomography. The lect	que, computer tomogra	aphy, imaging techni	ication in Biomedicine. The ma ques of nuclear medicine, ultra ory of imaging systems and dig	
Intend	ed lear	ning outcomes				
dersta images	nd the p s.	principles of image gen	eration and are able to	o explain different te	lication in Biomedicine. They u chniques and interpret simple	
V (3) +		, number of weekly cor	itact nours, tallguage -		all <i>)</i>	
		t in: German or English				
		essment (type, scope, on on whether module			ation offered — if not every sem	
			s of 2, approx. 30 mini	utes) or utes per candidate) o	pr	
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Master's degree (1 major) Physics (2020)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Functional Materials (2022)

exchange program Physics (2023)

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Functional Materials (2025)

Module title Abbreviation					
Image and Si	gnal Processing in Phy	sics		11-BSV-161-m01	
Module coord	linator		Module offered by		
	rector of the Institute of	Applied Physics	Faculty of Physics a	and Astronomy	
	od of grading	Only after succ. co		,	
6 nume	erical grade				
Duration	Module level	Other prerequisite	5		
1 semester	graduate				
Contents					
and image pr convolution p	aperiodic signals; prino ocessing; discretisatio product; tapering functi tion; statistical signals on.	n of signals/sampling to ons and interpolation	theorem (Shannon); I of images; the Parsiv	homogeneous and li al theorem, correlati	near filters, on and ener-
Intended lea	rning outcomes				
les of image	have advanced knowle processing and are fam ds and to implement th	iliar with different met	hods of signal proces		
Courses (type	e, number of weekly co	ntact hours, language -	– if other than Germa	an)	
V (2) + Ü (2)					
	nt in: German or English				
	sessment (type, scope tion on whether module			ition offered — if not	every seme-
	mination (approx. 90 t				
	nation of one candidat nation in groups (group		-	r	
	ort (approx. 8 to 10 pag		ales per candidate) o	I	
e) presentati	on/talk (approx. 30 mir	iutes).			
	amination was chosen e form of an oral exami				
	it is changed, the lectu				
nation date a				·	-
	assessment: German a offered: In the semeste		offered and in the su	ubsoquent semester	
Allocation of				ubsequent semester	
	places				
Additional in	formation				
Additional III					
Workload					
180 h					
Teaching cyc	le				
Referred to in	LPOI (examination re	gulations for teaching	degree programmes)		
			- · -		
Module appe	ars in				
Master's deg	ree (1 major) Mathemat	ics (2016)			
-	ree (1 major) Physics (2		<u>,</u>		
	ree (1 major) Nanostruc				
Master's with 1 maj	or Functional Materials (2016)	-	• generated 19-Apr-2025 • exter (120 ECTS) Funktionswerks	-	page 63 / 99

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Master's degree (1 major) Computational Mathematics (2016) Master's degree (1 major) Functional Materials (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Functional Materials (2022) Master's degree (1 major) Mathematics (2022) exchange program Physics (2023) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Functional Materials (2025)

Module	title		Abbreviation				
Coating Technologies based on Vapour Deposition					11-BVG-152-m01		
Module coordinator				Module offered by			
Managing Director of the Institute of Applied Physics				Faculty of Physics a	nd Astronomy		
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						
		ical principles of PVD an ation of layer materials o		nd processes. Coatii	ng deposit and layer characteri-		
Intende	ed learr	ning outcomes					
		nave advanced knowledg rial relevance and variety		processes in the gas	eous phase and gain insights in-		
Course	s (type,	number of weekly conta	ct hours, language —	if other than Germa	n)		
V (3) + I Module		t in: German or English					
		essment (type, scope, la on on whether module ca			tion offered — if not every seme-		
d) proje e) prese If a writ stead ta of asse nation Langua Assess	ect repo entatio ten exa ake the ssment date at ge of a ment o	form of an oral examina t is changed, the lecturer the latest. ssessment: German and, ffered: Once a year, sum) or es). method of assessme tion of one candidate must inform student /or English	ent, this may be char each or an oral exa	nged and assessment may in- mination in groups. If the method weeks prior to the original exami-		
Allocat	ion of p	olaces					
Additio	nal info	ormation					
Worklo	ad						
150 h							
Teachir	ng cycle	9					
Referre	d to in	LPOI (examination regu	lations for teaching-c	legree programmes)			
		vo in					
Module			una Tachneless (s	-)			
	-	gree (1 major) Nanostruct ee (1 major) Functional M		<i>b)</i>			
musici	Master's degree (1 major) Functional Materials (2016)						

Module title					Abbreviation		
Computational Materials Science (DFT) 11-CMS-161-mo1							
Modul	e coord	inator		Module offered by			
Managing Director of the Institute of Theoretical Physics and Astrophysics			Theoretical Physics	Faculty of Physics and Astronomy			
ECTS	<u> </u>	od of grading	Only after succ. con	npl. of module(s)			
8		rical grade		• • • •			
Duratio	on	Module level	Other prerequisites	i			
1 seme	ster	graduate					
Conter	Its						
2. Wan 3. Num 4. Hart 5. Man 6. And 7. Dyna 8. DFT 9. Stro Intend Aside f pool. T constru the sof	 Density functional theory (DFT) Wannier functions and localized basis functions Numerical evaluation of topological invariants Hartree-Fock and static mean-field theory Many-body methods for solid state physics Anderson impurity model (AIM) and Kondo physics Dynamical mean-field theory (DMFT) DFT + DMFT methods for realistic modeling of solids Strongly correlated electrons Intended learning outcomes Aside from the theoretical discussion of these topics, the students carry out hands-on exercises from the CIP pool. The participants are introduced to the use of DFT software packages such as VASP or Wienzk and to the construction of maximally localised Wannier functions through the projection of DFT results on atom orbitals with the software wanniergo. Furthermore, the students learn how to construct many-particle solutions of AIM and observe border cases such as the Kondo regime. Impurity solvers such as exact diagonalisation or continuous-ti-						
(DMFT) ted tra	. These nsition	e steps are necessary to metal oxide such as Sr ¹	reach the peak of the VO3.	lecture: a DFT-DMFT	calculation of a stro		
Course	s (type	, number of weekly con	tact hours, language –	- if other than Germa	in)		
V (4) + Module		t in: German or English					
		sessment (type, scope, ion on whether module			ition offered — if not	every seme-	
 a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester 							
	Allocation of places						
Additid	nal inf	ormation					
···							
Worklo	ad						
	au		-				
240 h	<u> </u>						
Master's w	ith 1 majo	r Functional Materials (2016)	-	er (120 ECTS) Funktionswerks	-	page 66 / 99	

Teaching cycle

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

Module appears in Master's degree (1 major) Mathematics (2016) Master's degree (1 major) Physics (2016) Master's degree (1 major) Mathematical Physics (2016) Master's degree (1 major) Computational Mathematics (2016) Master's degree (1 major) Functional Materials (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019) Master's degree (1 major) Physics (2020) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Mathematical Physics (2020) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Functional Materials (2022) Master's degree (1 major) Mathematics (2022) Master's degree (1 major) Mathematical Physics (2022) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Functional Materials (2025)

Module title	Abbreviation						
Principles of Energy Technologies 11-ENT-152-mo1							
Module coordinator		Module offered by					
Managing Director of the Institute of Ap	oplied Physics	Faculty of Physics a	and Astronomy				
ECTS Method of grading	IS Method of grading Only after succ. compl. of module(s)						
6 numerical grade							
Duration Module level	Other prerequisites	i					
1 semester graduate							
Contents							
Physical principles of energy conservat as renewable resources of energy. We ting materials, selective layers, highly students. Energy conservation via ther verters. Nuclear power plants. Hydroele Electricity. Biomass. Geothermal energ	also discuss aspects activated carbons). T mal insulation. Thern ectricity. Wind turbin	of optimising materi he course is especia nodynamic energy ef es. Photovoltaics. Sc	ials (e.g. nanostructured insula- lly suitable for teaching degree ficiency. Fossil fired energy con-				
Intended learning outcomes							
The students know the principles of dil port and storage. They understand the							
Courses (type, number of weekly conta	ict hours, language –	- if other than Germa	ın)				
V (3) + R (1) Module taught in: German or English							
Method of assessment (type, scope, la			tion offered — if not every seme-				
 b) oral examination of one candidate e c) oral examination in groups (groups of d) project report (approx. 8 to 10 pages e) presentation/talk (approx. 30 minut If a written examination was chosen as stead take the form of an oral examina of assessment is changed, the lecturer nation date at the latest. Language of assessment: German and Assessment offered: Once a year, winter 	Language of assessment: German and/or English						
Allocation of places							
Additional information							
Workload							
180 h							
Teaching cycle							
Referred to in LPO I (examination regu	lations for toaching	degree programmac)					
=		legree programmes)					
§ 22 Nr. 1 h) § 22 Nr. 2 f) § 22 Nr. 3 f)							
Module appears in							
Bachelor's degree (1 major) Physics (20	015)						

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Bachelor's degree (1 major) Nanostructure Technology (2015) First state examination for the teaching degree Grundschule Physics (2015) First state examination for the teaching degree Grundschule Didactics in Physics (Primary School) (2015) First state examination for the teaching degree Realschule Physics (2015) First state examination for the teaching degree Gymnasium Physics (2015) First state examination for the teaching degree Sonderpädagogik Didactics in Physics (Middle School) (2015) First state examination for the teaching degree Mittelschule Physics (2015) First state examination for the teaching degree Mittelschule Didactics in Physics (Middle School) (2015) Master's degree (1 major) Functional Materials (2016) First state examination for the teaching degree Grundschule Physics (2018) First state examination for the teaching degree Grundschule Didactics in Physics (Primary School) (2018) First state examination for the teaching degree Realschule Physics (2018) First state examination for the teaching degree Gymnasium Physics (2018) First state examination for the teaching degree Mittelschule Physics (2018) First state examination for the teaching degree Sonderpädagogik Didactics in Physics (Middle School) (2018) First state examination for the teaching degree Mittelschule Didactics in Physics (Middle School) (2018) Bachelor's degree (1 major) Physics (2020) Bachelor's degree (1 major) Nanostructure Technology (2020) First state examination for the teaching degree Grundschule Didactics in Physics (Primary School) (2020) First state examination for the teaching degree Grundschule Physics (2020) First state examination for the teaching degree Gymnasium Physics (2020) First state examination for the teaching degree Realschule Physics (2020) First state examination for the teaching degree Sonderpädagogik Didactics in Physics (Middle School) (2020) First state examination for the teaching degree Mittelschule Didactics in Physics (Middle School) (2020) First state examination for the teaching degree Mittelschule Physics (2020) Bachelor's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Functional Materials (2022) exchange program Physics (2023) Master's degree (1 major) Functional Materials (2025)

Module title					Abbreviation		
	Solid State Physics 2 11-FK2-161-m01						
Module	e coord	inator		Module offered by			
	Anaging Director of the Institute of Applied Physics			Faculty of Physics a	and Astronomy		
ECTS				npl. of module(s)			
8	·	rical grade					
Duratio		Module level	Other prerequisites				
1 seme		graduate					
and exe gation gnetic a	citation of magi and ele ations	s such as phonons and netic, orbital and charg ctronic properties of th	scattering as a method d magnetic waves; resc e order; X-ray and neu in films and superlattic ; STEM ("scanning tran	onant elastic X-ray so tron reflectometry; ir ces; resonant inelast	attering and absorp ivestigation of the st ic X-ray scattering; i	tion; investi- tructural, ma- nvestigation	
Intende	ed learr	ning outcomes					
tering, are fam	moderr niliar wi	n scattering theory, X-ra th the theoretical princ	scattering methods su ay and neutron reflecto iples and applications	metry and resonant of these methods.	inelastic X-ray scatte		
Course	s (type,	number of weekly con	tact hours, language –	- if other than Germa	ın)		
V (4) + Module		t in: German or English					
Method	d of ass	essment (type, scope,	language — if other th		tion offered — if not	every seme-	
 b) oral c) oral of d) projection e) pressed lf a write stead tage of assed nation Langua 	ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exami- nation date at the latest. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester						
Allocat	ion of p	olaces					
 Additional information							
Worklo	ad						
240 h							
Teachi	ng cycl	9					
	<u> </u>						
Referre	d to in	LPOI (examination reg	gulations for teaching-	degree programmes)			
Module							
	-	ee (1 major) Mathemati ee (1 major) Physics (20					
Master's wi	ith 1 major	Functional Materials (2016)		generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerks		page 70 / 99	

Master's degree (1 major) Nanostructure Technology (2016) Master's degree (1 major) Computational Mathematics (2016) Master's degree (1 major) Functional Materials (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019)

Module title		Abbreviation						
Opto-Electro	nic Material Properties		11-FU-MOE-161-m01					
Module coor	dinator		Module offered by					
Managing Di	rector of the Institute of Ap	oplied Physics	plied Physics Faculty of Physics and Astronomy					
· · · · · · · · · · · · · · · · · · ·	nod of grading	Only after succ. com	pl. of module(s)					
<u>↓</u>	erical grade							
Duration	Module level	Other prerequisites						
1 semester	graduate							
Contents								
Physical prir	ciples of optoelectronic m	aterial properties and	d applications					
Intended lea	rning outcomes							
The students	know the principles of op	toelectronic material	characteristics.					
Courses (typ	e, number of weekly conta	ict hours, language —	if other than Germa	n)				
V (3) + Ü (1) Module taug	ht in: Ü: German or Englisl	ı						
Method of a		nguage — if other tha		tion offered — if not every seme-				
 c) oral exam d) project re e) presentati If a written e stead take th of assessme nation date a 	ne form of an oral examina nt is changed, the lecturer	of 2, approx. 30 minut s) or es) method of assessme tion of one candidate must inform student	tes per candidate) or ent, this may be char e each or an oral exam	r nged and assessment may in- mination in groups. If the method weeks prior to the original exami-				
Allocation of	places							
Additional in	formation							
Workload								
150 h								
Teaching cy	le							
Referred to i	n LPO I (examination regu	lations for teaching-o	legree programmes)					
		<u></u>	<u> </u>					
Module app	ears in							
	ree (1 major) Functional M	aterials (2016)						
	ree (1 major) Functional M							
Master's deg	ree (1 major) Functional M	aterials (2025)						

Module title Abbreviation					Abbreviation
Mecha	nical aı	nd Thermal Material Prop	oerties		11-FU-MTE-161-m01
Module	a coord	inator		Module offered by	
		ector of the Institute of Ap	onlied Physics	Faculty of Physics a	and Astronomy
ECTS	-	od of grading	Only after succ. com		
5		rical grade			
Duratio		Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	Its				
Physica	al laws	of solids: Bonding and st	tructure, lattice dynar	nics, thermal and m	echanical properties.
		ning outcomes			
	-	have knowledge of mech	anical/thermal mater	ial characteristics.	
		, number of weekly conta			an)
V (3) +			,		
	• •	t in: Ü: German or Englisł	۱		
		sessment (type, scope, la on on whether module ca			tion offered — if not every seme-
d) proje e) pres If a writ stead t of asse nation Langua Allocat	ect repo entatio tten exa ake the essmen date at age of a ion of p	e form of an oral examina t is changed, the lecturer the latest. ssessment: German and,	s) or es) method of assessme tion of one candidate must inform student	ent, this may be cha each or an oral exa	nged and assessment may in- mination in groups. If the methoo weeks prior to the original exami
Worklo	ad		,		
150 h					
Teachi	ng cycl	e			
Referre	ed to in	LPOI (examination regu	lations for teaching-o	legree programmes)	
Module	e appea	ars in			
		ee (1 major) Functional M	aterials (2016)		
	Master's degree (1 major) Functional Materials (2022)				
master			uteriut5 (2022)		

Module	Module title Abbreviation				
Semico	Semiconductor Lasers and Photonics 11-HLF-152-mo1				
Module	e coord	inator		Module offered by	
Manag	ing Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy
ECTS		od of grading	Only after succ. con	npl. of module(s)	
6	nume	rical grade			
Duratio		Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
rent de model, hold co riers ar des, la: ductor	velopm which onditior nd phot ser reso lasers.	ents regarding compone will then be extended to a, characteristic curve and ons. Other topics of the l onators, mode selection,	nts. The principles of special aspects of se d laser efficiency are ecture are optical pro dynamic properties a urrent topics of laser	f lasers are described miconductor lasers. derived from couple ocesses in semicond as well as technology	semiconductor lasers, and cur- d on the basis of a general laser Basic concepts such as thres- d rate equations for charge car- uctors, layer and ridge wavegui- / for the generation of semicon- tantum dot lasers, quantum cas-
		ning outcomes	inonnance lasers.		
The stu	Idents I	•			r physics. They can apply their opment of components.
		, number of weekly conta			
V (3) +	R (1)	t in: German or English			
Metho	d of ass	essment (type, scope, la	nguage — if other tha	an German, examina	tion offered — if not every seme-
ster, in	formati	on on whether module ca	an be chosen to earn	a bonus)	
 b) oral c) oral d) projeting e) pression lf a write stead to fassed to fassed nation Languation 	examin examin ect repo entatio tten exa ake the essment date at age of a	form of an oral examinat	ach (approx. 30 minu of 2, approx. 30 minu of or es). method of assessme tion of one candidate must inform student /or English	tes per candidate) o ent, this may be char e each or an oral exa	r nged and assessment may in- mination in groups. If the method weeks prior to the original exami-
Allocat	ion of p	olaces			
 Additio	onal info	ormation			
Worklo	ad				
180 h					
Teachi	ng cycl	9			
Referre	ed to in	LPOI (examination regu	lations for teaching-o	degree programmes)	
Module	e appea	rs in			
Bachel	or's de	gree (1 major) Physics (20	015)		

Master's with 1 major Functional Materials (2016)

Bachelor's degree (1 major) Nanostructure Technology (2015) Master's degree (1 major) Functional Materials (2016) Bachelor's degree (1 major) Physics (2020) Bachelor's degree (1 major) Nanostructure Technology (2020) Bachelor's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Functional Materials (2022) exchange program Physics (2023) Master's degree (1 major) Functional Materials (2025)

Module					Abbreviation	
Semico	onducto	or Physics			11-HLPH-161-m01	
Module	e coord	inator		Module offered by		
		ector of the Institute of Ap	· · ·	Faculty of Physics a	nd Astronomy	
ECTS	<u> </u>	od of grading	Only after succ. con	npl. of module(s)		
6	·	rical grade				
Duratio		Module level	Other prerequisites			
1 seme		graduate				
Conten	ts					
2. Cryst 3. Optio 4. Elect 5. Temp	tal form cal exci tron-ph peratur	roperties ation and electronic ban tations and their couplin onon coupling e-dependent transport pr emiconductors	g effects			
Intende	ed learr	ning outcomes				
		are familiar with the princ d know their physical pro				re of semi-
Course	s (type,	, number of weekly conta	ct hours, language –	- if other than Germa	n)	
V (3) + Module		t in: German or English				
		e ssment (type, scope, la on on whether module ca			tion offered — if not	every seme-
 b) oral c) oral d) projetion e) pression lf a write stead t of assesting the stead t nation Languation 	examin examin ect repo entatio tten exa ake the essment date at age of a	nination (approx. 90 to 1 ation of one candidate e ation in groups (groups c ort (approx. 8 to 10 pages n/talk (approx. 30 minute amination was chosen as form of an oral examina- t is changed, the lecturer the latest. ssessment: German and, ffered: In the semester in	ach (approx. 30 minu of 2, approx. 30 minu o) or es). method of assessme tion of one candidate must inform student for English	tes per candidate) of ent, this may be char e each or an oral exa is about this by four	nged and assessmer mination in groups. weeks prior to the or	If the method riginal exami-
Allocat					issequent semester	
Additio	onal info	ormation				
Worklo 180 h	ad					
		_				
Teachi	ng cycl	e				
 Poforro	d to in	LPO I (examination regu	lations for toaching	dograa programmas)		
Module	20002	rs in				
		ee (1 major) Mathematics	(2016)			
	-	ee (1 major) Physics (201				
	-	ee (1 major) Nanostructur				
Master's w	ith 1 major	Functional Materials (2016)		generated 19-Apr-2025 • exa r (120 ECTS) Funktionswerkst		page 76 / 99

Master's degree (1 major) Computational Mathematics (2016) Master's degree (1 major) Functional Materials (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019)

6 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents Semiconductor nanostructures are frequently referred to as "artificial materials". In contrast to atoms, molecule or macroscopic crystals, their electronic, optical and magnetic properties can be systematically tailored by char ging their size. The lecture addresses technological challenges in the preparation of semiconductor nanostructures of varying dimensions (2p. 10, 0.0). It provides the basic theoretical concepts to describe their properties, with a focus on optical properties and light-matter coupling. Moreover, it discusses the challenges and concept of novel optoelectronic and quantum photonic devices based on such nanostructures, including building block for quantum communication and quantum computing architectures. Intended learning outcomes The students know the theoretical principles and characteristics of semiconductor nanostructures. They have knowledge of the technological methods to fabricate such structures, and of their applications to novel photoni devices. They are able to apply their knowledge to problems in this field of research. Courses (type, number of weekly contact hours, language — if other than German, examination offered — if not every seme ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 90 to 120 minutes) or b) or al examination in groups (groups of 2, approx. 30 minutes) or b) oral examination in groups (groups of 2, approx. 30 minutes bar on al examination in groups. If the metho of assessment is changed, the lecturer must inform students	Module title					Abbreviation
Managing Director of the Institute of Applied Physics Faculty of Physics and Astronomy ECTS Method of grading Only after succ. compl. of module(s) 6 numerical grade	Optical	Prope	rties of Semiconductor N	anostructures		11-HNS-161-m01
Managing Director of the Institute of Applied Physics Faculty of Physics and Astronomy ECTS Method of grading Only after succ. compl. of module(s) 6 numerical grade	Module	coord	inator		Module offered by	
ECTS Metities of grading Only after succ. compl. of module(s) 6 numetical grade 0 buration Module level Other prerequisites 1 semister graduate Contents Semiconductor nanostructures are frequently referred to as "artificial materials". In ontrast to atoms, molecule on macroscopic crystals, their electronic, optical and magnetic properties can be systematically tailored by charging their size. The lecture addresses technological challenges in the preparation of semiconductor nanostructures of varying dimensions (20, 10, 00). It provides the basic theoretical concepts to describe their properties, with a focus on optical properties and light-matter coupling. Moreover, it discusses the challenges and concept of rovel opto-lectronic and quantum photonic devices based on such nanostructures. Including building block for quantum communication and quantum computing architectures. Interest outcomes The students know the theoretical principles and characteristics of semiconductor nanostructures. They have knowledge to the technological methods to fabricate such structures, and of their applications to novel photoni devices. They are able to apply their knowledge to problems in this field of research. Course: (type, scope, language — if other than German, examination offered — if not every seme ster, information on whether module can be chosen to earn abonus) other samiation of one candidate each (approx. 30 minutes) or Ot				oplied Physics	-	and Astronomy
Duration Module level Other prerequisites 1 semester graduate Contents Semiconductor nanostructures are frequently referred to as "artificial materials". In contrast to atoms, molecule or macroscopic crystals, their electronic, optical and magnetic properties can be systematically tailored by char ging therms (20, 10, 0.0). It provides the basic theoretical concepts to describe their properties, with a focus on optical properties and light-matter coupling. Moreover, it discusses the challenges and concept on ovel opticelectronic and quantum photonic devices based on such nanostructures, including building block for quantum communication and quantum chonic devices based on such nanostructures. Intended learning outcomes The students know the theoretical principles and characteristics of semiconductor nanostructures. They have knowledge of the technological methods to fabricate such structures, and of their applications to novel photoni devices. They are able to apply their knowledge to problems in this field of research. Courses (type, number of weekly contact hours, language — if other than German, examination offered — if not every seme ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 90 to 120 minutes) or c) oral examination in groups. Jo 20 minutes, or c) oral examination of an oral examination of a sesessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the metho disassessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment. German and/or	ECTS					, , , , , , , , , , , , , , , , , , ,
1 semester graduate Contents	6	nume	rical grade			
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or macroscopic crystals, their electronic, optical and magnetic properties can be systematically tailored by char ging their size. The lecture addresses technological challenges in the preparation of semiconductor nanostruc- tures of varying dimensions (20, 10, 00). It provides the basic theoretical concepts to describe their properties, with a focus on optical properties and light-matter coupling. Moreover, it discusses the challenges and concept of novel optoelectronic and quantum chotonic devices based on such nanostructures, including building block for quantum communication and quantum computing architectures. Intended learning outcomes The students know the theoretical principles and characteristics of semiconductor nanostructures. They have knowledge of the technological methods to fabricate such structures, and of their applications to novel photoni devices. They are able to apply their knowledge to problems in this field of research. Courses (type, number of weekly contact hours, language — if other than German) V (3) + R (1) Module taught in: German or English Method of assessment (type, scope, language — if other than German, examination offered — if not every seme ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 9 to 120 minutes) or b) oral examination in groups (groups of 2, approx. 30 minutes) or c) oral examination in groups. B to pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the metho of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exam nation date at the latest. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester Aldottional information - Course of the tope of the technerge programmes)	Conten	ts				
The students know the theoretical principles and characteristics of semiconductor nanostructures. They have knowledge of the technological methods to fabricate such structures, and of their applications to novel photoni devices. They are able to apply their knowledge to problems in this field of research. Courses (type, number of weekly contact hours, language — if other than German) V (3) + R (1) Module taught in: German or English Method of assessment (type, scope, language — if other than German, examination offered — if not every seme ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) or e) presentation/talk (approx. 30 to 120 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester Allocation of places	ging the tures of with a f of nove for qua	eir size f varyir ocus o el optoe ntum c	The lecture addresses t og dimensions (2D, 1D, of n optical properties and electronic and quantum p communication and quan	echnological challen D). It provides the bas light-matter coupling photonic devices base	ges in the preparatic sic theoretical conce . Moreover, it discus ed on such nanostru	on of semiconductor nanostruc- pts to describe their properties, ses the challenges and concepts
knowledge of the technological methods to fabricate such structures, and of their applications to novel photoni devices. They are able to apply their knowledge to problems in this field of research. Courses (type, number of weekly contact hours, language — if other than German) V (3) + R (1) Module taught in: German or English Method of assessment (type, scope, language — if other than German, examination offered — if not every seme ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes) or c) oral examination may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exam nation date at the latest. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester Allocation of places 				ciploc and character	ctics of somissingly	tor poportructures. They have
devices, They are able to apply their knowledge to problems in this field of research. Courses (type, number of weekly contact hours, language — if other than German) V (3) + R (1) Module taught in: German or English Method of assessment (type, scope, language — if other than German, examination offered — if not every seme ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 90 to 120 minutes) or b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may in- stead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original exam nation date at the latest. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester Allocation of places						
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Method of assessment (type, scope, language — if other than German, examination offered — if not every seme ster, information on whether module can be chosen to earn a bonus) a) written examination (approx. 90 to 120 minutes) or b) oral examination in groups (groups of 2, approx. 30 minutes) per candidate) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). ff a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: German and/or English Assessment offered: In the semester in which the course is offered and in the subsequent semester Allocation of places Morkload 180 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in						
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Workload 180 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in	Allocat	ion of _l	places			
Workload 180 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in						
180 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in	Additio	nal inf	ormation			
180 h Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in						
Teaching cycle Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in	Worklo	ad				
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 Referred to in LPO I (examination regulations for teaching-degree programmes) Module appears in	Teachi	ng cycl	e			
	Referre	d to in	LPOI (examination regu	lations for teaching-	degree programmes)	
	Module	appe	ars in			
				5 (2016)		

Master's with 1 major Functional Materials (2016)

UNIVERSITÄT WÜRZBURG

Master's degree (1 major) Physics (2016) Master's degree (1 major) Nanostructure Technology (2016) Master's degree (1 major) Computational Mathematics (2016) Master's degree (1 major) Functional Materials (2016) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Functional Materials (2022) Master's degree (1 major) Mathematics (2022) exchange program Physics (2023) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Functional Materials (2025)

Laboratory and Measurement Technology in Biophysics Int-LMB-152-mo1 Managing Director of the Institute of Applied Physics Faculty of Physics and Astronomy ECTS Method of grading Only after succ. compl. of module(s) 6 num=rical grade Duration Module level Other prerequisites 1 semester graduate Contents The lecture covers relevant principles of molecular and cellular biology as well as the physical principles of physical procedures for the examination and manipulation of biological systems. The mean topics are orgoning techniques and sensors, methods of single-particle detection, special microscoping techniques and the application of biological systems. They have knowledge of optimeasuring techniques and the applications and are able to apply techniques of structure elucidation to s biomolecules. Courses (type, number of weekly contact hours, language — if other than German, examination offered — if not every sister, information on whether module can be chosen to earn a bonus) Set (vig) + R(t) Module taught in Seman or English Method of assessment (type, scope, language — if other than German, examination offered — if not every sister information on whether module can be chosen to earn a bonus) Set (vig) + R(t) Module taught in Seman or English Method of assessment (type, scope, lan	Nodule	title			Abbreviation	
Managing Director of the Institute of Applied Physics Faculty of Physics and Astronomy ECTS Method of grading Only after succ. compl. of module(s) 6 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents The lecture covers relevant principles of molecular and cellular biology as well as the physical principles of physical procedures for the examination and manipulation of biological systems. The main topics are optic measuring techniques and sensors, methods of single-particle detection, special microscoping techniques methods of structure elucidation of biomolecules. Intended learning outcomes Courses (type, number of weekly contact hours, language – if other than German) V (3) + R (1) Method of specessement (type, scope, language – if other than German, examination offered – if not every ster, information on whether module can be chosen to earn a bonus) a) withen examination in groups (groups of 2, approx. 30 minutes) or 0 project report (approx. 3 to to 2 page) to 2.0 minutes) or 0 project report (approx. 3 to to 2 page) or 0 project report (approx. 3 to to 2 page) or 0 project report (approx. 3 to to 2 page) or	aborat	ory and Measurement Techno	ology in Biophysics		11-LMB-152-m01	
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Bachelor's degree (1 major) Physics (2015) Bachelor's degree (1 major) Nanostructure Technology (2015) Master's degree (1 major) Functional Materials (2016)		annears in				
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Master's with 1 major Functional Materials (2016) IMU Würzburg • generated 19-Apr-2025 • exam. reg. da-	Master's	s degree (1 major) Functional	Materials (2016)			
ta record Master (120 ECTS) Funktionswerkstoffe - 2016	aster's with	h 1 major Functional Materials (2016)	-		-	page 80 / 99

Bachelor's degree (1 major) Physics (2020) Bachelor's degree (1 major) Nanostructure Technology (2020) Bachelor's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Functional Materials (2022) exchange program Physics (2023) Master's degree (1 major) Functional Materials (2025)

Module title Abbreviation				
Laboratory and Measurement Techno	logy		11-LMT-152-m01	
Module coordinator		Module offered by		
Managing Director of the Institute of A	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS Method of grading	Only after succ. con	npl. of module(s)		
6 numerical grade				
Duration Module level	Other prerequisites			
1 semester undergraduate				
Contents				
Introduction to electronic and optical nics, cryogenics, light sources, spectr				y and cryoge-
Intended learning outcomes				
The students have competencies in th vacuum technology and cryogenics, c quisition.				
Courses (type, number of weekly cont	act hours, language –	- if other than Germa	n)	
V (3) + R (1) Module taught in: German or English				
Method of assessment (type, scope, ster, information on whether module			tion offered — if not	every seme-
d) project report (approx. 8 to 10 page e) presentation/talk (approx. 30 minu If a written examination was chosen a stead take the form of an oral examin of assessment is changed, the lecture nation date at the latest. Language of assessment: German and Assessment offered: Once a year, win	ites). Is method of assessme ation of one candidate er must inform student d/or English	e each or an oral exa	mination in groups.	If the method
Allocation of places				
Additional information				
Workload				
180 h				
Teaching cycle				
Referred to in LPO I (examination reg	ulations for toaching	dogroo programmos)		
 Module appears in				
Bachelor's degree (1 major) Physics (2	2015)			
Bachelor's degree (1 major) Nanostru	-	5)		
Bachelor's degree (1 major, 1 minor) F		<i></i>		
Master's degree (1 major) Functional I	• -			
Bachelor's degree (1 major) Physics (2	2020)			
Bachelor's degree (1 major) Nanostru	cture Technology (202	o)		
Master's with 1 major Functional Materials (2016)	-	e generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerkst	-	page 82 / 99

Bachelor's degree (1 major, 1 minor) Physics (Minor, 2020) Bachelor's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Functional Materials (2022) exchange program Physics (2023) Master's degree (1 major) Functional Materials (2025)

Module	Module title Abbreviation				
	nalytics				11-NAN-152-m01
Module	e coord	inator		Module offered by	
Manag	ing Dire	ector of the Institute of Ap	plied Physics	Faculty of Physics a	nd Astronomy
ECTS		od of grading	Only after succ. con	npl. of module(s)	
6	L	rical grade			
Duratio		Module level	Other prerequisites		
1 seme		graduate			
level u of X-ray py. Sca crosco ray abs Intende The stu	les of a p to an y metho nning t pe Se corptior ed learr	atomic level, examination ods Physics and materia unneling microscopy E condary ions - mass spec ning outcomes nave basic knowledge of	n of chemical compo al systems on the nar lectron probes: Scan ctrometry - X-ray met modern research me	sition, spectroscopy noscale Scanning p ning electron micros nods: Synchrotron sp thods for different na	echniques from a microscopic of electronic properties, usage probes: Atomic force microsco- cope. Transmission electron mi- pectroscopy. Photoemission. X-
pic me		or the determination of el			e industry as well as spectrosco- uate the efficiency of different re-
Course	s (type,	, number of weekly conta	ct hours, language –	- if other than Germa	n)
V (3) + Module		t in: German or English			
Metho	d of ass	s essment (type, scope, la	nguage — if other th	an German, examina	tion offered — if not every seme-
ster, in	formati	on on whether module ca	an be chosen to earn	a bonus)	
 b) oral c) oral d) projetion e) pression lf a write stead to a st	examin examin ect repo entatio tten exa ake the essment date at age of a	form of an oral examinat	ach (approx. 30 minu of 2, approx. 30 minu) or es). method of assessmu tion of one candidate must inform student for English	tes per candidate) of ent, this may be char e each or an oral exar	r nged and assessment may in- mination in groups. If the method weeks prior to the original exami-
Allocat	ion of p	olaces			
 Additic Worklo		ormation			
180 h					
	ng cycl	9			
	<u> </u>	-			
Referre	ed to in	LPOI (examination regu	lations for teaching-o	degree programmes)	
Module	e appea	in and a second s			
Bachel	or's de	gree (1 major) Physics (20	015)		

Master's with 1 major Functional Materials (2016)

Bachelor's degree (1 major) Nanostructure Technology (2015) Master's degree (1 major) Functional Materials (2016) Bachelor's degree (1 major) Physics (2020) Bachelor's degree (1 major) Nanostructure Technology (2020) Bachelor's degree (1 major) Quantum Technology (2021) exchange program Physics (2023)

Modul	Module title Abbreviation					
Organi	Organic Semiconductors 11-OHL-161-mo1					
Modul	e coord	inator		Module offered by		
			anlied Dhusies	· · · ·	nd Astronomy	
	<u> </u>	ector of the Institute of Ap	· · ·	Faculty of Physics a	ind Astronomy	
ECTS	<u> </u>	od of grading rical grade	Only after succ. con	ipt. of module(s)		
	·					
Duratio		Module level	Other prerequisites			
1 seme		graduate				
		с · · · и и		1 1 1 1		1
Fundai ons.	mentals	of organic semiconduct	ors, molecular and po	olymer electronics ar	id sensor technology	i, applicati-
	ed learı	ning outcomes				
		nave advanced knowledg	to of organic comicon	ductors		
		-			`	
		, number of weekly conta	ict hours, language –	- if other than Germa	n)	
V (3) + Modul		t in: German or English				
		sessment (type, scope, la	nguage — if other th	an German, examina	tion offered — if not	everv seme-
		on on whether module ca				,
		nination (approx. 90 to 1				
		ation of one candidate e				
		ation in groups (groups o		tes per candidate) o	r	
		ort (approx. 8 to 10 pages n/talk (approx. 30 minut				
		amination was chosen as		ent, this may be chai	nged and assessmer	nt may in-
		form of an oral examina				
of asse	essmen	t is changed, the lecturer	must inform student	s about this by four	weeks prior to the or	iginal exami-
		the latest.	/			
		ssessment: German and, ffered: In the semester ir		offered and in the cu	ubcoquent comecter	
				onered and in the st	ibsequent semester	
Alloca	tion of p	Diaces				
Additio	onal info	ormation				
Worklo	ad					
180 h						
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination regu	lations for teaching-	degree programmes)		
Modul	e appea	irs in				
Master	's degr	ee (1 major) Physics (201	6)			
	-	ee (1 major) Nanostructu				
	-	ee (1 major) Functional M				
		ning degree Gymnasium				o16)
		y course MINT Teacher E		Network Bavaria (EN	B) (2016)	
	-	ee (1 major) Nanostructu				
	-	ee (1 major) Physics (202				,
		ning degree Gymnasium				
Master's w	nth 1 majoi	r Functional Materials (2016)		generated 19-Apr-2025 • exa r (120 ECTS) Funktionswerkst	•	page 86 / 99



Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Functional Materials (2022) exchange program Physics (2023) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025)

Master's degree (1 major) Functional Materials (2025)

Modul	e title				Abbreviation	
Physic	s of Adv	vanced Materials			11-PMM-161-m01	
Modul	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of A	pplied Physics	Faculty of Physics a	nd Astronomy	
ECTS	<u> </u>	od of grading	Only after succ. con	· · · · · · · · · · · · · · · · · · ·		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conter	its					
and su	percon	rties of various material ductors; thin films, heter imensional layer materia	ostructures and supe			
Intend	ed learı	ning outcomes				
	-	know the properties and	characterization met	hods of some moder	n materials.	
Course	s (type)	, number of weekly conta	act hours, language –	- if other than Germa	n)	
V (3) + Modul		t in: German or English				
		s essment (type, scope, la on on whether module c			tion offered — if not	every seme-
d) proj e) pres If a wri stead t of asse nation Langua Assess	ect repo entatio tten exa ake the essmen date at age of a ment o	ation in groups (groups of ort (approx. 8 to 10 pages n/talk (approx. 30 minut amination was chosen as form of an oral examina t is changed, the lectures the latest. ssessment: German and ffered: In the semester in	s) or ses). s method of assessme tion of one candidate r must inform student /or English	ent, this may be char e each or an oral exa s about this by four	nged and assessmer mination in groups. I weeks prior to the or	If the method riginal exami-
Allocat	ion of p	olaces				
Additio	onal info	ormation				
			-			
Worklo	ad					
180 h						
Teachi	ng cycl	e				
Referre	ed to in	LPOI (examination regu	llations for teaching-	legree programmes)		
Modul	e appea	irs in				
Master	's degr	ee (1 major) Mathematics	5 (2016)			
Master	's degr	ee (1 major) Physics (201	.6)			
	-	ee (1 major) Nanostructu				
	-	ee (1 major) Computation		6)		
	-	ee (1 major) Functional N				
		ning degree Gymnasium				516)
		y course MINT Teacher E		generated 19-Apr-2025 • exa		page 88 / 99
	1		· · · · · ·	r (120 FCTS) Funktionswerkst	-	P~30 00 / 99

UNIVERSITÄT WÜRZBURG

Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019) Master's degree (1 major) Nanostructure Technology (2020) Master's degree (1 major) Physics (2020) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020) Master's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Computational Mathematics (2022) Master's degree (1 major) Functional Materials (2022) Master's degree (1 major) Mathematics (2022) exchange program Physics (2023) Master's degree (1 major) Computational Mathematics (2024) Master's degree (1 major) Mathematics (2024) Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2025) Master's degree (1 major) Functional Materials (2025)

Module	Module title Abbreviation					
Quantu	ım Tran	sport			11-QTH-161-m01	
Module	e coord	inator		Module offered by		
Manag	ing Dire	ctor of the Institute of	Applied Physics	Faculty of Physics a	nd Astronomy	
ECTS	r	d of grading	Only after succ. con	npl. of module(s)	· · · · · · · · · · · · · · · · · · ·	
6	numei	ical grade				
Duratio	n	Module level	Other prerequisites	i		
1 seme	ster	graduate				
Conten	ts					
topics of phenor	of: balli nena b	stic and diffuse transp etween electrons, Cou	tal transport phenome ort, electron interferen omb blockade, thermo sulators, solid-state qu	ce effects, quantisat electric properties, c	ion of conductivity, i	nteraction
Intende	ed learr	ing outcomes				
		nave mastered the bas cations of respective c	ics of electronics of nation of the second	nostructures in theor	y and practice. They	know functi-
Course	s (type,	number of weekly cor	itact hours, language –	- if other than Germa	n)	
V (3) + Module		t in: German or English				
			language — if other th can be chosen to earn		tion offered — if not	every seme-
		nination (approx. 90 to		a Donus)		
 c) oral of d) project e) pression lf a write stead t of assession Languar 	examin ect repo entatio tten exa ake the ssment date at ge of a	ation in groups (group ort (approx. 8 to 10 pag n/talk (approx. 30 min mination was chosen form of an oral examin is changed, the lectur the latest. ssessment: German ar	utes). as method of assessm nation of one candidate rer must inform student	tes per candidate) o ent, this may be char e each or an oral exa ts about this by four	nged and assessmer mination in groups. I weeks prior to the or	If the method riginal exami-
Allocat						
Additio	nal info	ormation				
Worklo	ad					
180 h						
Teachi	ng cycl	2				
	0.7	-				
Referre	d to in	LPO I (examination re	gulations for teaching-	degree programmes)		
Module	e appea	rs in				
		ee (1 major) Mathemat	ics (2016)			
	-	ee (1 major) Physics (2				
	-		ture Technology (2016)			
	-	-	onal Mathematics (201	6)		
Master	's degre	ee (1 major) Functional	Materials (2016)			
Master's wi	ith 1 major	Functional Materials (2016)	-	e generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerkst	_	page 90 / 99

Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016) Master's degree (1 major) Computational Mathematics (2019) Master's degree (1 major) Mathematics (2019) Master's degree (1 major) Functional Materials (2022) Master's degree (1 major) Functional Materials (2025)

Modul			_	Abbreviation	
Physic	Physics of Semiconductor Devices 11-SPD-152-mo1				
Modul	e coordinator		Module offered by		
Manag	ing Director of the Institute of Ap	oplied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Method of grading	Only after succ. con	npl. of module(s)		
6	numerical grade				
Duratio		Other prerequisites			
1 seme					
techno amples levant effects into th techno ponent diodes JFET, TI nal cha sector. Intend The stu phono ties. Th the sol miliar v ding of electro patt, B injectio of sem	on the fundamentals of Semicor logies and discusses the main of s. The basic part introduces the semiconductors. The following p based on the charge carrier der e methods of production of sem logy. It discusses the way of fun ts, interface components and ap t, IMPATT, Baritt- and Gunn diode nyristor, Diac, Triac, Schottky did arge carrier systems for technolo ed learning outcomes udents know the characteristics n band structures of important s ney know the principles of charg ution of questions. They have ga with the theories of planar techn f component production. They un nics (diode, transistor, field-effe aritt or Gunn diode) and of opto- on laser), they know the realisati iconductors and their technolog	components in the fie crystal structures and part discusses the pri- isity of the thermal en- iconductor materials actioning of the follow oplication fields: Rect es, photodiode, solar ode, MOSFET, MESFE gy and basic researc of semiconductors, the enconductors and the e transport as well as ained insights into the pology and recent devi- nderstand the structure et transistor, thyristor electronics (photo di- ion possibilities of lo	elds of electronics and d band and phonon of inciples of charge tra quilibrium. The part of and presents the mo- ving components, so ifier diodes, Zener di cell, LED, semicond T, HFET. It highlights h and shows recent of hey have gained an of he resulting electron is the Poisson, Boltzm e methods of semicor velopments in this field are and way of function of diac, triac), of mico ode, solar cell, light- w-dimensional charge	d photonics on the basis of ex- dispersions of technologically re- insport involving non-equilibrium on technology gives an insight ost important methods of planar rted according to volume com- iodes, varistor, varactor, tunnel uctor injection laser, transistor, the importance of low-dimensio- developments in the components overview of the electronic and ic, optical and thermal proper- nann and continuity equation for onductor production and are fa- eld, they have a basic understan- oning of the main components of rowave applications (tunnel, Im- emitting diode, semiconductor	
compo Course	s (type, number of weekly conta		- if other than Germa	n)	
V (3) +	· · ·			19	
	d of assessment (type, scope, la formation on whether module c			tion offered — if not every seme-	
b) oral c) oral d) proj e) pres If a wri stead t of asse nation Langua		ach (approx. 30 minu of 2, approx. 30 minu s) or es). method of assessmution of one candidate must inform student /or English	tes per candidate) o ent, this may be char e each or an oral exa		
	i				

Additional information

Workload

180 h

Teaching cycle

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

Module appears in

Bachelor's degree (1 major) Physics (2015)

Bachelor's degree (1 major) Nanostructure Technology (2015)

Master's degree (1 major) Functional Materials (2016)

Bachelor's degree (1 major) Physics (2020)

Bachelor's degree (1 major) Nanostructure Technology (2020)

Bachelor's degree (1 major) Quantum Technology (2021)

Master's degree (1 major) Functional Materials (2022)

exchange program Physics (2023)

Master's degree (1 major) Functional Materials (2025)

Drimain	title			Abbreviation		
Princip	Principles of Two- and Three-Dimensional Röntgen Imaging 11-ZDR-152-mo1					
Modula	coordinator		Module offered by			
	ing Director of the Institute o	f Applied Physics	Faculty of Physics and Astronomy			
ECTS	Method of grading	Only after succ. con	, ,			
6	numerical grade					
Duratio		Other prerequisites	6			
1 semes						
Conten	ts					
ton abs projecti traction charact	sorption, scattering), physics ion, Fourier reconstruction, i n, visualisation,). Applicat terisation, metrology, biolog	of X-ray detection. Matl terative methods). Imag ions of X-ray imaging in	nematics of reconstrue e processing (image the industrial sector	between X-rays and matter (pho- uction algorithms (filtered rear data pre-processing, feature ex- (component testing, material diation effect (dose,).		
	ed learning outcomes			with matter. They have in a sing		
	lues using X-rays and metho	c ,		vith matter. They know imaging nareas of these methods		
	s (type, number of weekly co					
V (3) + F				,		
	e taught in: German or Englis	h				
ster, inf a) writte b) oral e c) oral e d) proje e) prese If a writ stead ta of asses nation o Langua; Assessi	formation on whether modul en examination (approx. 90 examination of one candidat examination in groups (group ect report (approx. 8 to 10 pa entation/talk (approx. 30 mi tten examination was choser ake the form of an oral exam ssment is changed, the lectu date at the latest. ge of assessment: German a ment offered: Once a year, s ion of places	e can be chosen to earn to 120 minutes) or te each (approx. 30 minu ps of 2, approx. 30 minu ges) or nutes). n as method of assessm ination of one candidate urer must inform student	a bonus) utes) or ites per candidate) o ent, this may be cha e each or an oral exa	tion offered — if not every seme- r nged and assessment may in- mination in groups. If the method weeks prior to the original exami-		
	nal information					
 Workloa						
 Worklos 180 h	ad					
 Worklo 180 h						
 Workloa 180 h Teachin 	ad ng cycle					
 Workloa 180 h Teachin 	ad	egulations for teaching-	degree programmes)			
 Worklos 180 h Teachin Referre	ad ng cycle ed to in LPO I (examination r	egulations for teaching-	degree programmes)			
 Workloa 180 h Teachin Referre Module	ad ng cycle ed to in LPO I (examination r e appears in		degree programmes)			
 Worklos 180 h Teachin Referre Module Bachelo Master'	ad ng cycle ed to in LPO I (examination r	i (2015) ructure Technology (201 al Materials (2016)				

Bachelor's degree (1 major) Nanostructure Technology (2020) Bachelor's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Functional Materials (2022) exchange program Physics (2023) Master's degree (1 major) Functional Materials (2025)

Module			Abbreviation						
Methods of Non-Destructive Material Testing 11-ZMB-152-m01									
Module	e coord	inator		Module offered by					
Manag	ing Dire	ector of the Institute of	Applied Physics	Faculty of Physics a	and Astronomy				
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)					
4	nume	rical grade							
Duratio	on	Module level	Other prerequisites	i					
1 seme	ster	undergraduate							
Conten	ts								
		on-destructive materia ptical testing, laser. Im	al and component testin age processing.	ng. Thermography. N	eutron radiography.	X-ray testing.			
Intende	ed learr	ning outcomes							
on (hea thods f	at, X-ray or the o	, terahertz), particles	of the generation and i (neutrons) or ultrasoun ypes, particles and ultr aracterisation.	d waves with materia	als. They know the a	pplied me-			
Course	s (type,	, number of weekly cor	ntact hours, language –	- if other than Germa	ın)				
V (2) + Module		t in: German or English							
Metho	d of ass	essment (type, scope,	language — if other th	an German, examina	tion offered — if not	every seme-			
ster, in	formati	on on whether module	can be chosen to earn	a bonus)					
 b) oral examination of one candidate each (approx. 30 minutes) or c) oral examination in groups (groups of 2, approx. 30 minutes per candidate) or d) project report (approx. 8 to 10 pages) or e) presentation/talk (approx. 30 minutes). If a written examination was chosen as method of assessment, this may be changed and assessment may instead take the form of an oral examination of one candidate each or an oral examination in groups. If the method of assessment is changed, the lecturer must inform students about this by four weeks prior to the original examination date at the latest. Language of assessment: German and/or English Assessment offered: Once a year, winter semester 									
Allocat	ion of p	olaces							
Additio	onal info	ormation							
Worklo	ad								
120 h									
Teachi	ng cvcl	9							
	0 7	-							
Referred to in LPO I (examination regulations for teaching-degree programmes)									
			<u>34</u>						
Module	annes	rs in							
			(2015)						
	Bachelor's degree (1 major) Physics (2015) Bachelor's degree (1 major) Nanostructure Technology (2015)								
	Master's degree (1 major) Functional Materials (2016)								
	Bachelor's degree (1 major) Physics (2020)								
Bachel	Bachelor's degree (1 major) Nanostructure Technology (2020)								
Master's w	ith 1 major	Functional Materials (2016)	_	e generated 19-Apr-2025 • exa er (120 ECTS) Funktionswerks	-	page 96 / 99			

Bachelor's degree (1 major) Quantum Technology (2021) Master's degree (1 major) Functional Materials (2022) exchange program Physics (2023) Master's degree (1 major) Functional Materials (2025)

Modul	e title				Abbreviation			
		High Voltage insulation	and High Voltage Sys	tems	99-HIS-161-m01			
Modul	e coord	inator		Module offered by				
		aculty of Electrical Engine Sciences Würzburg-Schw	-	rsi- University of Applied Sciences Würzburg- Schwein- furt (FHWS)				
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							
		ss, electrical strength, di ems, diagnostics, measu			nd application of insulating mate ng systems.			
Intend	ed lear	ning outcomes						
terials. knowle	. They c edge in	an design simple insulat the field of diagnosis an	ing systems by their o d technology of insula	own and approve the ating materials.	ems with layering of different ma- e existing design. They have basic			
		, number of weekly conta	act hours, language –	- if other than Germa	in)			
V (2) +	Ü (1) +	P (1)						
Method of assessment (type, scope, language — if other than German, examination offered — if not every seme- ster, information on whether module can be chosen to earn a bonus)								
	-			a bonus)				
b) oral c) oral Langua	examir examin age of a	mination (approx. 90 min nation of one candidate e ation in groups (groups ssessment: German and or bonus	each (approx. 20 minu of 2, approx. 30 minu	-				
Allocat	tion of _l	olaces						
Additio	onal inf	ormation						
Worklo	oad							
150 h								
	ing cycl	e						
Referre	ed to in	LPOI (examination regu	llations for teaching-o	legree programmes)				
Modul	e appea	ars in						
		ee (1 major) Functional N						

Modeling and Simulation for Technological Systems 99-MST-161-1 Module cordinator Module offered by Dean of the Faculty of Mechanical Engineering at the University of Applied Sciences Würzburg-Schweinfurt University of Applied Sciences Würzburg-Schweinfurt ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents Theoretical foundations and practical application of the theory of linear and non-linear dynamitrical engineering and beyond. Intended learning outcomes The student has basic knowledge of dynamic and nonlinear systems and can describe them widelling and analyse their behaviour by simulation. V (2) + Ü (2) Method of assessment (type, scope, language – if other than German, examination offered – ster, information on whether module can be chosen to earn a bonus) written examination (approx. 90 minutes) and practical examination (modelling assignment, at Language of assessment: German and/or English Assessment offered: Once a year, winter semester Written ber or buses Met	ürzburg- Schwein-
Dean of the Faculty of Mechanical Engineering at the University of Applied Sciences Würzburg-Schweinfurt University of Applied Sciences W ECTS Method of grading Only after succ. compl. of module(s) 5 numerical grade Duration Module level Other prerequisites 1 semester graduate Contents Theoretical foundations and practical application of the theory of linear and non-linear dynam trical engineering and beyond. Intended learning outcomes The student has basic knowledge of dynamic and nonlinear systems and can describe them we delling and analyse their behaviour by simulation. Courses (type, number of weekly contact hours, language — if other than German, examination offered — ster, information on whether module can be chosen to earn a bonus) Written examination (approx. 90 minutes) and practical examination (modelling assignment, a Language of assessment: German and/or English Assessment offered: Once a year, winter semester U: creditable for bonus	
versity of Applied Sciences Würzburg-Schweinfurtfurt (FHWS)ECTSMethod of gradingOnly after succ. compl. of module(s)5numerical gradeDurationModule levelOther prerequisites1 semestergraduateContentsTheoretical foundations and practical application of the theory of linear and non-linear dynam trical engineering and beyond.Intended learning outcomesIntended learning outcomesThe student has basic knowledge of dynamic and nonlinear systems and can describe them w delling and analyse their behaviour by simulation.Courses (type, number of weekly contact hours, language — if other than German)V (2) + Ü (2)Method of assessment (type, scope, language — if other than German, examination offered — ster, information on whether module can be chosen to earn a bonus)written examination (approx. 90 minutes) and practical examination (modelling assignment, a Language of assessment: German and/or English Assessment offered: Once a year, winter semester Ü: creditable for bonus	
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Theoretical foundations and practical application of the theory of linear and non-linear dynam trical engineering and beyond. Intended learning outcomes The student has basic knowledge of dynamic and nonlinear systems and can describe them we delling and analyse their behaviour by simulation. Courses (type, number of weekly contact hours, language — if other than German) V(2) + Ü(2) Method of assessment (type, scope, language — if other than German, examination offered — ster, information on whether module can be chosen to earn a bonus) written examination (approx. 90 minutes) and practical examination (modelling assignment, a Language of assessment: German and/or English Assessment offered: Once a year, winter semester Ü: creditable for bonus	ic systems in elec-
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Method of assessment (type, scope, language — if other than German, examination offered — ster, information on whether module can be chosen to earn a bonus) written examination (approx. 90 minutes) and practical examination (modelling assignment, a Language of assessment: German and/or English Assessment offered: Once a year, winter semester Ü: creditable for bonus	
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Language of assessment: German and/or English Assessment offered: Once a year, winter semester Ü: creditable for bonus	if not every seme-
Allocation of places	approx. 40 hours)
-	
Additional information	
Workload	
150 h	
Teaching cycle	
Referred to in LPO I (examination regulations for teaching-degree programmes)	
Module appears in	
Master's degree (1 major) Functional Materials (2016)	